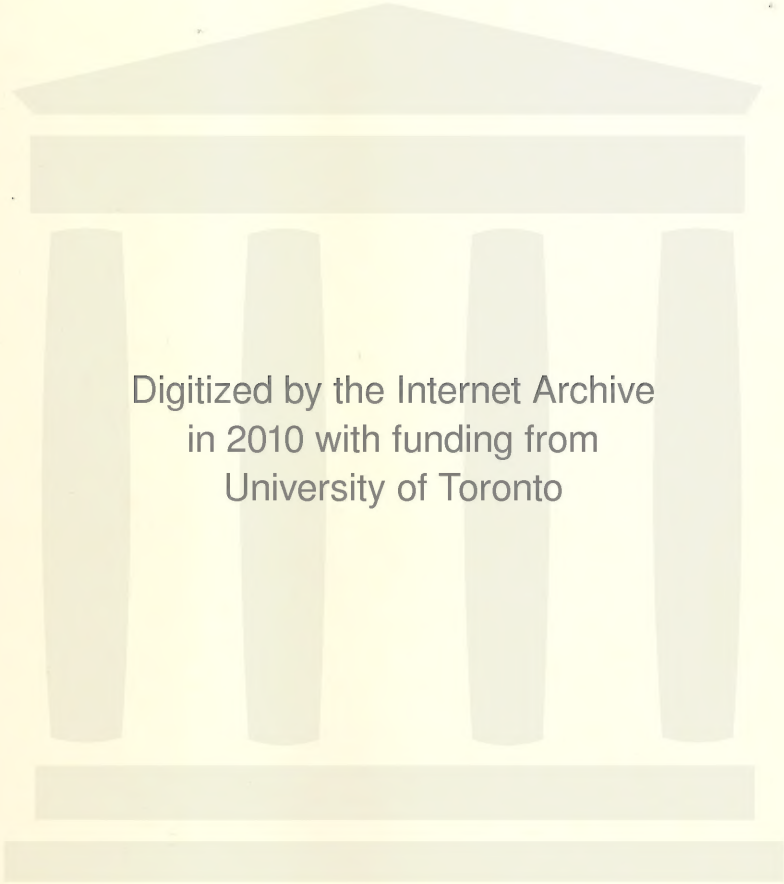
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AUTOMOTIVE INDUSTRIES

The AUTOMOBILE

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TO
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Here is an accurate guide to the authoritative articles and reference data which have appeared in AUTOMOTIVE INDUSTRIES during the last six months. The publication of this index is in line with our constant efforts to make this publication of maximum service to the entire automotive industry.

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What Do Your Dealers Think of Your Car?

Some manufacturers have been trying to find out. One group considers dealers' opinions of value in designing new models. Others disagree. Suggestions from dealers are encouraged by most sales managers. Dealers' views reflect local conditions.

By Norman G. Shidle

NEARLY every automobile dealer has a private opinion of the car he is selling. This private opinion is entirely separate from the one expressed in making sales. The two may be similar in character, but are none the less separate.

Will the manufacturer be able to design a car that will sell better if he incorporates in his design many of these private dealer ideas? Is it worth while to question large numbers of dealers, to find out what they think of the car as to body design, axle construction, clutch type, ignition make, etc?

The question is worth serious consideration, because the dealer is undoubtedly in a position to learn certain buyer reactions to the car and to note any special features that seem to create sales resistance. Some manufacturers have considered it worth while to send out rather lengthy questionnaires to dealers asking for their opinions about the design and performance of the car. AUTOMOTIVE INDUSTRIES recently asked a number of prominent sales managers what they thought about this practice.

A majority of them are opposed to the sending out of such a questionnaire, because they feel that the results would not justify the effort. Some members of the group feel more strongly than others that inquiries of this kind are useless, but most of them recognize the value of receiving dealer communications concerning unsatisfactory features.

One manufacturer sent a questionnaire to dealers asking about a dozen questions, the first of which was:

"If you were to design and build a high quality motor car for your territory, what would be the general specifications?

1. Motor.
2. Wheelbase.
3. Lubrication.
4. Bodies.
5. Speed range.
6. Gasoline consumption.
7. Price.
8. Other details.

"What features of our present model would you suggest improving?"

The value of a dealer's answers to queries of this sort depends largely upon the interpretation and analysis made by the factory of the answers given. If a large majority of widely scattered dealers are found to agree upon a particular type of lubrication, for example, it may properly be assumed that its use on the car will aid in making sales; that it is favorably thought of by a good many users.

Users' and dealers' opinions are not always in line, however, with the dictates of sound engineering practice nor with the possibilites of practical, economical production. It is the task of the management to correlate the consensus of dealer opinion with manufacturing necessities.

Frequently, moreover, dealer opinion is far from unanimous. One dealer may have a very strong prejudice against a certain design feature, while another may favor it strongly. These different opinions may or may not run along sectional lines.

In such cases, the value of the dealer opinon is not likely to be very great. Some sales managers believe that most of the results of questionnaires are likely to be of this class. One prominent sales executive, for instance, says that:

"As a general proposition such questionnaires or inquiries are valueless from our standpoint, as so many different opinions are reflected in connection with the subject that it is not practicable to take them all under consideration, particularly as many such are influenced by local conditions that do not exist elsewhere.

"Motor manufacturers have always endeavored to work about a compromised point in connection with general design so as to satisfy the general conditions existing in all parts of this country and throughout the world."

Another successful car builder says:

"We are not so sure about the value of such an investigation. Opinion oftentimes is influenced too strongly by what dealers and salesmen feel from competition. We have always adopted the policy of building a car to render a certain type of service."

One company which stands high in the production of middle-priced cars writes the following in regard to its own experience with dealer inquiries along this line:

"We have made verbal inquiries on certain points in the past. Frankly, the net results of the answers we have received were not of very much assistance. I think this is because the average distributor allows his opinion on such matters as this to be influenced too much by his own personal likes and dislikes and also by the local idiosyncrasies of his territory. Consequently the net result of his thinking has little constructive value in solving the manufacturer's problem which is nationwide."

These statements emphasize the strong influence which local conditions are likely to exert in molding the dealer's opinion about the car he is selling. It is true that the dealer does not, and cannot, view the problem of car design from the broad angle necessary for the manufacturer. For that reason his opinion should not be allowed to influence design to too great a degree. The dealer does know the details about local conditions, however, and the summarized opinion of many dealers concerning local user opinions should be of some value in discussing new models and design changes.

This fact is recognized by nearly all sales managers, although some consider it worth more attention than others. One high-priced car maker, for example, says:

"Such information should no doubt be of considerable help because it will reflect the tendency in body designs and mechanics of future production in the automobile industry."

One company thinks so much of its dealers' views that it has practically built its car to coincide with the desires of these men who are to distribute and sell it. The sales manager of this organization says:

"We have never sent out a questionnaire, but when we built up one important model, which we are manufacturing to-day, we called all of our dealers and distributors into the factory and had them go over the car in every respect. . . . We really built the car in accordance with our distributors' request in practically every detail."

This is a most striking example of the distributor influencing design. Many who do not think it wise or worth while to get the dealer's opinion about every item of design, however, are strongly convinced that the dealer can and does offer frequently helpful suggestions and criticisms.

"We often have distributors' meetings," says one car maker, for example, "at which time we invite their expressions as to the type of body they desire, together with any mechanical suggestions that they care to offer that will assist us in attaining as nearly as possible the goal of perfection."

Along this same line is the statement of the sales manager, who says:

"We keep a very careful record of all complaints made by distributors, dealers or owners in our service department. If there is anything fundamental in these complaints, the attention of the engineering department is immediately called to it. In that way we are enabled to check the service which our cars are giving."

Another sales manager states that:

"We are continually making investigations of this kind and find them very helpful to us in making our plans for future designs and refinements.

"A recent questionnaire sent to our organization revealed the fact that our sales organization is almost 100 per cent satisfied with our product in its present state and could make very few suggestions for changes.

"In addition to questionnaires, this subject is followed up by our mechanical inspectors and in talks with our leading distributors. We believe contact of this kind is very necessary."

Still another, who does not approve of the detailed questionnaire idea, says:

"We do welcome suggestions, however, made by our dealers for the improvement of any part of the car and all suggestions are referred to the engineering department for their information and investigation."

The purpose of the manufacturer in designing a motor car is to build a vehicle from which he can make the most profit. The type vehicle will depend upon manufacturing facilities, character of sales organization, past models, etc. But from the viewpoint of ultimate profits three factors must be considered in every new model:

Yes and No

THERE is an old story about a rustic who walked along the bank of a stream running through the estate of a rich landowner. He finally came to a sign, prominently displayed on a tree, which read:

"Don't fish here."

He looked at it for a moment and then remarked:

"Some says they do; some says they don't."

* * * *

This is about the answer given by automobile manufacturers in answer to the question: "Is the dealer's opinion as regards design worth very much?" This article tells what some of the leading sales managers think about this interesting question and discusses their answers from a merchandising and production viewpoint.

1. Engineering practice and possibilities.
2. Production practice and possibilities.
3. Sales reaction; that is, opinion of users who base their opinion chiefly upon factors of appearance, comfort, apparent performance, etc.

The first two of these are fundamental, of course, to permanent progress. The car must be built in accordance with engineering and production necessities or it will not stand the test of time, nor will the manufacturer be able to make a profit.

The third factor, while important, is less definite and subject to a greater degree of variation and change. The laws governing it are not anything like so accurate, scientific and fixed as in the case of the first two.

A company may build a car, for instance, with a radiator shape that seems peculiar and which causes an unfavorable reaction in the minds of most users and still sell that car in increasing quantities through sales effort.

The company may disregard some of the accepted principles of sales effect and still make progress.

It is utterly impossible, however, for a company to build a car whose engine has been designed without regard to correct engineering practice and still be successful. Successful cars must operate.

This relation between the three basic factors probably explains the feeling of manufacturers, that the opinion of the dealer is of limited value in considering design. The dealer's own opinion of the dealer is not useful as regards the engineering and production phases of the problem. But these phases are fundamental. Whatever attempt is made to meet buyer desires must be made within the limits of possibility set by these two phases.

If the dealer expresses a preference for clutch type "A," for instance, and the engineering department of the factory is certain that clutch type "B" is superior, permanent progress in sales will be advanced to a higher degree by using clutch type "B."

THERE are certain features, however, about which the dealer can express an intelligent and constructive opinion. He can indicate the body models most in demand in his territory and can thus aid the factory in adjusting production schedules accordingly. He can tell the effect which price is having on his sales. He can turn in important service "kicks" to the factory. He can suggest many things about the car that have had some effect, favorable or unfavorable, on his sales. And the factory can profit by those suggestions.

If the opinion of the dealer is asked about such things as mechanical equipment and performance, the replies received should be very carefully interpreted. A general dealer prejudice against a particular type axle may not indicate a need for changing the axle, but merely the necessity for "selling" the axle to the dealers on its merit. The engineer is a better judge of that merit than the dealer. But the factory wants the dealer sold on every part of the car.

By interpreting dealer replies carefully and by refraining from accepting them simply at face value, some practical advantage may be gained even from asking dealers questions concerning which their judgment is obviously superficial.

The effect of such questions upon the relation between the dealer and the manufacturer must also be considered. Dealers often feel that they should have more to say about the design and equipment of the cars which they are handling. One big New England dealer, for example, complained bitterly a year or two ago because his factory has suddenly put a "freak" radiator on a new model which, he claimed, reduced his sales 25 per cent. "That change would never have been made," he said, "if the dealers had been consulted beforehand."

THE difficulties of following dealers' suggestions have already been pointed out, but the advantages to be secured from encouraging dealers to make suggestions must not be overlooked. Among these are:

1. Valuable and constructive criticism may be secured.
2. The dealer is made to feel that he is an integral part of the factory organization and that the factory is really trying to meet his selling needs to the best of its ability.
3. The factory learns the "kicks" that are in the dealer's mind and is enabled to explain to him the reason for certain things. Thus, the dealer's confidence and enthusiasm are increased.

There are certain dangers attached, of course, as the dealer will probably look for some ulterior reason behind the questioning. One sales manager expresses this thought very well in the following:

"I am strongly opposed to sending out questionnaires to dealers concerning changes in cars. When such action is taken, the dealer immediately figures that within a comparatively short time some radical change is going to be made and, as a result, business is immediately restricted.

"Furthermore, there is so much difference of opinion among dealers as to designs that, should any change be made, those who were out of line would feel that their recommendations had no weight.

"We frequently receive suggestions or comments. These are carefully tabulated and submitted to the engineering department. We welcome any suggestions of this kind, but do not believe that a detailed questionnaire would be of benefit."

There is little question that manufacturers will profit by encouraging suggestions and added co-operation from their dealers all along the line. The good will between factory and dealer is increased through such relationships. But whenever questions, specific or general, are to be asked of dealers, it should be recognized that an opportunity for promoting co-operation is presented, and effort should be definitely made to achieve that end and avoid possible dangers which may arise.

What Cornell University Is Doing in Automotive Research

PROF. H. DIEDERICHS, head of the Department of Experimental Engineering, Sibley College, Cornell University, writes:

"In this laboratory we have just found it possible to obtain some money to start research work, but we are not very far along. Just at present we are interested in materials of construction and in fuels. Along the former line the laboratory is carrying out some fatigue tests under the direct auspices of the Bureau of Mines, and we are also investigating the heat treatment of a special alloy die steel. In connection with fuels we are studying the gasoline problem, making first a collaboration of all the available information, which will later be followed up with work particularly devoted to the development of apparatus to determine the completeness of vaporization of gasoline in the manifold. We are also making preparations to study the combustion phenomena in the Diesel engine."

General Purpose Tractor Needed for American Farm Market

The common type of tractor can be used for 77% of field operations in raising common grains; for 38% in row crops. Extensive market for general purpose machine. Cost of marketing decreased through wider distribution. Large farms constitute small proportion of total. Small farms real tractor market.

By G. B. Gunlogson*

THERE is submitted herewith a report of an analysis of the power requirements on the farms in this country, with the object of showing the agricultural and economic possibilities of the common type of tractor and calling attention to the great field and opportunity open to a machine of greater range of adaptability.

The tractor has now become so well established that it will always be a factor in agriculture, and the tractor business is assured of permanency. The question before the tractor manufacturer is no longer whether the tractor business will continue or not but rather **how extensive a business he should prepare for.**

Farm power requirements are so vast that if tractors were to furnish this power or even one-half or one-fourth of it, at a seasonable rate, millions of tractors would be required. However far we may be from complete motorization, these agricultural power requirements determine the possibilities of mechanical power in the farming industry. Thus plowing has become the principal work of tractors because that operation requires more power than any other one operation on the farm. The common type of tractor has therefore been designed especially as a plowing machine, although it is also suitable for some of the other field operations, such as disking, harrowing, seeding and harvesting. While this common type predominates, we have various other types of tractors each designed to meet some particular condition or requirement. It will be the first aim of this report to show the possibilities, or rather the future of these different types of tractors.

We are nearer to complete motorization of farming than is generally supposed. To adapt mechanical power to the varied requirements of farming is not a simple problem, however, or one to be accomplished in haste, but it is no more impossible than have been the transitions in some of the other industries. Practically all the efforts of the tractor manufacturer have been directed toward mechanical improvement and refinement rather than adapting the tractor to the conditions of power farming. In fact, surprisingly little has been done so far along this line. Some of the most successful farms in the country have been operated without a horse for two years more economically and more satisfactorily than they were before. One of the State experimental farms in Arkansas is being completely motorized and will be operated without a horse. Three other states are contemplating similar moves. The horse has disappeared entirely from the roads in many parts of the country and the truck has taken its place. It is also interesting to note that the production and sale of the garden type tractors are on a stable basis. These disjointed facts are mentioned because they are very significant in the present trend.

There are two problems so fundamental in the practical adaptation of the tractor to farming that no study of tractor possibilities can be made without their careful consideration.

First, the diversity of farm operations—which govern the range of utility of any type of tractor on a farm.
Second, the size of the individual farm unit.

To satisfy, in a fashion, the multitudinous conditions involved, various types of tractors have been offered, which may be classified as follows:

(1) Common Type	Which may be wheel or crawler; two or four-wheel drive.
(2) General Purpose	Machines that may be used, in addition to some of the common field operations for cultivating corn and other row crops by slight changes or the use of convertible elements.
(3) Garden Tractors	Tractors designed to take the place of one or two horses for cultivating and other work in gardens and small truck farms.
(4) Power Cultivators	Designed for cultivating corn and other row crops.

The only object in presenting this classification at this time is to effect their association with the analysis which follows that the possibilities of these various types will be considered in connection therewith.

Tractors have been so extensively used under such wide range of conditions that their possibilities with respect to farm results may now be determined with some accuracy. These results, after all, determine the future of the tractor.

Chart No. 1 shows the acreage of the principal field crops grown in this country and their relative areas expressed in percentages. This indicates in a measure the complexity of field operations. It will be noticed that row crops constitute 59 per cent of the acreage of field crops, not including hay.

In this study the hay crop may be grouped with row

*J. I. Case Threshing Machine Co.

crops since the use of the common type tractor is very limited in connection with either. Then both the row crops and the hay crop constitute about 66 per cent of the total crop acreage in the country.

Under favorable conditions, when not restricted by any economic limitations, the common type of tractor may be used for about 77 per cent of the field operations in raising the common grains and about 38 per cent in row crops.

The principal field crops of the country are corn, wheat, oats, cotton and hay. While these crops, except cotton, are not strictly sectional their relative importance varies according to quite well-defined areas.

Chart No. 2 shows the United States divided into representative crop areas.

The demarkations are based on crop surveys made by various state agricultural colleges and agricultural statistics.

Only a vague idea can be had of farm conditions, crops, field operations and farm requirements without extensive farm management surveys. Unless one possesses very intimate knowledge of farm conditions and practices in the various parts of the country the most misleading conceptions are sometimes gained from farm statistics, especially when applied to anything relating to the farm as a whole or as a unit. Therefore, these charts only furnish a general picture.

Charts Nos. 3, 4 and 5 show typical farms with respect to crop layout in three of the crop sections indicated in the previous charts.

Each chart shows the average farm in each of the crop areas. These charts show better than anything else the very important influence that the diversity of crop and the size of the farm unit, as stated before, have on farm power requirements, and therefore the sale of tractors.

THIS is a report submitted to a big tractor company by a special representative who had been sent out to analyze the farm tractor market. This representative was to bring back data upon which future design and sales policies might be built. The report is specific and intimate in character. It is of special interest for two reasons:

1. **It gives an accurate account of what one well qualified tractor man thinks about the tractor market and the necessities of future tractor design.**
2. **It is an excellent example of tractor marketing research; the type of specific merchandising studies that are needed in every part of the automotive industry.**

Every tractor executive may not agree with the conclusions reached by Mr. Gunlogson, but every one will find it interesting and practical.

There is a definite relation between the size of the farm and the economic limitations of the tractor. For that reason I have divided the farms of the United States into three classes by sizes (Chart No. 6).

In the foregoing some of the important factors which determine the adaptability and the economy of the farm tractor have been indicated. The tractor has been in use so long and so extensively that its status has now been established, its economic and agricultural possibilities and its relation to general farm conditions more or less clearly indicated. There is no doubt that this has been pretty well accomplished and that the present type of tractor has now found its place. This field, which the common type of tractor can claim is extremely limited, however, when compared with the actual or total power requirements on farms. It is desirable to point out at this time how the sale of tractors has been governed by the conditions set forth and how the future of the tractor is absolutely dependent upon these conditions.

To find out what size of farms our tractors are being used on, over 5000 cards were sent to owners of Case 9-18, 10-18, 10-20 and 15-27 tractors.

Over 2800 cards have been returned from all parts of the country and these have been tabulated.

Less than 20 per cent of these tractors have been sold on farms of less than 175 acres in size. There are approximately 6,300,000 farms of all sizes in the United States of which only 18 per cent are 175 acres or over in size. It is particularly noteworthy that over 80 per cent of our small tractors are going to farms in this small class and less than 20 per cent to the other 82 per cent.

If we were to include the larger sizes of tractors this percentage would again be reduced somewhat, since still fewer of the larger tractors will be found on farms of less than 175 acres.

While the tractor market in this class is quite extensive, there being over 1,000,000 farms included in the classification, it is only 17.9 per cent of the total number of farms in the country.

Referring to Chart 6: Class A includes farms of less than 50 acres. This cannot be considered a market for the common type of tractor, but it should afford an extensive market for a tractor adapted to it.

Class B, with nearly 3,000,000 farms, affords by far the largest possibilities, but less than 20 per cent of our tractors are being sold to farms in this class, because they are not adapted *economically* and *agriculturally* to the average farm in this class.

Hence, it is seen that the business is restricted to comparatively large farms. However extensive this market may be, it is only a small part of the total market, as has been indicated. It is also evident that a power farming dealer handling our product only is not in a position to serve the entire community, and this suggests a problem that in itself is a very important one, although outside of the scope of this report.

The tractor surveys that have been made by the Department of Agriculture and some of the State colleges cor-

CHART 1

Principal Field Crops in the United States

	Not Cultivated		Cultivated	
Corn			110,000,000	39.4
Wheat	55,000,000			19.6
Oats	42,000,000			15.0
Cotton	8,500,000		35,000,000	15.5
Barley	8,500,000			3.0
Peas			5,500,000	2.0
Rye	5,000,000			1.8
Sorghum grains			5,000,000	1.8
Potatoes			4,200,000	1.5
Flax	1,900,000			0.7
Peanuts			2,000,000	0.7
Beans			1,000,000	
Tobacco			1,500,000	
Sugar beets			1,000,000	
Rice	1,100,000			
Buckwheat	1,000,000			
	114,500,000	41%	165,200,000	59%
All field crops	279,700,000			
Hay	55,500,000			
Total	335,200,000			

(5 year average)

THE UNITED STATES DIVIDED INTO TYPICAL CROP SECTIONS

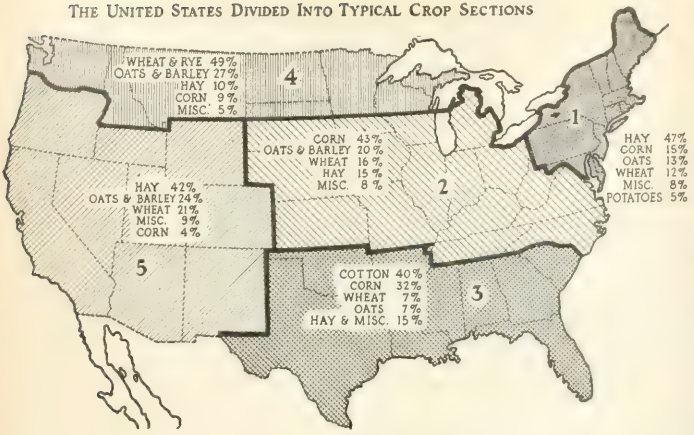


Chart 2

roborate these results, and your attention is called to:

The Kentucky Agricultural Experiment Station. Bulletin No. 222.

The Farm Tractor in the Dakotas. U. S. D. A. Bulletin No. 1035.

Economic Study of the Farm Tractor in the Corn Belt. U. S. D. A. Bulletin No. 719.

Tractor Experiences in Illinois. U. S. D. A. Bulletin No. 965.

The investigations that have been made by some of the State colleges and the results obtained make it worth while to consider further some of the facts revealed with respect to the tractor business.

The outstanding feature in every case is the distribution of tractors with respect to size of farms and the comparatively small number of tractors found on the medium size farms.

There is also quite a definite relation between the price of the tractor and its occurrence on small farms. Thus the percentage of Fordson tractors on small farms is considerably higher than in the case just cited.

It is illuminating to define further the agricultural and economical limitations of the common type of tractor by showing the actual power operations required and generally employed in growing and preparing for market our principal grains.

It is evident that tractors will not continue to be sold on farms where they cannot be economically employed. The amount of work or rather the relative amount of work that can be economically and satisfactorily performed with the tractor determines whether or not the tractor investment is justified.

In **Chart 7** is shown the amount of horse labor in hours generally employed in raising some of the important crops.

These operations are further detailed in **Chart 8** in order that a line may be drawn between such operations as may be satisfactorily performed with the common type of tractor and those that cannot be so performed.

In the central States (crop section 2, Chart No. 4) and this section embraces about two-thirds of the crop area of the country, corn forms over 40 per cent of the crop acreage.

Therefore, on a 160-acre farm in this section **over fifty** acres are in corn, besides some little other row crops.

To cultivate 50 acres of corn as it must be and is cultivated requires 500 horse-hours of labor during the season. This one operation is almost equivalent in amount of power used to all the plowing on this same farm.

Furthermore, cultivating corn is a seasonal job that must be performed within a definite period every year. To do this one operation properly on this 160-acre farm requires at least **four horses.** In fact, the average acreage of corn cultivated per horse in this section is only around 10 acres.

CHART 7

Labor Requirements

Per Acre of Crops

Horse Hours

Wheat	30 hrs.
Oats	29 hrs.
Barley	30 hrs.
Corn, husked	54 hrs.
Corn, silage	58 hrs.
Wild hay	15 hrs.

(Average from Minnesota Bulletin 157.)

Similar records obtained from other parts of the country, for the same grains, are almost identical.

But the 160-acre farm in question is essentially a 5- to 6-horse farm. In eastern Nebraska the average number of horses on 160-acre farms is 5. In a few other sections, such as in parts of Illinois and Ohio, the aver-

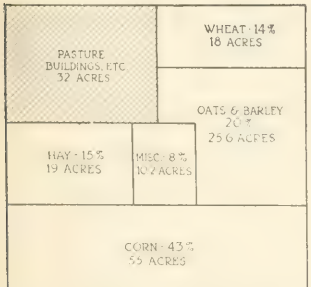


Chart 3—Typical farm crop layout in crop section 2

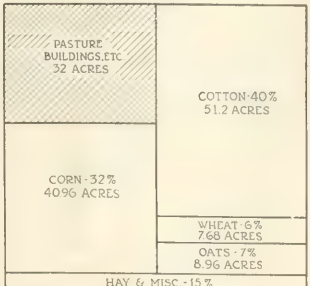


Chart 4—Crop layout in section 3

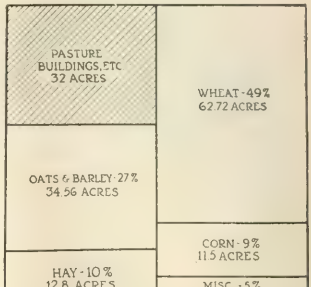


Chart 5—Typical crop layout in crop section 4

age number of work horses on a 160-acre farm is 6.

Since 4 to 6 horses are required to care properly for the corn crop on operations which can not be done with the common type of tractor and since the whole farm can be operated with five or six horses, the investment in a tractor is not justifiable on the basis of economy. For this reason very few tractors of the common type have found their way to farms of this size and their use on such farms will always be restricted.

CHART 8

Power Required for Principal Field Operations in Horse-Hour Units

Operation	Horse Hours per Acre One Operation	Average Number of Operations Required	Power Required for Finished Operation Per Acre
Plowing	10.00	1	10 Horse Hours
Harrowing (spike tooth)	1.25	2	2.50 " "
Disking (single disk)	2.50	2 (corn 4)	5.00 " "
Packing (roller)	1.5	1	1.50 " "
Seeding (drill)	2.25	1	2.00 " "
Planting corn	1.2	1	1.2 " "
Cultivating corn	2.5	3.7	9.25 " "
Harvesting (binder)	2.75	1	2.75 " "
Harvesting corn (binder)	4.00	1	4.00 " "
Mowing hay	2.2	1	2.00 " "
Raking hay	.8	1	.8 " "

Hauling the crop in the field, hauling manure and such operations as vary a great deal are not included.

Belt work constitutes about 14% of the power used in raising and preparing for market all the grains raised upon the average farm.

Nothing has been said about the initial investment in the tractor. It is too often assumed that the farmer has sufficient capital to provide himself with efficient equipment. This is far from being so and because the average farmer is often unable to borrow sufficient money the farm is not as well equipped with necessary tools as it should be. It may be of interest to note that the average 160-acre farmer in the State of Nebraska has less than $1400 invested in all his machinery and work horses. It is not surprising then that he considers seriously the probable effects and results of every investment he makes in equipment. The farmer is not so much interested in efficiency in certain field operations as he is in the economical operation of the farm as a whole. For instance, on the 160-acre farm described before, there are about 40 acres seeded annually to small grain. This operation is accomplished with a 16 or 20 shoe drill and requires 2 to 3 days. Even if power was available without cost on this farm, it would not pay the farmer to buy an additional grain drill to expedite his seeding. He may have 50 acres to double harrow at a certain period. With a four-horse drag this operation is performed in about 2½ days and again it would not pay to buy additional harrows in order to utilize more power and hasten the operation. The same is true of the other operations on the medium and small farm. Thus it is seen that a sensible balance must be maintained between efficiency and economy in farm operations.

It is true that it is often practical to combine certain implements when a large power unit is used, but this is only for certain operations and at certain seasons. On the average 160-acre diversified farm there is little field work that can be performed in this manner. For instance, there may be no need of surface tillage at the time of seeding. Likewise in fall disking there may be no need of dragging the field, etc.

The operations on the average farm are so many and so diversified that the farmer cannot afford to use the most efficient equipment for each operation. His equipment as well as his power unit must be properly balanced. An interesting study along this line is afforded by some data collected by the Department of Agriculture about two years ago showing the number of horses used in a unit for plowing in the various parts of the

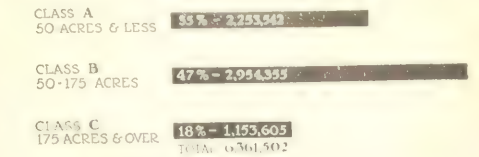


Chart 6—Tractor market classified by farm sizes

country. Chart 9 is reproduced from the 1919 agricultural year book. It is interesting to note that about three-fifths of all the land plowed in the country is still done with three horses or less to a plow and only a very small percentage is done with five horses.

Conclusion

The above will serve to indicate the very wide gap in our line of power farming equipment when considered in the light of actual and general farm requirements.

As manufacturers of power farming equipment we should not overlook the opportunity in the manufacture and sale of a small **general purpose** tractor. While the business has increased rapidly and been controlled by the rate of production rather than the market, **it is also evident that the cost of selling is determined largely by the extent of the market for a product, that is, a product possessing a general appeal or serving a universal need can be marketed at a less cost than one of restricted application or appeal, although there may be the same need for both in their respective fields.** Any one who has had experience selling our product appreciates that fact.

There are, of course, several makes of machines on the market designed to serve as general purpose machines, such as the Moline Universal Tractor. Many of these, however, have some serious shortcomings or drawbacks either mechanically or from an agricultural standpoint.

Then there are many motor cultivators on the market which are usually not practical for other purposes than cultivating corn or row crops. These have not been sold extensively and never can be. To afford a strictly motor cultivator a farmer must have, at least, 150 acres of corn, which would mean a farm of over 400 acres and there are very few of these even in the corn belt. Charts 7 and 8 will at once indicate the impossibility of such a machine on the average farm.

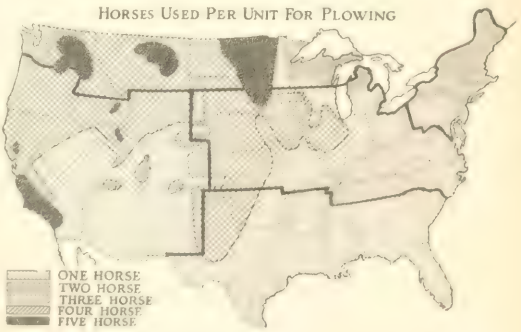


Chart 9

Marked Increase in Use of Chains for Front End Drives

Stock engines thus equipped, hence this drive appears on assembled as well as manufactured cars. Decision to use this system on new Star car shows wide range of adaptability. New and original drive layouts and improvements permit easy adjustment.

By J. Edward Schipper

AUTOMOBILE engine designers have been very much interested in the marked increase in the use of chains for front end drives. In the Engineering Number of AUTOMOTIVE INDUSTRIES a year ago, in an article on "Problems of the Front End Drive in Automobiles," it was pointed out that there was considerable drift toward the use of chain drive. At that time, out of 125 models considered, 81 per cent had helical gear front end drives, 16 per cent chain, 2 per cent spur and 1 per cent other drives. To-day the percentage of chain drives has crept up to 24; that is, nearly a quarter of all models are using this drive.

New recruits to the chain drive advocates include such prominent concerns as Hudson, Haynes, Jordan and Rickenbacker. It has been decided to use this type of drive for the new Star car, which will be put out by Durant and whose engine will be built by Continental Motors.

It was pointed out in the Engineering Number of AUTOMOTIVE INDUSTRIES of June 16, 1921, that 33-1/3 per cent of the manufacturers who make their own engines use chain drive. This year this percentage has increased to about 37. It was also stated at that time that no assembled cars were using the chain front end drive, because no stock engines had such a drive. However, several cars equipped with Continental engines are now using chain front end drive. The new Duesenberg stock engine has a chain front end drive, as has also the Weidely. In addition to these, a number of the stock engines are now being made with the timing gear so arranged that it may be adapted either to chain or helical gear drive.

With the decided drift toward the use of chain drive, there is considerable interest as to what improvements have been made in order to popularize this drive. Probably the most potent factor in this connection is improvement in the manufacturing methods used in making the chain, which has resulted in turning out a superior product at a considerably decreased cost. The fact that this type of drive has been selected for the engine of the Star car which latter is listed around the $350 mark, and is also employed in cars of the Lincoln class, indicates a wide range of adaptability. In the manufacture of accurate chains in large quantities use is made of some of the most highly specialized machinery in the manufacturing world. At the plant of the Link-Belt Co., Indianapolis, a machine has recently been perfected which practically feeds the link pieces in at one end and issues finished chain at the other.

DURING the past year the use of chain drive has increased from 16 to 24 per cent; that is, nearly one-quarter of all models produced employ this type of drive.

* * *

Chain drive has been popular on high priced cars for many years. Its use on lower priced cars is increasing, and this fact is of importance in considering the trend in the use of this drive.

* * *

Improvement in manufacturing methods has undoubtedly popularized chain drive, as it has resulted in production of a superior product at a considerably decreased cost.

Some of the new installations are very interesting, because they show the precautions which have been taken to eliminate trouble due to the chain jumping the teeth and causing mis-timing, and also because of the ease with which slack in the chain due to wear or stretch can be taken up.

The Morse chain installations on the Rickenbacker, Oakland, Jordan and the Continental 6Y engine show interesting variations of the triangular layout which is favored by Morse. It will be noted that in all of these drives the chain has at least a 90-deg. contact on every sprocket. The Weidely Motor Co. has adopted the Link-Belt chain with ½-in. pitch. This chain drive layout employs the automatic take-up which was described in AUTOMOTIVE INDUSTRIES for Oct. 20, 1921, page 774. The use of this automatic tension governor involves the employment of the double sided chain in which some of the links are reversed, to provide a bearing surface on both sides. As will be noted from the drawing herewith, the use of the automatic idler affords increased bearing contact on the adjacent sprocket.

A very interesting and novel type of layout is the two-step chain front end drive which has been worked out by the Link-Belt Co. for the Holmes Automobile Co. This comprises two eccentric idlers for taking up wear or stretch, both bearing against the reverse side of the chain. The

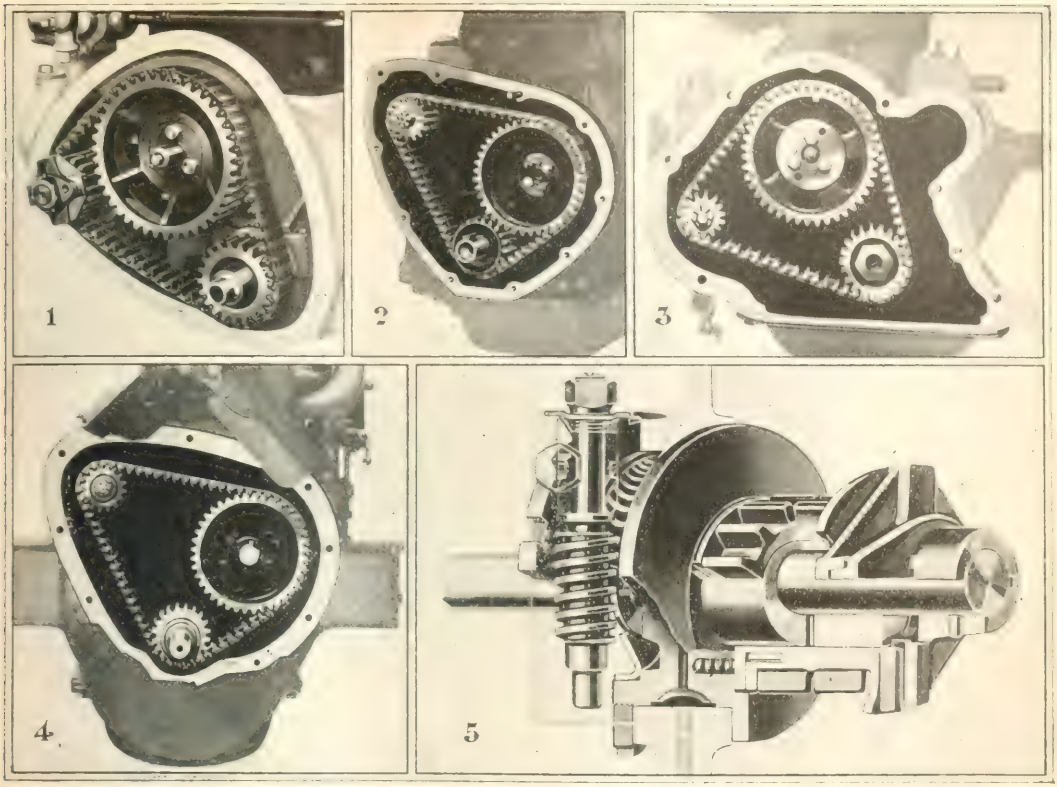


Fig. 1—New front end chain drive on Hudson. This is a triangular Morse installation with eccentric adjustment. Fig. 2—Front end chain drive installation on the Continental 6Y engine. Fig. 3—Chain front end drive on the Jordan car. Fig. 4—A triangular front end chain layout has been adopted for the new Rickenbacker car. Note that all the sprockets have more than 90 deg. chain contact. Fig. 5—Morse single type of chain adjustment

lower of the two chains has 106 pitches of ⅜ in. The upper chain has 98 pitches of ⅜ in. The lower sprocket has 27 teeth, the first idler 21 teeth and the other sprockets have 19 teeth. The double sprocket for the step-up has 27 teeth. The second idler is a duplicate of the first and the upper sprocket has 54 teeth.

In the Morse installation on the Hudson car the chain by which the camshaft and water pump shaft are driven is provided with an adjustment to take up any looseness which may develop. This is an eccentric adjustment with a notch so arranged that by the removal of three bolts a plug in the front cover can be removed, which enables the operator to determine the amount of slack in the chain. A maximum of ¾ in. slack (up or down movement) is permitted. The chain can then be adjusted by means of the slotted adjustment piece, one notch at a time, until the desired results are obtained. The adjusting device consists of a main support, sprocket, floating coupling and end flange, with the addition of the notched adjusting mechanism. The main support has an eccentric extension which provides a bearing for the sprocket and through which the shaft passes concentrically with the mounting. The eccentric relation of the sprocket to the shaft is compensated for by means of the grooved floating couplings engaging both the sprocket and the end flange and passing to and fro with each revolution of the sprocket. In the Hudson installation this is a ground and lapped piece and friction and wear at this point are minimized. The adjustment or chain take-up is made by rotating the support, changing the position of the sprocket relative to its driving members. This operation is accomplished by the notched adjusting piece shown in the illustration herewith.

Designs which have come out recently indicate that all manufacturers are realizing the necessity of giving an adequate angle of contact on all sprockets. Most chain manufacturers are recommending three nominal widths for passenger car engines, namely, 1 in., 1¼ in. and 1½ in. Some chain makers state that either an even or odd number of teeth may be used in the sprocket, but an odd number of links should be used in the chain, such as 51, 53 and 55, etc. The normal operating speed of the engine has much to do with the size of the sprocket which is permissible on the crankshaft. With a chain of ½-in. pitch, a 24-tooth crankshaft sprocket will give 1 ft. per engine revolution per minute. For the sake of silence in operation it is undesirable to use fewer than 18 teeth in the crankshaft sprocket, which, of course, would mean 36 teeth in the camshaft sprocket. Representative chain companies recommend that all sprockets of less than 31 teeth be made of low carbon steel; that is, 10 per cent to 20 per cent carbon O. H. carbonized and hardened 1/32 in. deep.

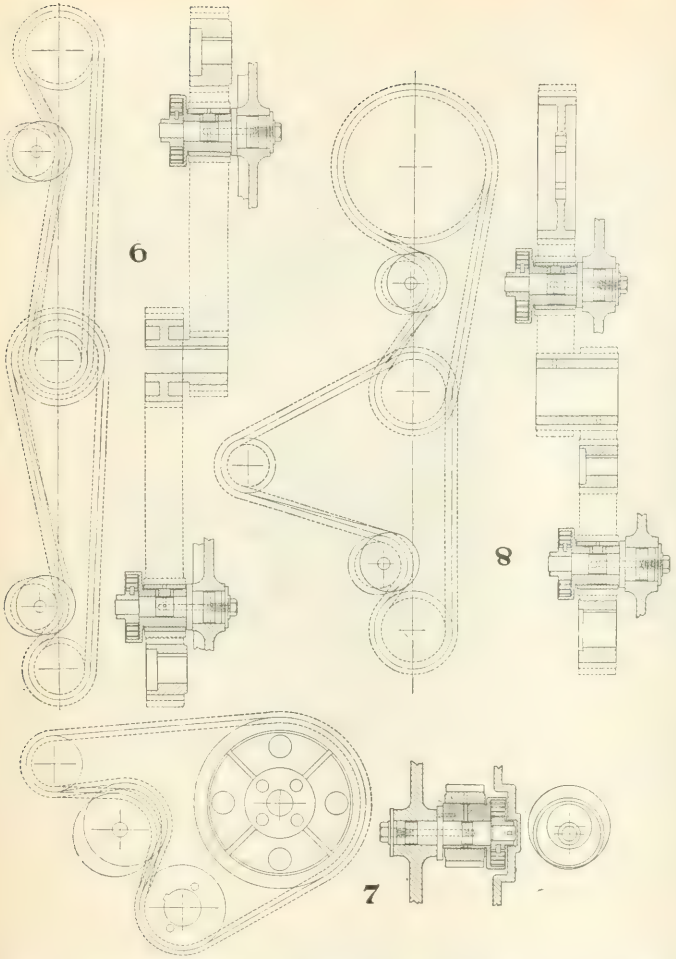


Fig. 6—On the Frontenac car the overhead camshaft is driven by a two-step Link-Belt chain layout employing two automatic idlers to maintain proper tension on each chain. Fig. 7—The new chain front end drive on the Haynes automobile engine employs an automatic idler take-up with a double sided chain. Fig. 8—The Link Belt chain installation on the Holmes car is a two-step employing two automatic tension idlers

Sprockets of more than 30 teeth are generally made of high carbon steel, heat treated, or semi-steel casting or of a very good grade of cast iron.

Probably, when all is considered, the matter which passenger car engineers are looking into more closely than anything else, with the possible exception of silence, is the ease of adjustability. No matter how well the chain is designed or how good a layout is employed, the full benefits of chain silence cannot be obtained if some means of taking up the normal stretch is not provided. The chain adjustment must be accessible and must be of sufficient range to allow of an adjustment of one full link plus 10 per cent. On a ½-in. pitch chain, this would be equal to 0.55 in.

Considerable interest has developed in the use of the automatic spring chain tension idler which is designed to maintain the proper tension in the chain at all times without any attention on the part of the operator. A good example of this is the installation used on the Haynes. This chain is a ⅜-in. by 60 deg. unit, driving the camshaft and generator shaft. The crankshaft sprocket has 30 teeth, the camshaft sprocket 60 teeth, the generator shaft 20 teeth and the automatic take-up idler 29 teeth. The chain has 108 pitches, or, in other words, is 3 ft. 4½ in. in length. The advantage claimed for the automatic adjustment is, of course, that the chain is continually running at the proper tension and, consequently, the silent drive operates without noise.

It must be realized that the high stresses in chain drive are momentary due to sudden acceleration and deceleration of the engine. For this reason, the stresses in the chain run far higher than what would be calculated as required for merely driving the units involved. The stresses are of a shock nature, and, consequently, large factors of safety must be employed. The art, however, has developed rapidly during the past few years and the reliability of this type of drive has been fully established. Furthermore, other parts of the engine have been quieted to such an extent that the minor timing gear noises, which at one time were lost in the noises of greater volume, have now become prominent enough to cause the close scrutiny which is being given the front end drive. It may be safely predicted that next year will see even a greater increase in the percentage of chain front end drives than did 1922.

Standard Building New Speed Truck

A NEW light delivery speed truck of 1¼ tons capacity has just been announced by the Standard Motor Truck Co. The same component parts used in other trucks of the Standard Co. are employed, these including a 3¾ x 5 in. Continental Model N engine, Brown-Lipe multiple disk clutch and gear-set, Timken axles—model 1250 front and 6250 worm-type rear—Spicer universals, Eisemann magneto, Stromberg carbureter and Ross steering gear. The truck will have 134 in. wheelbase and be equipped with 33 x 5 in. cord tires, front and rear, alloy steel springs, all steel seat and riser and vacuum tank. It will sell for $1,330, f.o.b. Detroit.

European Efforts to Reduce Car Weights Bring Radical Body Construction

Extreme reduction of weight and noise features Weymann system of body building. Lends itself to production at low cost. Lancia builds a four-passenger, 122 in. wheelbase car weighing 1650 lbs. complete. Chassis frame members used as body frame members.

By W. F. Bradley

A FOUR-PASSENGER four-door sedan on a 130 in. wheelbase chassis can be produced with a total weight of not more than 440 lb. by the Weymann system of body building. This weight, which is about half that of a phaeton body on a chassis of similar length, comprises fenders, valances, running boards, spare wheel carrier, tool boxes and the usual body accessories. Other advantages obtained by this method of construction are entire absence of noise, which is a matter of considerable importance in a closed body, and low cost of production.

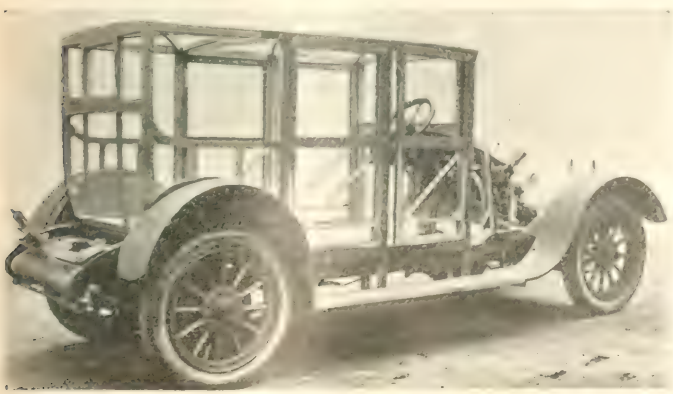
The method of body construction according to this French patent is a complete break-away from generally accepted practice. Weymann's starting point is that an automobile chassis is not and cannot be made absolutely rigid, and therefore to attempt to mount a rigid body on a flexible foundation is an illogical procedure. No matter how strongly constructed, the body must weave with the chassis and this weaving sets up noise and wear. Another fundamental fault in standard body construction is that the passengers are mounted on the body and not on the chassis, thus the body has to withstand the forces of inertia due to the weight of the passengers.

Under the Weymann system the seats are mounted directly on the frame members, independently of the rest of the body. As seats are not high, they are, practically speaking, uninfluenced by any twisting or weaving of the frame over bad roads. Another advantage obtained by placing the seats directly on the frame members is that the total height of the body is reduced, and this, of course, involves a reduction of weight.

The body is built around these seats, but in no way attached to them. All the frame members of the body are straight and of square section $1\frac{1}{2}$ by $1\frac{1}{2}$ in. There are no dovetailed and glued joints, the assembly of the body members being by means of light metal angle-irons or tie-rods of the type used in airplane fuselage construction, sufficient play being left between the wood members to avoid contact. The body panels are covered with artificial leather, which is painted externally exactly like wood, or given a cane work finish. Except by touch it is impossible to distinguish these panels from those made of metal or wood.

FOR a sedan body four doors are fitted, but instead of making them a close fit in their frames and eliminating rattle by the use of metal or rubber wedges, from $\frac{1}{4}$ to $\frac{1}{2}$ in. play is left all round. The weight of each door, with the glass window, is only 6 lbs.; it can thus be hung on a pair of hinges. It is perpetually in movement when the car is under way, but as it never comes in contact with the door frame there is no noise. The gap between the door and the door frame is closed by extending the artificial leather beyond the frame on the outside and by the use of leather or cloth lining on the inside. Connection between the body and the dash board is made by artificial leather in the same way as for the panels.

Fenders and running boards are built in the usual manner, the only distinctive features being that the fenders are concentric to the wheels, and the running boards, instead of being attached to the frame members, are secured to the body. One of the greatest troubles of a sedan body is resonance. With the Weymann non-rigid frame construction and artificial leather panelling there is no tendency whatsoever for the body to resound. Cost is brought down very low by reason of the fact that the four vertical frames which form the body are built up of uniform size members and are united by very light metal angle-pieces or tie-rods, leaving nearly a quarter of an inch play

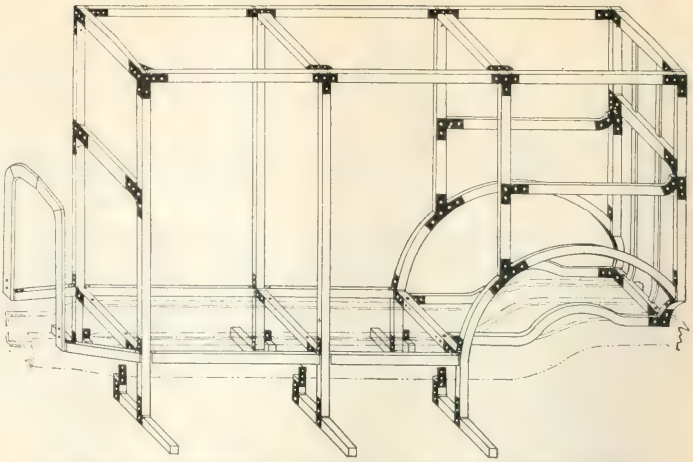


Weymann system of body construction—sedan body with four doors

between the wood members. This is a straightforward production job requiring little skill.

AMONG the limitations of this system of body construction is the necessity for maintaining straight lines. Only the simplest of curved forms are possible. Rounded off angles and bulbous tails have to be eliminated. The inventors believe that this is a matter of taste and fashion, and that a straight line body can be made just as acceptable to the public as a curved line construction. One of the reasons, it is claimed, why curves are so common in automobile body construction is that it is difficult to make a big, flat panel in sheet metal capable of retaining its shape.

So far only hand-built experimental bodies have been built under the Weymann patents. The saving in weight is so important compared with a body built on ordinary lines, and the absence of noise is so pronounced that details are being perfected with a view to putting it into production on a big scale. Several of the leading French firms are interesting themselves in this type of construction, particularly for sedans.



Body frame members assembled by means of angle-irons and not in contact with each other

Important work has been done by Lancia in Italy toward the reduction of weight. This Italian manufacturer has produced a 122 in. wheelbase normal track four-passenger phaeton with a four-cylinder 122 cu. in. engine weighing all complete for the road, tanks filled and spares aboard, only 1650 lbs. The car has a road speed of better than 70 m.p.h. and holds to the road perfectly at this high speed.

Lancia has obtained this result by building a car without frame members, or, to express the matter in another way, by using his chassis frame members as body frame members. There is no front axle of the usual type. Tubular steel construction is used in front and the engine is carried in a subframe. The body is built up of light steel stampings riveted together and covered with sheet metal panels. It forms a part with the chassis and is not separable from it. All the upholstery is placed inside this metal shell. This original car has been under experiment in the Lancia shops for the last two years and is about to go into production.

Synthetic Cast Iron

PIG iron with a low phosphorus content produced in the electric furnace from steel turnings is usually referred to as synthetic pig iron. The process was introduced during the war, and although its use has declined greatly since then it is believed by metallurgists that it has considerable possibilities, particularly if better methods of carburizing are discovered.

At a recent meeting of the American Electrochemical Society at Baltimore a number of papers on this subject were presented. One of these bore the title "A Study of Carburization in the Manufacture of Synthetic Cast Iron" and was by Clyde E. Williams, metallurgist, Northwest Experiment Station, Bureau of Mines, Seattle, Wash. This paper dealt particularly with the advantages resulting from the use of different varieties of carbon and with the effect of slag and of impurities. Some of the conclusions drawn are as follows:

> The carburizing ability of different forms of carbon decreases as the ash content increases and the denser varieties of carbon are more effective than the more porous ones. Artificial graphite, resistor carbon, petroleum coke, and coal-tar coke give better results than the higher ash cokes or charcoal.
>
> The presence of slag decreases the rate of carburization by tending to prevent contact between the metal and the carburizer. This action is more pronounced as the acidity of the slag increases.
>
> Silicon carbide is an excellent medium for adding both silicon and carbon to iron. It cannot be used for introducing all the carbon because too much silicon would be carried into the metal and also the cost would be too high.
>
> Silicon has no effect upon the rate or the degree of carburization, although it may slightly decrease the content of total carbon in the resultant pig.
>
> Manganese seems to increase both the rate and the degree of carburization, although this increase is small.
>
> An increase in temperature from 1350 to 1450 deg. C. has no noticeable effect upon carburization.

That this new development interests the automotive industry was indicated by the fact that H. M. Williams, General Motors Research Corp., in a paper presented at the same meeting described how cast iron was being melted in a 250-lb. furnace originally obtained for experimental purposes. Castings are made from borings, pig back scrap, and from all back scrap, and are refined and then given physical tests. Mr. Williams stated that he had made synthetic iron from boiler punchings, ferrosilicon, malleable iron from borings and steel and alloy iron of various kinds in this furnace which was adaptable to all types of melting where refining by slagging is not required.

Lumber Situation Demands Utilization of New Woods for Bodies

Increase in number of closed bodies forces use of less expensive woods. Quality not diminished. Scientific study of substitute woods necessary. Cables to supplement strength of wood possible.

By George J. Mercer

THE lumber situation as it affects the building of automobile bodies, especially closed bodies, has reached a point where it needs more careful consideration and scientific investigation. The established business of body building is using increasingly larger quantities of lumber in normal times because more bodies of the enclosed type are being built.

Ash was used exclusively in the beginning. In fact the term "body ash" was the name used in the trade for virgin growth ash. The second growth generally is harder to work by hand, hence it was used for those parts which could be worked entirely by machine. Ash has the properties of moderate weight, requisite strength, being easy to work and it does not warp or twist. It is particularly suitable for door pillars; even at the present time many builders use various woods for other parts of the framing, but make the doors of ash because it is so important that they retain their shape in order to fit properly and prevent rattle.

The increasing demand for ash naturally forced up the price and resulted in the substitution of other less expensive woods. Woods ranking next in favor with body builders are hard maple and white elm, the latter often known as gray elm. Maple being a heavier wood than ash increases the weight of a body, while elm is lighter. The use of these two substitute woods together makes an average weight equal to an all ash body.

The lumber situation has necessitated going beyond the point of substituting the two above mentioned woods. There are 600 different varieties or species of trees in the United States; 500 hardwoods and the rest soft.

The United States Department of Agriculture, Forest Service and Forest Products Laboratory have dealt with the situation through their numerous bulletins and from these much of the data in the accompanying tables has been obtained. Body builders have gone a long way, through force of circumstances, in determining the suitability of various woods and lumber dealers have cooperated by offering many helpful suggestions.

The efforts of any one group has its limitations. It is only reasonable to think that a collective effort on the part of all those interested, including the Society of Automotive Engineers, might succeed in showing that there are a larger number of hardwoods in the country suitable for bodies than we now think. In addition, there is the opportunity offered every season when car manufacturers build models which are not sold, to make use of possible lumber substitutes without additional expense.

MUCH help could be given to the lumber situation if a competent body should authorize and approve a number of substitutes for ash, specifying where each may be used, so that the car manufacturer and body builder could agree quickly on specifications.

* * *

The possibility of using tie-wires or cables to supplement the strength required of the wood frame has not as yet been considered from the practical standpoint. There are wonderful possibilities in this type of construction and it is fair to assume that in time the cable tie will be used to obtain necessary rigidity and save weight.

A competent body should authorize and approve a number of substitutes for ash, specifying where each may be used, so that the car manufacturer and body-builder can agree quickly on specifications. There are approximately 300 feet of lumber used in working up the framing of one enclosed body, and it makes considerable difference whether the lumber used is ash at $90 to $100 per thousand feet or part of it gum at about $40 to $50.

When cutting, mill operations are started on the large parts first so as to use the cuttings for the small irregular patterns. Many of the frame parts are simply tie or connecting pieces and on these it is necessary to cut to the bone because manufacturers want cheaper bodies. But the latter must give service, hence saving in the lumber substitutes must be planned carefully and competently.

The accompanying illustration shows the framing of a five-passenger sedan body, drawn in the same manner as the shop working draft in production. Each piece is given a name and number as well as a symbol letter connecting it with its particular group or subsidiary unit. The drawing will serve as a medium by which the needed strength value can be considered.

The strength of a piece is not the only consideration in body building. Tables are available showing the beam strength or stiffness of various woods, but in body work many of the parts must have shock resisting qualities and be able to hold screws and nails and not warp or twist to any considerable extent.

Lumber dealers grade hardwood in four classes or standard grades as follows: Firsts and seconds, which are considered as one grade, No. 1 common, No. 2 common and No. 3 common. In thickness of more than 1 in., the increase is measured by ¼ in. It is customary to speak of the thickness of a plank as so many quarters, for instance, a 1-in. plank is termed four quarter, etc. The price is based on four quarter thickness.

The available woods that are at present used as substitutes for ash for body-framing are listed here, together with the names of the pieces and some of the characteristics compared with the wood for which they are substituted.

Use of hard maple on enclosed bodies is confined generally to the sills and sill cross bars but is often used on open bodies for the entire framing including the doors. It is a strong, close grained wood, as good as ash for the places mentioned, except that it increases the weight of the body and does not possess the shock resisting qualities of ash.

Yellow maple and beech are substitutes having qualities similar to maple. The former is less hard, has more stiffness and greater shock resisting ability than maple. Beech is nearly the equal of maple in these qualities. Both of these woods are used wherever maple is used and in addition for the main bars on the door and body.

White or, as it is generally called, gray elm, is commonly used as the substitute for ash for more parts of the body, except the sills, than any other wood. It is similar in appearance to ash and has much the same characteristics so far as working is concerned. However, it is much softer and does not have the same strength or stiffness, and is lighter in weight. It is a good substitute for most parts of the framing except the lock pillars of the doors, unless these are much larger than the usual size. It has the drawback that it does not hold nails, used to fasten the metal panels, as well as ash.

Red gum has been used in increasing quantities for seat frames, strainers and bars. Its tendency to twist as well as being a comparatively soft, weak wood has limited its use to the members mentioned.

Chestnut, sound, wormy oak and the hard pines are used for floor and running boards.

TABLE I.

Species	Strength as a beam or post	Stiffness	Shock resisting ability	Hardness
Ash—white, forest grown	100.0	100.0	100.0	100.0
Ash, black	71.3	79.3	90.1	62.3
Ash, white, second growth	122.5	117.6	119.6	118.9
Basswood	59.1	80.6	40.5	29.6
Beech	93.5	96.9	96.0	90.0
Birch, yellow	104.8	116.8	120.6	80.9
Chestnut	66.0	71.9	53.4	35.3
Cottonwood	60.6	79.0	54.3	35.3
Cucumber	85.4	112.4	76.7	54.9
Elm, rock or cork	98.8	92.9	140.5	101.6
Elm, white	79.2	79.5	89.5	57.1
Gum, red	80.7	91.5	75.5	59.0
Gum, tupelo or cotton	81.4	82.5	63.5	77.3
Hickories, pecan	103.5	103.8	119.7	139.6
Hickories, true	126.6	120.2	173.9	150.4
Maple, red	90.0	101.2	78.7	75.4
Maple, silver	66.9	68.5	71.7	64.3
Maple, sugar	104.7	105.9	90.5	103.0
Oaks, all kinds	92.6	101.3	94.9	104.5
Poplar, yellow	67.3	93.8	41.5	37.9
Fir, Douglas, Pacific Coast Conifers	95.7	122.1	59.9	58.3
Pine, loblolly	93.7	105.6	71.0	60.0
Pine, longleaf	112.2	122.1	77.7	74.8
Pine, shortleaf	94.1	100.6	69.7	64.0
Pine, Western white	75.5	99.7	53.8	37.0
Pine, Western yellow	67.0	75.6	42.9	41.0
Spruce, Sitka	69.5	94.1	63.3	44.9

TABLE II.

Kind of wood	Cost per 1000 board feet	Weight in lbs. per board foot Air dry	Green
Class A Stock—Grade F & S. Thickness 6/4			
Ash	$100.00@$110.00	3.8	4.6
Hard Maple	75.00@ 85.00	3.9	5.4
White (grey) Elm	75.00@ 85.00	3.1	4.75
Birch	100.00@ 110.00	4.0	5.5
Beech	80.00@ 85.00	4.0	5.75
Class B Stock			
Soft Elm	75.00@ 85.00	3.1	4.7
Soft Maple	75.00@ 85.00	3.3	5.0
Grade No. 1, Common			
Qtrd. Red Gum	70.00@ 80.00	3.3	5.5
Plain Red Gum	60.00@ 65.00		
Sound Wormy Oak	50.00@ 55.00	4.0	5.5
Sound Wormy Chestnut	42.00@ 44.00	2.8	5.0
Panel Stock—Grade F & S. Thickness 4/4			
Poplar	110.00@ 120.00	2.8	3.9
Basswood	80.00@ 83.00	2.5	4.2
Cottonwood	65.00@ 70.00	2.8	4.6

Table I is taken from the circular issued by the Forest Products Laboratory in which they refer to their bulletin No. 556, entitled "Mechanical Properties of Woods Grown in the United States." This table gives four of the physical properties of woods useful for automobile body construction in comparison with forest growth white ash, which is rated at 100.

Of the woods enumerated, the hickories are not body woods, their use being confined to wheel manufacture. The conifers or cone bearing woods have never been considered for body work except for floor and running boards, while the rock elm has been used for trim rails on open bodies. It is particularly well suited for this because it can withstand the strains of fitting to the body without splitting.

In Table II some of the woods enumerated in the Forest Products Laboratory list have been classified under two divisions, A and B, and their weights per square foot and market value per thousand feet given. In Table III the list of the members shown on the drawing are tabulated and the woods possible to use for each are given.

The woods enumerated in Classes A and B are those that have been used for some time by some, if not all, body-builders, and by looking at the prices it can be readily seen that what are considered the least suitable woods for body building have become, through their use in other industries and the additional demand from body builders, so high in price that their use as body framing substitutes is debatable.

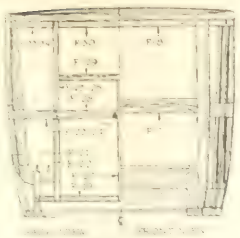
As mentioned before, it will be necessary to go further afield and try entirely new sources. One wood that the writer has used is the eucalyptus. This is a native of Australia, but is being cultivated in this country in places that have a limited water supply. It grows quickly and the wood is similar to birch.

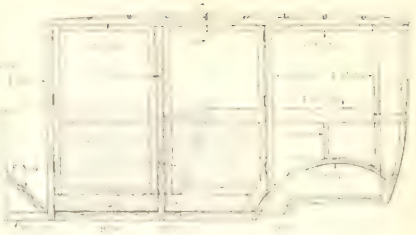
Bodybuilding is being developed to permit an increase in the use of steel for panels and it is reasonable to suppose that in time the panel will be so constructed as to bear a larger share of the stress. When this objective in the trade is developed, a decrease in the use of wood will be possible, but even then we will require a wood filler to hold the tacks, screws and nails, and therefore wood for body frames must be of a reasonably firm and hard nature.

Present practice requires a wood for body construction similar to those listed as Class A, Table II. It is important to reiterate the time honored injunction as to the necessity of the layout mill man selecting the planks properly so that the pillars and top rails are cut with the heart side of the plank in correct position to maintain the body shape, because the sap side of the plank will shrink more than the heart side and as a consequence the heart side will be the round or convex shape.

Door pillars should be cut to help the convex shape, as they tend to become straight in use due to the strain of the lock, and the companion pillar on the body should be the reverse so as to help to exaggerate or offset this tendency. In the case of the body toprail, one piece should be made to counteract the tendency of its companion piece.

One avenue that has not as yet been considered from the practical standpoint is the possibility of using tie wires or cables to supplement the strength required of the wood frame. At present the cost of wood is not high enough in price to make experiments in this direction necessary. There are wonderful possibilities in this type of construction and it is fair to assume that in time bodies will be made, incorporating the cable tie to obtain necessary rigidity.







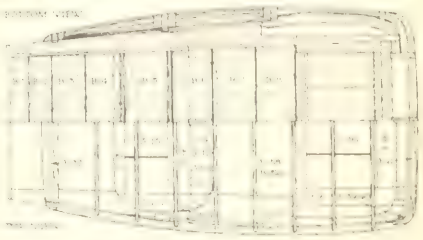


TABLE III

Part Number	Name of Part	Class of Stock
F-1 and 2	Body sill left and right	A
F-3 and 4	Toe bracket L and R	B
F-5 and 6	Pillar No. 1 L and R	A
F-7	Front middle bar	B
F-8	Front header bar	A
F-9 and 10	Pillar No. 2 L and R	A
F-11 and 12	Pillar No. 3 L and R	A
F-13 and 14	Pillar No. 4 L and R	A
F-15 and 16	Wheelhouse framing L and R	A
F-17 and 18	Quarter middle bar L and R	B
F-19	Tail bar	A
F-20	Strainer	B
F-21	Wheelhouse upright	B
F-22	Block	B
F-23 and 24	Middle corner block L and R	B
F-25 and 26	Back light pillar L and R	B
F-27	Strainer	B
F-28	Middle back bar	B
F-29	Back light lower bar	B
F-30	Back light header bar	B
F-31 and 32	Quarter header bar L and R	B
F-33 and 34	Corner header block L and R	B
F-35 and 36	Toprail L and R	A
F-37	Front toprail	A
F-38	Bows	A
F-39 and 40	Toprail corner block L and R	B
F-41	Back toprail	B
F-42	Sidelight piece	B
D-1 and 2	Ft. door hinge pillar l. and r.	A
D-3 and 4	r. door hinge pillar L and R	A
D-5 and 6	Ft. door lock pillar L and R	A
D-7 and 8	R. door lock pillar L and R	A
D-9 and 10	Ft. door bottom bar L and R	B
D-11 and 12	R, door bottom bar L and R	B
D-13 and 14	Middle bar L and R	A
D-15 and 16	Header bar L and R	A
D-17 and 18	Lock board L and R	B
D-19	Lower lining board	B
D-20	Middle lining board	B
B-1	Toeboard number 1	B
Ba2	Toeboard number 2	B
B-3	Treadboard number 3	B
B-4	Treadboard number 4	B
B-5	Bottomboard number 5	B
B-6	Bottomboard number 6	B
B-7	Bottomboard number 7	B
B-8	Bottomboard number 8	B
B-9	Ft. seat heelboard front	B
B-10	Ft. seat heelboard rear	B
B-11	Rear seat heelboard front	B
S-1 and 2	Ft. seat side L and R	B
S-3	Ft. seat front bar	B
S-4	Ft. seat rear bar	B
S-5 and 6	Rear seat side L and R	B
S-7	Rear seat front bar	B
S-8	Rear seat rear bar	B
S-9	Ft. seat center strainer	B
S-10	Ft. seat center toprail	B
S-11 and 12	Ft. seat corner strainer L and R	B
S-13 and 14	Ft. seat corner toprail L and R	B
S-15	Ft. seat board	B
S-16	Rear seat board	B

Experiments Show Power Loss in Automobile Tires

THE rubber laboratory of the Bureau of Standards is equipped with a special dynamometer for determining, among other things, the power loss in automobile tires. A great many of the standard makes of tires have been tested on this dynamometer, and valuable data are being obtained concerning the percentage of the power of an automobile engine which is absorbed by the tires under various conditions.

Some interesting figures have already been secured as a result of this work. For instance, an average 4-in. fabric tire, under conditions of normal load and air pressure, will absorb approximately .90 h.p. due to rolling resistance at a speed of 25 miles per hour. Under the same conditions, the power loss in a 4-in. cord tire is approximately .60 h.p., while a 5-in. cord tire represents a loss of 1.20 h.p.

Courtesy Is Common Sense on the Highways

Truck "road hogs" promote unfavorable vehicle legislation. Courtesy on the road will "sell" the public on truck transportation. N. A. C. C. truck committee begins campaign on better manners for drivers. Movement means more sales and less restrictive laws.

PUBLIC opinion about truck transportation will play an important part in determining the number and character of future truck sales. Truck manufacturers can help materially to influence that opinion favorably by taking advantage of a bit of simple human psychology.

Most people form their opinions as a result of their personal experiences, however narrow, and base these opinions largely upon feeling rather than logic.

If Mr. Public is driving along a highway and suddenly finds a huge motor truck blocking his path, he will form his opinion of truck transportation almost exactly in accordance with the difficulty which he has in passing that particular truck. His voice is eventually going to be raised in connection with truck legislation. What he says will probably be determined largely by his own contacts with trucks.

He should form his opinion "on the basis of a careful study of the economic function of the truck in providing efficient and effective transportation." But he doesn't. It is hard to interest him in such subjects.

He is very much interested, however, in "road hogs." His interest in passing trucks can't be kept down.

By taking advantage of this general human tendency to generalize on the basis of specific instances, truck manufacturers can "sell" truck transportation to the public, to legislatures, and to all others concerned in the use and operation of commercial vehicles.

This fact is recognized in the movement just launched under the direction of F. W. Fenn, secretary of the Motor Truck Committee of the N. A. C. C. The National Motor Truck Committee has just started a campaign on the importance of courtesy on the highways, directed to all motor truck drivers in the country.

The committee has prepared literature which it will distribute with the aid of manufacturers to dealers, motor truck traffic manager and fleet owners, and through these latter to truck operators.

WHEN the French had their backs against the wall at Verdun, the slogan "They shall not pass," served as a rallying cry. It was appropriate to the occasion.

But there is a time for all things.

Too many truck drivers in America have adopted "Ils ne passerons pas" as their motto. And to the regular user of the highway the words constitute a real battle cry.

* * *

Courtesy creates goodwill. Goodwill creates favorable legislation. Favorable legislation increases profitable sales. Profitable sales make successful truck manufacturers. The Courtesy Campaign is worthy of sincere and active support.

The following form letter, which is designed for dealers and fleet owners, give an excellent idea of what the committee has in mind in conducting this campaign.

With the entrance of over 1,000,000 motor trucks into the freight transportation field there has arisen a need for driver courtesy on highways. Discourtesy on the part of truck drivers cannot be tolerated to any large extent, inasmuch as trucks are engaged to-day in a very important transportation service, and in the words of President Harding, "they are not only feeders to the railroads and offer relief from their local burdens; they are actuallly lines of motor traffic in interstate commerce."

In view of this, we are suggesting to traffic managers all over the country, under whose direction our motor truck fleet are operating, to hold company meetings or dinners, at which the drivers will be present when the keynote of driver success is sounded.

May we make the following suggestions for incorporation in your speech:

1. A truck, when properly handled, becomes an important factor in the advancement of humanity. Any discourtesy committed lessens the truck's economical prestige.
2. Driver discourtesy must not be tolerated as it creates public opinion antagonistic to highway transport.
3. Follow up personal injury cases by seeing that injured is taken immediately to hospital, regardless of who is at fault.
4. Drive at a moderate rate of speed at all times.
5. Avoid trying to take chances that other drivers do.
6. Give ample warning to pedestrians or vehicles that are about to be passed.
7. Recognition of fact that pedestrians crossing streets have prior rights at crossings.
8. Watch especially children playing on streets and sidewalks; regard them as your own children.

If you will kindly inform me how many drivers you have in your fleet I will be very glad to send you as many copies of the enclosed pamphlet, "Common Sense on the

Highway" as you feel will be necessary for distribution.

Courtesy is the lamp that lights the way to efficient operation, and only through a united effort can success be attained and highway transport established on a firm foundation.

Will you help?

A booklet for drivers has also been prepared which shows the driver why courtesy pays from his standpoint. This booklet incorporates the Briggs cartoon which accompanies this article, along with material like the following:

Courtesy is as cheap as the air you breathe—practice it on those with whom you come in contact on the highways. *IT PAYS!* When you are aware that a faster moving vehicle is trying to pass, *move to the right at the first opportunity. Give the passing vehicle a cheerful greeting as it goes by.*

CHEERFULLY sharing the road with others makes friends. BLOCKING the road makes an unnecessary enemy. *YOU CAN'T AFFORD TO MAKE ENEMIES —THEY MAY PROVE EXPENSIVE.*

THE MAN in the car behind may be the GOVERNOR OF THE STATE, bound for the capital—or an important member of the State Legislature. Can there be any satisfaction in delaying them? *They have it in their power to drive you from the highway—to throw you out of your job.*

BE CHEERFUL—Let them pass.

You hear a horn—it may be a Doctor on an ERRAND OF MERCY—*YOU WOULD NOT WILLINGLY OR KNOWINGLY TAKE A LIFE. But you may if you persist in holding the center of the road.* LET HIM PASS—with a spirit of *"GOD SPEED."*

Are you going to let them say, *"DAMN THE TRUCKS, I'm for driving them off the highway," or, with a smile, "THANK YOU, OLD TOP"—or "ATTA BOY."*

Your GOOD WILL lies at stake. Good will is represented in:

Your right to a place on the highway.

The capital investment in vehicle and load from which you receive your income.

Whether the public classes you as a necessity or a nuisance.

HANG ON TO THAT JOB!

PROTECT THAT INVESTMENT!

PRESERVE THAT GOOD WILL!

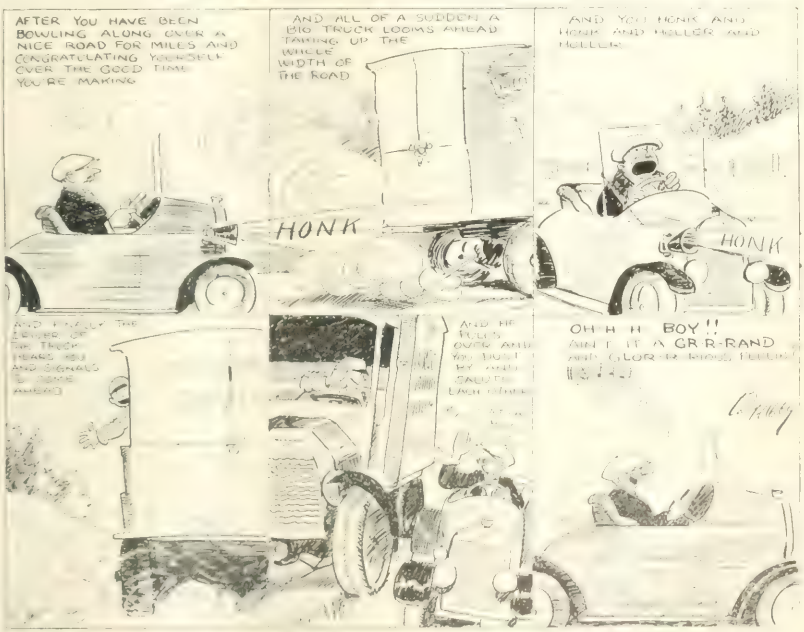
IT IS YOUR MEAL TICKET—DON'T BE FOOLISH AND THROW IT AWAY!

Public opinion can make or break an industry. The time passed years ago when a business could afford to disregard the opinion held of it by people in general. The general growth of educational facilities and the increased distribution of information through the press both tend to make public opinion of constantly growing importance.

The automotive industry has had occasion to learn this on numerous occasions. If the public thinks the automobile is essentially a luxury vehicle, automotive manufacturers will continue to pay excessive taxes and, consequently, to operate under less favorable sales conditions than would otherwise be the case.

If the public thinks motor trucks tear up the highways and hold up traffic so badly as to offset any value they may possess as economic means of transport, that opinion will be reflected in legislation adverse to the motor truck. Some such legislation has already been passed. Motor truck manufacturers are intimately concerned with the legislative future as regards their product.

AIN'T IT A GRAND AND GLORIOUS FEELING?



SOME PROMINENT MEN AT THE S. A. E. SUMMER MEETING



Photographs by N. Lazarnick

Fig. 1—F. S. Duesenberg. 2—F. S. Slocum. 3—F. E. Moskovics, Nordyke & Marmon. 4—H. E. Rice. 5—R. J. Nightingale, Willard Storage Battery Co. 6—F. W. Andrew, Eisemann Magneto Corp. 7—F. Jehle, Aluminum Manufacturers. 8—H. R. Williams, Beaver Truck Corp. 9—F. Jardine, Aluminum Manufacturers. 10—Azel Ames. 11—W. G. Wall, National Motor Car Corp. 12—B. G. Koether, Hyatt Roller Bearing Co. 13—R. E. Northway, Northway Motors Corp. 14—G. W. Vaughn. 15—J. M. Germaine, Gilliam Mfg. Co. 16—W. I. Ralph, Class Journal Co.

Performance of Lubricants Needs More Research

Dearth of precise information as to their properties and the effect of various factors upon their value as lubricants, a heavy handicap to their intelligent use. Effect of dilution and other factors bearing upon serviceability are subject of some investigations.

By Herbert Chase

So little fundamental information on the subject of lubricants and the factors which determine their suitability for automotive uses is in existence that rule of thumb methods are still very largely used as a basis for the production, sale and utilization of both oils and greases. Under these circumstances the need for thorough-going research work is very apparent, but little such work is in progress so far as the public is generally informed. For the most part the various oil companies are either doing no research work at all or are keeping such work as is being done a strict trade secret. The Bureau of Standards is one of the few organizations which has conducted basic research on lubricants in this country, and the staff of men and funds available for this purpose at the Bureau has been so limited that progress has been extremely slow.

Basic Research

One of the few other pieces of basic research being undertaken to our knowledge is that in process under the direction of Professor R. E. Wilson, of the Massachusetts Institute of Technology. This work is being conducted on behalf of the General Motors Research Corp. and the Standard Oil Co. The major portion of the results thus far obtained are expected to be ready for publication at an early date. One report is to cover the subject of fluid fuel lubrication of journals and is to include correlated data taken from the meager available literature on the subject. A second report is intended to deal with the fundamental properties of lubricants, with special reference to the rather elusive property of "oiliness" which is possessed in greater or less degree by all true lubricants. The methods used in measuring and investigating this property are to be described, together with examples of the results which have been obtained to date. Wilson is also doing some work with a view to determining the solubility of fuel in oils.

Some of the most recent work done at the Bureau of Standards is described in a paper entitled "Viscosity and Friction," by W. H. Herschel, which was presented at the last annual meeting of the Society of Automotive Engineers. In this paper the author discusses at length the effect of viscosity in complete film lubrication and comments upon various methods for measuring viscosity. Herschel states that "if all the changes of the lubricant with time, by evaporation, oxidation or otherwise are disregarded, the only remaining properties that determine the friction are viscosity and oiliness." It appears that while many investigators have observed the pressure, speed and coefficient of friction, few have paid attention to measurements in this connection of the viscosity and the clearance in the bearing which are said to be of equal importance. "With complete film lubrication, viscosity is the only property of the lubricant that needs to be considered. With incomplete film lubrication, the differences in friction with different lubricants under otherwise identical conditions cannot be accounted for by differences in viscosity. Therefore it is necessary to consider some other property or properties of the lubricant. This property is only vaguely understood; it is not identified with any recognized physical or chemical constants and is known by a variety of names such as "body, oiliness, greasiness and the like." The author then describes various testing machines intended to measure the oiliness of lubricants and shows how high pressures tend to produce incomplete film lubrication and the manifestations of difference in oiliness.

Among the conclusions reached are the following:

Friction tests with complete film lubrication can give no information in regard to the quality of a lubricant, and viscosity is measured more readily with a viscosimeter.

The only use of a friction-testing machine for determining quality of a lubricant is in measuring oiliness, and this must be done at high pressures, low speeds or other conditions which cause incomplete film lubrication. It can be assumed that the pressure must be over 800 lb. per sq. in. or the speed less than 40 ft. per min.

Bearing metals also should be tested with incomplete film lubrication.

It is impracticable to keep a constant smoothness of rubbing surfaces with a journal bearing, so that changes in friction, commonly supposed to be due to changes in quality of lubricant, are generally due to changes in smoothness.

Service tests are even more untrustworthy than friction tests, because there are a multitude of bearings whose temperature cannot be controlled or estimated readily.

The best solution of the difficulty appears to be the use of a disc machine. The disc could be kept of constant smoothness by removing an interchangeable veneer and subjecting it to a standardized polishing process after the test of each oil, if necessary. A journal could not be kept polished in this way because the radius of curvature, and consequently the film thickness, would be changed

Among the factors being given much consideration at the present time is the effect of dilution of lubricants by fuel which in nearly all present-day automotive engines reaches the crankcase largely as a result of leakage of

fuel by the pistons. It is understood that the International Harvester Co. has done some work, with a view to determining the effect of dilution and other factors upon viscosity. An effort is being made to continue this work at Ohio State University. The results obtained to date indicate that certain oils lose their viscosity to a considerable extent even when used with fuels with which dilution is said to be impossible. Other fuels are said to become less viscous when used with kerosene as fuel, which causes dilution, but are not affected by fuels which do not cause dilution. A third class is said not to be affected either by diluting or non-diluting fuels. The complete results of tests have not yet been made public.

Tests are being made at the Iowa State College under the direction of Professor J. B. Davidson, in which a number of oils are subjected to practical running tests prior to and at the end of which their characteristics are determined. It has of course been found that some oils are much more stable than others, but means for predetermining these characteristics have not been found.

C. W. Stratford, of the Associated Oil Co., is planning research work with the intention of learning how the chemical stability of various oils can be increased. It is hoped to develop laboratory methods of determining chemical stability without recourse to expensive and more or less unsatisfactory tests in engines which have heretofore been depended upon in measure to determine changes in chemical and physical characteristics.

Carbon Residue Tests

It is a well-known fact that oils of certain character are more prone to cause carbon deposit than others of different character. Various laboratory tests, including the Conradson carbon residue test and the Waters oxidation test, are used for this purpose, but it is not definitely known to what extent measurements made by these methods can be depended upon to predict the carbon forming tendencies of an oil in practical service. Some tests along this line have been made in certain laboratories, but the results have not yet been published.

Engine friction is known to be quite largely dependent upon the viscosity of the oil used, and viscosity is, of course, affected to a considerable degree by the temperature of the oil, which in turn is dependent upon engine temperature. In tests made by the Fifth Avenue Coach Co. a saving of as much as one hp. in friction at moderate engine speeds has been shown to result from the use of a light oil as compared to another of higher viscosity. This saving in power is expected to result in considerable saving in fuel, especially at the light loads of normal use, and further tests along this line are to be conducted.

Viscosity

To what extent it is justifiable to reduce viscosity as a means for reducing friction or to permit viscosity to be reduced by fuel dilution, without undue sacrifice in wear of bearings, cylinders and other parts, is a question which should receive further study and will doubtless be the subject of further research and experimental work in the future.

The relative value of greases as compared to oil, of greases of various character as compared to each other, and of solid lubricants, especially graphite when used in connection with grease and oil, also requires further study before certain conclusions as to relative merit can be reached. Tests made in England as well as in this country are said to have shown that considerable advantage results from the use of finely divided graphite in lubricating oil. Similar claims are made also for graphite grease lubricants, but authoritative data are lacking.

Research both here and in England indicates that small quantities of animal or vegetable oil added to mineral oil render the latter more suitable for engine lubrication, especially when high temperatures are involved, but further tests in this connection seem to be required before this fact is definitely established or at least before it is determined what proportion and what character of non-mineral oils are best suited to various conditions of service.

High Tariff Wall Prevents Exportation of American Automotive Products to Germany

THE development of the automobile industry in Germany following the war is reported to have made great strides. In spite of many handicaps, it is, by comparison with other industries in the country, one of the healthiest. This is the finding of a survey made for the Automotive Division of the Department of Commerce.

Passenger cars registrations which are indicative of growth when increasing, show this particular field of automotive transportation to be expanding rapidly. From February 1, 1920, until March, 1922, the increase in registration has been approximately as follows:

February, 1920	32,000
July, 1921	60,000
January, 1922	78,726
March, 1922 (estimated)	85,000

As a result of the agricultural industry's adoption of motor trucks as a means of transportation, the demand for trucks is growing fast. The present registration of trucks (30,424) is declared to be an increase over 1914 of 300 per cent. Motor truck transportation is also gaining in favor because of success in competing with railroads.

Germany has been conducting a comparatively active export trade. Exports of passenger cars and trucks numbered 17,534 in 1920 and 5,810 in the last 8 months of 1921. Imports have been kept low and totaled 347 in 1920, and 361 in the period of 1921, coming chiefly from Austria.

The cause of the surprisingly small number of importations, and incidentally the almost total exclusion of the American product, is due to the high tariff wall built around German production.

The existence of a rigid foreign trade control, policed in this instance by the "Aussenhandelstelle fuer die Fahrzeug Industrie," Berlin, composed in part by manufacturers and constituting a semi-governmental agency with discretionary powers to refuse import permits, makes for an added exclusion of foreign wares calculated to compete with the home industry.

There is little likelihood that foreign cars will be able to enter the German market under the present system of control, especially since Germany can export automotive products while retaining her raw materials and foodstuffs. It is still questionable whether German automotive goods have reached world markets, and it is doubtful whether countries having a more favorable exchange rate with Germany, although soaring higher every month, can compete with German manufacturers in German markets, when one considers cost of production and the many obstacles to be overcome.

How to Build Aluminum Tanks for Automotive Use

98 per cent pure sheet aluminum in half hard condition employed. Welding process requires sheet scraps or welding wire of same chemical composition. Care taken to insure clean working surfaces. Tank fittings should be machined from rolled aluminum.

THE best material for aluminum tanks for aircraft and other automotive purposes is sheet aluminum which is 98 per cent pure. In the soft condition it has a tensile strength of 12,000 lb. per sq. in., and an elongation of 25 per cent; and in the half hard condition a tensile strength of 18,000 lb. per sq. in., and an elongation of 6 per cent. The use of the half hard condition sheet is recommended. The most practical gages of material for tank construction are: No. 20 (.032), No. 18 (.040), No. 16 (.051) and No. 14 (.064) B & S Gage.

Welding can be done with scrap strips of the sheet or with a welding wire of the same chemical composition. If rivets are used they should also be of the same chemical composition as the sheet.

In inserting heads in tanks, joining in bulkheads, and welding on fittings, a corrugation similar to that shown in Fig. 1 has to be rolled or pressed into the sheet adjacent to and around the weld. This is to localize and relieve shrinkage and expansion stresses set up by welding. The best and most economical method of welding requires that the edges of the sheets to be joined be bent up at an angle of 45 deg., an amount equal to three times the thickness of the sheet, as in Fig. 1. The edges should then be cleaned with a 10 per cent solution of either nitric acid or tri-sodium phosphate which must be thoroughly washed off with clear water after applying. A welding flux composed of 17 per cent sodium chloride and 83 per cent potassium chloride, or one composed of 30 per cent sodium chloride, 3 per cent sodium sulphite, 15 per cent lithium chloride, 45 per cent potassium chloride and 7 per cent potassium fluoride is then applied with a brush or swab. The edges are then brought together and tacked about every 2 in. with the oxy-acetylene torch. The edges are held with pliers or a clamp while the spots are being melted or fused, as in Fig. 1. Welding is to be done with the oxy-acetylene torch by melting down and fusing together the two edges of the sheets until the under side of the joint on 45 deg. work is well filleted out, and on flat work is slightly concave. It is essential that the edges be melted down very carefully and evenly to avoid weak spots. All welds are to be left undressed.

BULKHEADS or baffles should be turned up at 45 deg. as shown in Fig. 2, and riveted to a "V" shaped corrugation in the tank shell. Aluminum rivets ⅛ in. in diameter should be used, spaced about 3 in. apart. The rivets are to be headed up but not fully flattened, as is customary in ordinary riveting. The heads of the rivets are welded with the oxy-acetylene torch using regular welding wire as filler. Holes of sufficient size are usually provided in the bulkheads to permit free flow between the compartments. Where necessary, the bulkheads are stiffened by rolling a "V" shaped corrugation in them. All flat surfaces, such as tank heads, should be stiffened with corrugations similar to those used in tank sides where bulkheads join as in Fig. 2. The "V's" should project into the tank, making a flush external surface.

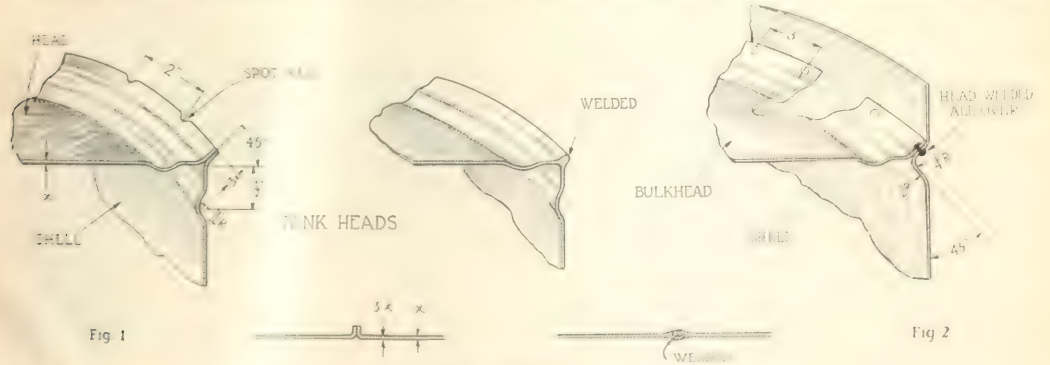


Fig. 1 Fig. 2

Fig. 1—Corrugation rolled or pressed into sheet adjacent to and around weld, when inserting heads in tanks, joining in bulkheads, and welding on fittings

Fig. 2—Bulkheads or baffles turned up at 45 deg. angle and riveted to a "V" shaped corrugation in the tank shell

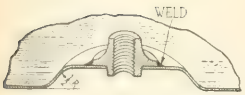


Fig. 3—Tank "bumped" at point of attachment and casting welded on

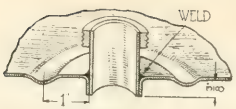


Fig. 4—Liberal use of welding rod shown

All tank fittings, wherever practicable, should be machined from rolled aluminum which is 98 per cent pure. Where this is not practicable, the fittings should be cast from aluminum alloy conforming to the SAE Standard Alloy No. 1, Specification 30, of which the chemical content is as follows: Aluminum, not less than 90 per cent; copper, 8.5 to 7 per cent; total impurities, 1.7 per cent; maximum zinc, 0.2 per cent. Castings should have well filleted corners and should have holes cored, rather than be cast solid and then drilled, in order to keep the section as uniform as possible and thus avoid porosity from uneven shrinkage. Where castings can be made with a flange the tank should be "bumped" at the point of attachment and the casting welded on as shown in Fig. 3. Where a flanged casting is not practical, or where a sheet metal cylinder is the joining medium, the edges of the tank should be bent in at 90 deg., an amount equal to ⅜ inch, and a bead rolled around the opening as in Fig. 4. Liberal use of welding rod is to be recommended, as shown in Fig. 4.

Where annealing is necessary, it can best be done by moving a flame over the surface to be softened until a piece of newspaper rubbed on the metal will just leave a brown mark.

After the tank is completed and before it is installed, it should be thoroughly cleaned by filling with and submerging it in a 10 per cent solution of sulphuric acid for one hour, in order to remove the welding flux. It should then be washed thoroughly with clean water. This treatment is essential when the tank is to contain gasoline. However, it should not be undertaken with any fittings other than those of aluminum on the tank, since then electrolytic action would be sure to begin and the aluminum tank would become pitted.

The foregoing covers most of the standard production methods of aluminum tank construction as far as developed up to the present.

Stewart "Utility Wagon" Has Buda Engine

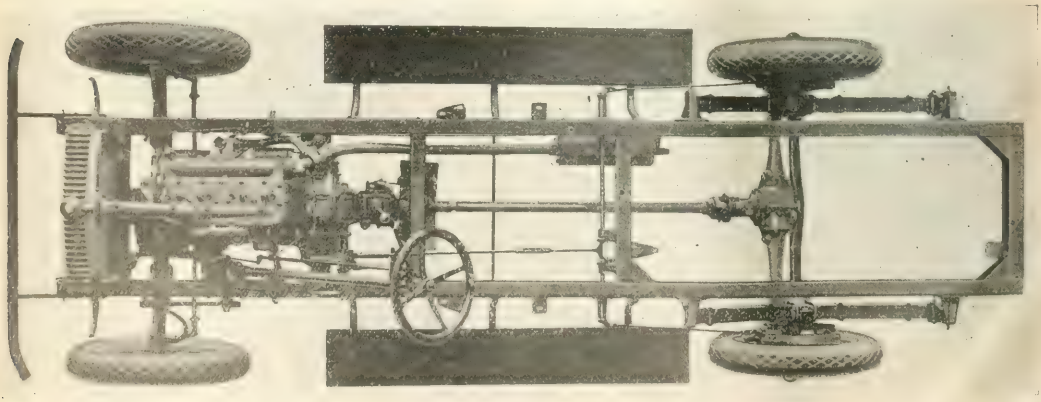
New speed truck capable of 35 to 40 m.p.h. Wheelbase 128 in. Clark internal gear drive type axle.

A NEW utility truck with 128 in. wheelbase and a maximum load capacity of 1¼ tons has recently been announced by the Stewart Motor Corp. It is equipped with the new 3⅝ x 5⅛ in. Buda engine designed especially for this class of service, and is said to be capable of speeds from 35 to 40 miles per hour. The frame is designed to carry an 8 ft. body. Equipment includes electric starter, electric lights and 34 x 4½ in. non-skid cord tires.

The engine used was described in detail in AUTOMOTIVE INDUSTRIES for March 30, 1922. It has a detachable head, hollow crankshaft affording pressure feed to all crankshaft bearings, and is designed to provide water circulation completely around all valves. The head is designed with a ledge projecting beyond the cylinder block to facilitate removal without injury to the head gasket. Pistons are fitted with three rings above the wristpin and a scraper ring at the base of the skirt. The one-piece oil pan is readily removed without disturbing the bearings which are thus made readily accessible for adjustment. A single plate clutch and three-speed gearset are mounted in unit with the engine or a three point support.

The rear axle is the Clark internal gear drive type used on other Stewart models and has a reduction of 5½ to 1. All springs are of the semi-elliptic type, those in front measuring 38⅝ in. long and those in the rear 50 in. The rear springs are equipped with full length rebound plates, bronze bushings and hardened steel pins.

The steering gear is of the screw and nut type and is provided with adjustable thrust bearings to take up end motion of the screw. The chassis is provided with an Alemite lubricating system.



Chassis plan view of new Stewart "Utility Wagon"

S. A. E. Summer Meeting

Measuring the Tendency of Various Fuels to Knock

Relative effectiveness of alcohol, benzol and other substances in preventing detonation are determined by more precise methods than used in earlier tests. Results indicate some conclusions reached by Ricardo are in error. Xylidine effective in small amount.

By Thomas Midgley, Jr., and T. A. Boyd*

THAT the addition of benzene and other aromatic hydrocarbons to paraffin base gasolines greatly reduces the tendency of these fuels to detonate when used in automobile engines has been known for some time. Also, it is well known that alcohol when blended with a paraffin base gasoline improves the combustion characteristics of the fuel. As the reserves of petroleum in this country become more and more depleted the use of benzol, and particularly of alcohol, in commercial motor fuels will probably become greatly extended.

*Condensed from a paper presented at the summer meeting of the Society of Automotive Engineers. The authors are connected with the Fuel Section of the General Motors Research Laboratory.

[1] See *Journal of the Society of Automotive Engineers*, January, 1922, p. 7.

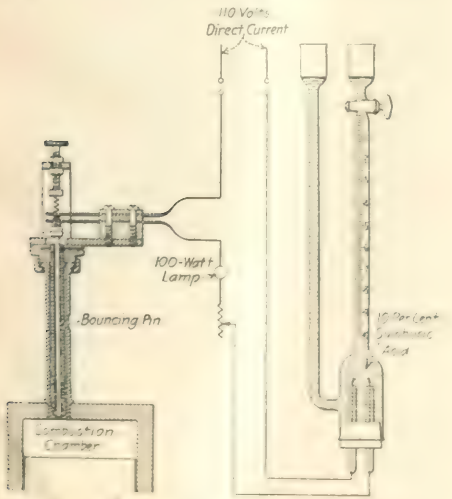


Fig. 1—Arrangement of apparatus for measuring detonation by the bouncing-pin method

Alcohol as produced commercially dissolves in gasoline only to a very small extent; but the addition of a proper percentage of an aromatic hydrocarbon, such as benzol, toluol or xylol, to the mixture renders the ingredients completely miscible.

The object of this paper is to report the progress that has been made in measuring the detonating tendencies of mixtures of some of the principal materials that are used as components of the blended motor fuels now available commercially. Although these data are incomplete and have not been obtained in such a form as to be universally usable, it was thought advisable to present some of them in this way, especially in view of the fact that a considerable amount of the matter dealing with this subject that has been published in the past is in error. As examples of this the following statements by Ricardo may be cited:

(1) Xylene is inferior to toluene for the suppression of detonation

(2) The detonation point of mixtures of ethyl alcohol, acetone, toluene and xylene with paraffin and other hydrocarbons, follows a straight law when the mixture is apportioned by weight and not by volume; that is, the addition of 40 per cent by weight of, say, toluene to hexane would raise the detonation point exactly four times as much as the addition of 10 per cent

The primary reason for the unreliability of some of the data on blending characteristics that have been obtained and published is the previous lack of a means for measuring the detonating tendencies of fuels with sufficient accuracy. The use of the bouncing-pin method for the measurement of the intensity of detonation, however, gives results that are reliable and have a high degree of accuracy. This instrumentation, which is illustrated in Fig. 1 and was described in our paper entitled Methods of Measuring Detonation in Engines[1] has made it possible to secure the data that are presented in this paper.

In order that the effects of blending materials might be measured in as wide a range of concentrations as practicable, they were blended with kerosene for making the majority of the determinations reported in this paper.

The greater tendency of kerosene than lighter paraffin hydrocarbons to detonate made it possible to determine the detonation characteristics of blends up to a concentration of 80 per cent benzol or 50 per cent alcohol without introducing the difficulties incident to excessively high engine compression. The curves of Fig. 2 show that in general the characteristics of gasoline blends follow closely those of kerosene. This agreement is still better on the molecular basis. So that results obtained from a given concentration of blending material in kerosene are applicable within fairly close limits to blends of similar compositions in which the kerosene has been replaced by a gasoline.

On account of variations in engine conditions it is evident that data obtained from any particular engine are applicable in a quantitative way only to that one design and set of conditions. But, although widely different behavior may characterize the combustion of a certain fuel in two different engines, the relative behaviors of two given fuels will be comparative in whatever type of engine they may be run. Hence, in measuring the detonating tendency of any fuel it is essential that some standard be used as a basis of comparison. In the tests reported herein small percentages of xylidine in the same paraffin fuel that was used for blending with the alcohol and with the aromatic hydrocarbons were employed as a standard. Xylidine has the property, common to aromatic amines and considerably more marked in a number of other materials, of exerting a powerful suppressing action on detonation, when present in a fuel in percentages that are relatively very small. Thus, it may be seen from Fig. 2 that 1 per cent of xylidine in kerosene is equivalent for the elimination of detonation to about 15 per cent of benzene in the same material. This property of xylidine makes it possible to convert kerosene into a fuel that will withstand very high compressions without knocking, and with the addition of such a small percentage of xylidine that the combustion characteristics of the kerosene, other than its tendency to detonate, are not materially changed.

Properties of Materials Used as Fuels

The materials used as ingredients of the various fuels that were either examined or employed as standards in the examinations, the results of which are reported in this paper, were "high-test" gasoline, commercial gasoline, kerosene, xylidine, benzene, or 90-deg. benzol, toluene, xylene and alcohol. The xylidine employed was a commercial material composed of the mixed xylidines. The alcohol used was absolute ethyl. The use of absolute rather than commercial denatured alcohol in these tests was necessary on account of the almost complete insolubility of the latter in paraffin oils, unless a "binder" such as benzol is used. Some physical properties of the other materials included in this list are presented in Table 1.

A ¾-kw. Delco-Light engine was used for making all the determinations. This is a single-cylinder, air-cooled engine, direct-connected to a 32-volt, direct current generator, and having a 2½-in. bore and a 5-in. stroke. The engine was standard, except that a means was provided for adjusting the spark timing, and that the compression was increased by stages from the normal ratio of 3.47 to 1 to a ratio of 5.36 to 1. This was done by a series of cylinder heads that had been cut down by different amounts, so as to reduce the clearance volume by corresponding stages.

The method used in making the determinations can best be explained by giving a specific example, for which the comparison of a blend containing 45 per cent of benzol and 55 per cent of kerosene with fuels composed of small percentages of xylidine in kerosene was employed. A compression ratio of 3.87 to 1 was used, so that some detonation would occur, but which was not so violent as to cut down the power of the engine seriously or to cause it to operate in an erratic manner. The fuel under examination was put into one side of the fuel system and the mixing valve on the engine was adjusted so as to give a maximum of detonation. This adjustment produces close to the leanest possible mixture for maximum power. By trial it was found that 5 per cent of xylidine in kerosene had a slightly less detonating tendency than the benzene-kerosene blend under examination. This fuel was then placed in the other side of the fuel system and its level was adjusted so as to give the point of maximum detonation. The setting of the mixing valve was left undisturbed throughout the determination so that the compression pressure of the engine would be unchanged. A number of alternate 1-min. runs were then made, with the 5 per cent xylidine-in-kerosene and the benzene-kerosene blend. The amount of gas evolved in the electrolytic cell during each period was recorded. The outut of the generator in volts and amperes was also kept as a matter of record. After three to six runs had been made with each fuel, the benzene-kerosene blend was replaced with 4 per cent of xylidine in kerosene and a second series of runs was made in the same manner. The amounts of gas evolved during the 1-min. runs were then averaged, and the values thus obtained for the xylidine-kerosene fuels were plotted on a coordinate chart having as its vertical axis the amount of gas evolved per minute and as its horizontal axis the percentage of xylidine in kerosene. These two points were next joined by a straight line. From the point at which this line crossed the horizontal line corresponding to the volume of gas evolved by the benzene-kerosene fuel under examination, a vertical projection was made to the

TABLE 1—PHYSICAL DATA ON THE FUELS USED IN THE TESTS

Hydrocarbon	Kerosene	Commercial Gasoline	"High-Test" Gasoline	90-Deg. Benzol	Toluene	Xylene
Specific Gravity at 15 Deg. Cent. (59 Deg. Fahr.)	0.816	0.734	0.704	0.878	0.860*	0.869*
Absorption in Cold Sulphuric Acid, per cent.	7	5	3	....	....	....
Distillation Temperatures First Drop.						
Deg. Cent.	186.0	40.0	44.0	74.0	107.0	135.0
Deg. Fahr.	366.8	104.0	111.2	165.2	224.6	275.0
10 Per Cent.						
Deg. Cent.	201.0	65.0	59.0	77.5	108.0	136.0
Deg. Fahr.	393.8	149.0	138.2	171.5	226.4	276.8
20 Per Cent.						
Deg. Cent.	207.0	83.5	68.5	78.7	108.5	136.2
Deg. Fahr.	404.6	182.3	155.3	173.7	227.3	277.2
30 Per Cent.						
Deg. Cent.	212.0	99.0	76.0	79.2	108.6	136.5
Deg. Fahr.	413.6	210.2	168.8	174.6	227.5	277.7
40 Per Cent.						
Deg. Cent.	217.5	111.5	82.7	79.8	108.7	136.7
Deg. Fahr.	423.5	232.7	180.9	175.6	227.7	278.1
50 Per Cent.						
Deg. Cent.	222.0	125.0	89.3	80.1	108.8	136.9
Deg. Fahr.	431.6	257.0	192.7	176.2	227.8	278.4
60 Per Cent.						
Deg. Cent.	227.5	140.0	96.0	80.5	108.8	137.1
Deg. Fahr.	441.5	284.0	204.8	176.9	227.8	278.8
70 Per Cent.						
Deg. Cent.	233.5	157.5	103.0	81.1	108.8	137.3
Deg. Fahr.	452.3	315.5	217.4	178.0	227.8	279.1
80 Per Cent.						
Deg. Cent.	241.0	177.0	114.0	82.0	108.9	137.5
Deg. Fahr.	465.8	350.6	237.2	179.6	228.0	279.5
90 Per Cent.						
Deg. Cent.	253.5	200.0	128.0	85.0	109.0	137.8
Deg. Fahr.	488.3	392.0	262.4	185.0	228.2	280.0
95 Per Cent.						
Deg. Cent.	268.0	219.0	157.0	92.5	109.2	138.1
Deg. Fahr.	514.4	426.2	314.6	198.5	228.6	280.6
Dry, Deg. Cent.	291.0	226.0	178.0	....	....	....
Deg. Fahr.	555.8	438.8	352.4	....	....	....

*Approximate.

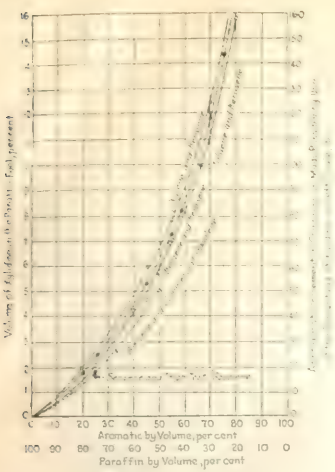


Fig. 2—Graphical arrangement of the data obtained in determining the detonation characteristics of blends of aromatic and paraffin hydrocarbons

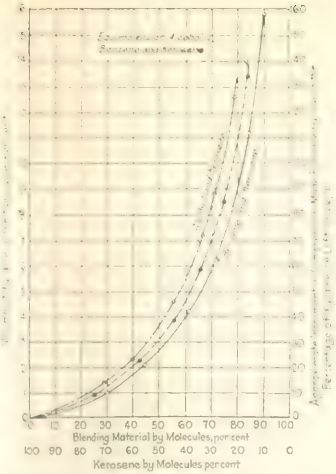


Fig. 3—Chart showing the effects on the detonation characteristics of kerosene of blending with it various percentages of alcohol and benzene

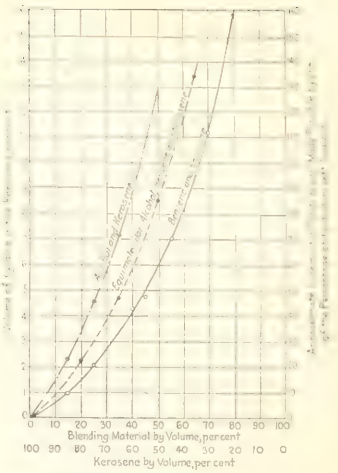


Fig. 5—Chart showing the effects on the detonation characteristics of kerosene of blending with it various molecular percentages of alcohol and benzene

horizontal scale at the bottom of the chart giving the percentage of xylidine in kerosene. The intersection of this projected line with the bottom scale then gave directly the percentage of xylidine in kerosene that was equivalent in its effect for the suppression of detonation to 45 per cent of benzene in kerosene.

Results

The data obtained in the tests on which this paper is based are given in Tables 2 and 3. The averages of the results given in these tables have been used in plotting the curves, Fig. 3. Attention is called to the consistency of the data, and to the agreement between the results obtained with like concentrations of given materials. The close checks indicate a high degree of accuracy.

From Fig. 2 the rapidly increasing slope of the curves as the percentage of the aromatic constituent is raised may be noted. Thus the curves show that the presence of only a small percentage of an aromatic hydrocarbon in a paraffin fuel has but a slight effect toward supressing detonation. This is in agreement with the practical observation made by those who have used benzol-gasoline blends that the addition of less than 20 per cent of benzol to a commercial gasoline or a naphtha exerts only a small influence toward causing the engine to give smoother operation. But when benzol is blended with paraffin fuels in larger percentages its effect increases rapidly as its concentration relative to the paraffin fuel is raised. This is due, in part at least, to the greater percentage of reduction in the amount of the paraffin constituent present as the aromatic content of the blend is increased. It will also be observed from Fig. 2 that toluene on the basis of volume is more effective than benzol for eliminating detonation conditions, and that xylene is, in turn, still more effective than toluene for this purpose.

The vertical scale at the right of Fig. 2 shows approximately the increments in compression pressure of the engine that are made possible by the addition to a paraffin fuel of the corresponding percentages of xylidine given on the vertical scales to the left. From the two scales on the charts it will be observed that the addition of 1 per cent of xylidine to a fuel that gives incipient detonation in a certain engine makes it possible to raise the compression of the engine about 10 lb., without any

TABLE 2—DATA OBTAINED IN DETERMINING THE DETONATION CHARACTERISTICS OF VARIOUS BLENDS OF ALCOHOL AND KEROSENE

Determination Number	Compression-Ratio	Spark, Deg. Before Top Center	Alcohol by Vol. per cent	Kerosene by Vol. per cent	Determined Equivalent Xylidine in Kerosene by Volume, per cent	
					Individual	Average
74	3.47 to 1	43	15	85	2.25	
75	3.47 to 1	43	15	85	2.30	
76	3.47 to 1	43	15	85	2.40	2.30
68	3.87 to 1	32	25	75	4.60	
69	3.87 to 1	32	25	75	4.60	
70	3.87 to 1	32	25	75	4.60	4.60
53	4.59 to 1	32	35	65	7.40	
54	4.59 to 1	32	35	65	7.15	
55	4.59 to 1	32	35	65	7.00	
56	4.59 to 1	32	35	65	7.10	7.20
50	5.36 to 1	25	50	50	12.40	
51	5.36 to 1	25	50	50	12.70	
52	5.36 to 1	25	50	50	12.80	12.60

TABLE 3—DATA OBTAINED IN DETERMINING THE DETONATION CHARACTERISTICS OF VARIOUS BLENDS OF AN EQUI-MOLECULAR MIXTURE OF ALCOHOL AND BENZENE WITH KEROSENE

Determination Number	Compression-Ratio	Spark, Deg. Before Top Center	Fuel Blend: Equi-molecular Alcohol and Benzene, by Vol., per cent	Fuel Blend: Kerosene, by Vol., per cent	Determined Equivalent Xylidine in Kerosene, by Vol., per cent: Individual	Determined Equivalent Xylidine in Kerosene, by Vol., per cent: Average
77	3.47 to 1	43	20	80	2.35	
78	3.47 to 1	43	20	80	2.25	
79	3.47 to 1	43	20	80	2.15	2.25
71	3.87 to 1	32	35	65	4.65	
72	3.87 to 1	32	35	65	4.75	
73	3.87 to 1	32	35	65	4.75	4.75
80	4.59 to 1	32	50	50	8.60	
81	4.59 to 1	32	50	50	8.20	
82	4.59 to 1	32	50	50	8.60	8.50
84	5.36 to 1	25	65	35	13.15	
86	5.36 to 1	25	65	35	13.55	
87	5.36 to 1	25	65	35	13.45	
88	5.36 to 1	25	65	35	13.30	13.40

greater detonation being obtained than with the untreated fuel at the original and lower compression. The increment in compression made possible by each per cent of xylidine added to the fuel can only be approximated, but the values given are based upon a number of observations made under practical operating conditions, on engines ranging from the single-cylinder Delco-Light to the 12-cylinder Liberty, over a compression range of from 50 to 160 lb. By referring the curves given on the charts to the scales at the right, an approximation may be obtained of the relative composition necessary to give smooth operation at a corresponding increase above the normal limiting or critical compression of the paraffin fuel alone.

The data in Tables 2 and 3, together with the benzol-kerosene curve of Fig. 2, are arranged graphically in Fig. 3. This chart shows to a good advantage the relation between the effectiveness of alcohol and that of benzol for the suppression of detonation when blended with a paraffin fuel. It will be observed that on the volume basis alcohol is considerably more effective than benzol for this purpose. Thus, from the chart, 35 per cent of alcohol blended with kerosene produces an effect in suppressing the detonating tendency of the fuel equal to that given by 55 per cent of benzol blended with the same material.

The middle curve of Fig. 3 is plotted from data obtained in determining the effect of blending an equi-molecular mixture of alcohol and benzene with kerosene in the percentages by volume as indicated in Table 3. This equi-molecular mixture was composed of 39.2 per cent of alcohol and 60.8 per cent of benzol by volume. A given volume of the alcohol-benzol mixture contained, of course, equal amounts of alcohol and benzene on the molecular basis. Thus, 100 cc. of the mixture contained 0.675 gram molecules of each of the ingredients, alcohol and benzene. The curve of the detonation characteristics of the fuel obtained by blending this mixture with kerosene should lie somewhere between the curves obtained in a similar way when using alcohol-kerosene and benzol-kerosene blends, respectively. Since the alcohol-benzol mixture contained 39.2 per cent of alcohol and 60.8 per cent of benzol by volume, it is natural to suppose that for a given concentration of this mixture in kerosene the point representing the detonation value of the blend should lie above the benzol-kerosene curve a distance equal to 0.392 part of the differential between

TABLE 4—A COMPILATION OF DATA BASED ON FIG. 3 AND ILLUSTRATING THE OBSERVATION THAT A BLEND OF TWO FUELS SOMETIMES HAS A GREATER TENDENCY TO DETONATE THAN IS INDICATED BY THE CHARACTERISTICS OF ITS COMPONENTS

(1) Blending Material in Fuel on the Basis of Volume, per cent	20	30	40	50
(2) Excess Effect of Alcohol over Benzene in Equivalent Percentage of Xylidine	1.900	3.050	4.650	6.650
Excess Effect of Alcohol-Benzene Mixture over Benzene in Equivalent Percentage of Xylidine				
(3) Actual Value	0.700	1.150	1.700	2.550
(4) Mean Value of Components	0.750	1.200	1.820	2.600
(5) Ratio of Value in Item 2 to That in Item 3	0.369	0.377	0.366	0.384

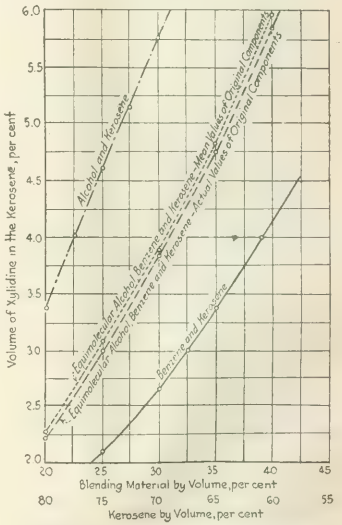


Fig. 4—A blend of two fuels sometimes has a greater tendency to detonate than is indicated by a mean of the values of its components

similar points on the benzol-kerosene and the alcohol-kerosene curves. Because they are of such small magnitude no account has been taken here of the changes in volume that occur when some of these materials are blended. In making the mixtures used in the tests, each ingredient was measured separately; that is, before being blended. But, while the actual points lie very close to this mean value, it is significant that in every case they are below it. This statement is illustrated by the curves of Fig. 4 and by the data presented in Table 4. The values given in the first three items of Table 4 were taken directly from the curves of Fig. 3, and those in Item 4 were obtained by multiplying the corresponding values in Item 2 by 0.392. The curves in Fig. 4 are based on those in Fig. 3 and on the figures in Table 4.

It appears, then, that the mixture obtained by blending two fuels of definite detonation characteristics sometimes has a greater detonating tendency than is indicated by the arithmetical mean between the components on the basis of the percentage in which each is present. The authors have previously called attention to the fact that in some cases two fuels of similar detonation characteristics, upon being blended, give a fuel that has a very much greater tendency to detonate than either of the ingredients. The results obtained in the tests reported in this paper appear to indicate that this characteristic is common to blended fuels; that is, the detonating tendency of a fuel composed of two ingredients is greater than the average of the values representing the detonating tendencies of the two components taken separately. But this is a point that has not yet been determined accurately for a wide range of different materials.

On the molecular basis there is not such a marked difference between the effectiveness of alcohol and that of benzol for suppressing detonation as shown in Fig. 5 as there is on the volume basis as indicated in Fig. 3. The closer agreement between the effects of the two materials on the basis of molecular concentration is due to the smaller size of the alcohol molecule as compared with that of the benzol molecule. But even on this basis alcohol is still more effective than benzol for suppressing detonation. Thirty-five per cent of alcohol, which, as is indicated above, is equivalent in effect to 55 per cent of benzol on the volume basis, is equivalent to 42 per cent of benzol on the molecular basis.

Since the middle curve in Fig. 5 is based on the results obtained by blending an equi-molecular mixture of alcohol and benzol with kerosene, it is natural to suppose that any point on it should lie half-way between the points occupying like positions on the two outside curves, which were obtained by blending alcohol and benzol separately with kerosene. However, the points on the middle curve do not occupy this middle position; but, as is the case on the volume basis, as shown in Table 4 and Fig. 4, they are uniformly lower than the mean values of the original components, thus showing that in this case a blend of the two ingredients is not so effective for the suppression of detonation as the mean average of the effects of the ingredients would indicate.

Heat Treatment of Steel Forgings

IN a paper on Drop Forging Practice presented at the annual meeting of the S.A.E. last winter J. H. Nelson of the Wyman & Gordon Co., gave chemical analysis and physical tests of 107 different melts of plain carbon steel purchased from different mills and fairly representative of the steels used for automobile drop forgings. A tensile test specimen is machined up from an extension or coupon forged on the end of every crankshaft, and which remains on the crankshaft throughout the various heat treatments, to act as a check of these treatments.

The crankshafts were all quenched in water from 1525 deg. Fahr. and drawn back to various temperatures. The heat treatments are intended to give physical properties which will meet the following specifications: Tensile strength, 100,000 lbs. p. sq. in.; elastic limit, 70,000 lbs. p. sq. in.; elongation in 2 in., 18 per cent; reduction of area, 50 per cent; Brinell hardness, 228 to 248. In the following table the averages of the results with any particular steel and heat treatment are given. It will be noticed that the various steels require drawing temperatures ranging from 980 to 1120 deg. Fahr. to bring them within the limits specified. It is concluded from the results that the chemical composition of the steel is not a sufficient criterion to enable any person to prescribe heat treatments with any degree of accuracy, and that the only safe way to determine this is by actual experimentation for each melt of steel used. Following is a summary of the conclusions reached:

1. Steels of the same grade and of the same chemical composition do not respond in the same way to heat-treatment.

2. To heat-treat with minimum loss, only steels from the same melt should be included in a furnace charge.

3. Stock subjected to heat-treatment should be carefully segregated into piles of the same melt; it should be kept segregated throughout the entire process of fabrication to produce satisfactory forgings of uniform quality.

4. Tensile and hardness tests should be required on all heat-treated forgings to check the thoroughness with which the various heat-treatment operations were performed.

5. At least one hardness test should be made on all heat-treated forgings to insure that all have responded to the heat-treatment operations in the same manner.

Table 1—Averages of Test Results

Group	Drawing Temperature deg. fahr.	C 0.400 to 0.500	Mn 0.600 to 0.800	P 0.045 max.	S 0.050 max.	Yield-Point, lb. per sq in.	Tensile-Strength, lb. per sq. in.	Elongation in 2 In., per cent	Reduction of Area, per cent	Brinell Hardness No.	Number of Tests Averaged
A	980	0.430	0.650	0.012	0.043	74,280	111,220	20.1	51.3	238	60
B	1,000	0.430	0.690	0.016	0.041	77,540	115,900	20.8	52.8	238	110
C	1,020	0.470	0.690	0.018	0.041	77,300	115,950	21.6	53.6	236	90
D	1,040	0.470	0.730	0.021	0.044	77,500	115,750	21.3	52.9	238	230
E	1,060	0.460	0.710	0.024	0.042	77,420	114,980	21.6	54.3	238	120
F	1,080	0.460	0.710	0.028	0.046	79,100	117,200	20.8	53.1	240	170
G	1,100	0.450	0.750	0.021	0.042	76,900	114,600	22.1	55.2	241	110
H	1,120	0.450	0.770	0.032	0.044	78,500	115,750	21.7	56.0	243	190

Exports of Passenger Cars, Trucks, Tires, Tractors,

COUNTRIES	GASOLINE PASSENGER CARS						GASOLINE TRUCKS						PARTS	ELECTRIC PASSENGER CARS AND TRUCKS	
	Up to $800		$800 to $2000		$2000 and over		Up to 1 ton incl.		Over 1 to 2½ tons		Over 2½ tons				
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	Value	No.	Value
Europe															
Azores and Madeira Islands													$160		
Belgium	348	$117,352	25	$28,495	1	$2,200	157	$41,323	1	$3,030			30,149		
Bulgaria													109		
Czechoslovakia													4		
Denmark	15	9,918	33	31,474									216,883		
Esthonia															
Finland							1	800					1,311		
France	44	21,856	6	9,550	8	59,350			2	3,240			129,365	1	$4,072
Germany	4	1,741	1	1,200			2	849	1	1,800			1,731		
Gibraltar			1	1,549											
Greece	23	12,038	3	3,723			1	401					3,137		
Iceland and Faroe Islands													187		
Italy			2	2,457	1	3,000							4,320		
Latvia	1	435	2	2,000					1	425	5	17,000	379		
Malta, Gozo and Cyprus Islands	2	826											1,011		
Netherlands	35	20,755	31	30,403	8	25,192							7,529		
Norway	188	59,109	48	46,474	1	2,500	71	21,506	11	8,897			14,532		
Poland and Danzig													28		
Portugal	2	888	10	11,110									2,518		
Roumania	5	1,792			2	8,000							513		
Russia in Europe													43		
Spain	46	27,657	108	126,885	18	53,094	40	10,528	1	2,079	2	$1,133	200,154	1	4,775
Sweden	176	88,105	189	208,966	1	2,412	40	14,620					13,763		
Switzerland			45	43,434	1	3,500							1,033		
Turkey in Europe	12	4,475					6	2,128					3,981		
Ukraine			10	11,000	3	7,650							625		
England	167	116,430	70	78,941	4	18,744	1	1,032	1	1,080			473,764		
Scotland	6	4,390	4	3,585									811		
Ireland	11	4,717											7,374		
Yugoslavia, Albania, etc.													1,153		
North and South America															
British Honduras	2	670											390		
Canada	640	378,274	778	943,924	83	231,256	47	36,731	97	113,350	52	116,846	1,946,003	1	400
Costa Rica	5	3,496											940		
Guatemala	1	565	3	3,121									1,856		
Honduras	3	1,098					2	545	1	3,935			1,893		
Nicaragua													250		
Panama	12	6,699	4	4,598									4,885		
Salvador			8	11,387									2,084	1	3,500
Mexico	428	201,315	131	142,542	16	50,297	36	11,507	22	20,377	1	4,751	60,041	1	875
Newfoundland and Labrador			2	3,475									3,632		
Barbados	1	200							1	2,500			3,179		
Jamaica	13	7,266	7	9,050	3	6,615	15	6,197	1	1,610			9,346		
Trinidad and Tobago	17	7,382	2	1,800			10	4,040					3,445		
Other British West Indies	7	2,356	1	1,595	1	3,500	12	4,899					2,037		
Cuba	127	56,250	38	48,607	8	26,443	12	4,081	2	3,634	1	2,835	83,612		
Dominican Republic	6	2,333	1	1,391									3,291		
Dutch West Indies	6	2,440					1	414					1,152		
French West Indies													925		
Haiti	2	1,448											2,827		
Virgin Islands of U. S.	1	367	1	1,300									1,073		
Argentina	26	13,250	85	90,168	18	57,638			1	2,108			293,423		
Bolivia													631		
Brazil	12	8,544	37	40,868	3	11,500							43,502	1	1,620
Chile							9	3,762					8,190		
Colombia	4	1,592	2	2,222									3,702		
Ecuador	6	4,506	4	4,171									764		
British Guiana													905		
Dutch Guiana	4	1,820											2,668		
French Guiana													45		
Paraguay															
Peru			1	990			15	6,060					8,777		
Uruguay	40	13,830	1	1,323	2	7,000	10	2,832					19,996		
Venezuela	23	10,619	6	8,064	4	13,384	5	2,041					8,927		
Asia															
Aden													350		
Armenia and Kurdistan	5	1,750					4	2,803							
Ceylon	11	7,369											638		
China	42	25,365	26	25,950	1	2,500	3	2,274	7	3,430			9,388		
Chosen															
British India	22	14,301	7	11,148	1	2,200	6	6,277	3	4,860			20,527		
Straits Settlements			4	4,656									7,581		
Other British East Indies													53		
Other Dutch East Indies			1	1,329					3	3,089			1,339		
Java and Madura	2	1,500	18	25,036	3	9,916							11,343		
French Indo-China													2,290		
Hejaz, Arabia and Mesopotamia													3,670		
Far Eastern Republic													250		
Hongkong			1	1,150	2	8,000			1	1,910	3	5,500	1,414		
Japan	108	33,681	7	9,485	1	3,600	50	25,980	2	3,817	4	8,687	41,376	12	15,740
Palestine and Syria	81	34,372	7	7,724									8,038		
Persia	1	513											430		
Philippine Islands	48	26,125	4	6,940	2	4,697							24,357		
Greece in Asia															
Siam	3	2,172	6	6,058									401		
Oceania															
Australia	1,130	234,093	319	325,301	6	13,510	10	13,526	63	81,159	5	6,633	104,394	1	3,000
New Zealand	26	18,207	44	49,165	1	3,500	2	2,616	2	3,996			14,961		
Other British Oceania													264		
French Oceania													292		
Other Oceania	1	755											208		
Africa															
Algeria and Tunis	6	2,782													
British West Africa	1	755	5	5,306	1	2,238							11,450		
British South Africa	36	24,337	51	51,888									10,564	1	1,809
British East Africa	1	250	3	4,000									494		
Canary Islands	2	1,210							2	3,611			856		
French Africa	1	425											2,371		
Egypt	24	11,468	3	5,000			3	1,244					12,304		
Morocco													126		
Portuguese Africa	1	663					9	3,636							
Portuguese East Africa			2	1,996									386		
	4,023	$1,670,897	2,211	$2,506,904	204	$645,536	580	$234,455	326	$273,937	73	$166,385	$3,933,488	20	$35,791

Motorcycles and Aircraft for April, 1922

TIRES						FARM TRACTORS		PARTS	MOTORCYCLES		AIRPLANES AND SEAPLANES		PARTS	COUNTRIES
Casings		Inner		Solid										
No.	Value	No.	Value	No.	Value	No.	Value	Value	No.	Value	No.	Value	Value	
														Europe
						1	$304							Azores and Madeira Islands
334	$6,009	200	$418					$527	156	$43,328				Belgium
														Bulgaria
276	4,919					1	385		1	375				Czechoslovakia
4,067	77,287	1,522	3,172	4	$150			1,091	38	9,185				Denmark
									10	2,634				Estonia
316	7,011	230	579					242						Finland
1,144	23,536	5	15			10	4,138	709	80	13,244			$300	France
5	300								5	1,398				Germany
54	[illegible]													Gibraltar
48	[illegible]	43	75			3	2,192							Greece
106	1,680	82	150											Iceland and Faroe Islands
822	[illegible]	[illegible]	970					407	85	23,202				Italy
9	153	12	23			1	385	98						Latvia
384	4,071	20	39	8	250				2	350				Malta, Gozo and Cyprus
1,224	20,973	340	510	44	1,156			78	215	62,489				Netherlands
4,474	91,346	2,005	5,559	22	997				59	14,689	1	$3,000		Norway
								2,996						Poland and Danzig
									28	7,338				Portugal
1,013	17,220	359	785						1	308				Rumania
						14	56,014	20,567						Russia in Europe
1,857	45,995	2,684	5,495	310	5,893	46	17,375	565	141	37,902				Spain
4,040	68,735	2,210	4,951	104	2,043			412	38	6,109				Sweden
183	[illegible]	[illegible]	199	4	64				22	5,931				Switzerland
170	[illegible]	218	368					590						Turkey in Europe
140	2,000													Ukraine
25,099	[illegible]	[illegible]	17,899	479	9,781	3	1,298	2,875	41	11,544			300	England
[illegible]	[illegible]	[illegible]	114											Scotland
157	[illegible]	115	[illegible]					10,833	1	100				Ireland
370	6,008	486	908											Yugoslavia, Albania, etc.
														North and South America
24	289													British Honduras
6,244	92,752	10,856	23,250	270	10,782	2,798	312,793	50,791	101	27,463			226	Canada
[illegible]	1,088	73	166						1	75				Costa Rica
103	2,042	70	184	2	68	1	3,341						14	Guatemala
44	987	50	144	6	213			1,276						Honduras
52	[illegible]	[illegible]	124											Nicaragua
750	11,510	698	1,303	30	454			39	2	974				Panama
401	4,724	396	611	26	538									Salvador
2,738	[illegible]	[illegible]	11,669	1,701	25,792	7	4,405	12,970	7	2,027			150	Mexico
515	7,520	607	1,158		45			89						Newfoundland and Labrador
45	525	57	117					64						Barbados
321	4,237	201	355	46	1,181									Jamaica
579	5,659	379	1,025	18	182				2	550				Trinidad and Tobago
17	215	20	36											Other British West Indies
7,686	100,198	7,013	11,730	207	6,817			56					138	Cuba
279	2,909	82	239					282					234	Dominican Republic
110	1,274	54	131											Dutch West Indies
379	4,498	98	187	88	1,855			121						French West Indies
[illegible]	[illegible]	103	217											Haiti
41	366	42	76					50						Virgin Islands of U. S.
5,699	81,595	8,688	19,334	8	198	123	59,229	1,233	10	2,582			50	Argentina
								5,775						Bolivia
3,511	37,124	4,686	4,765	76	1,052	30	10,937	964	10	2,905				Brazil
515	7,602	409	986	2	104			613						Chile
[illegible]	[illegible]	[illegible]	1,044	2	42	5	15,300	1,258						Colombia
[illegible]	[illegible]	[illegible]	85			4	1,988							Ecuador
[illegible]	[illegible]			12	178									British Guiana
32	[illegible]	36	61			2	650	50						Dutch Guiana
2	62													French Guiana
														Paraguay
968	15,349	472	1,083	20	1,077	1	593	815						Peru
1,574	18,000	1,160	1,626			40	14,584							Uruguay
1,269	21,145	1,336	2,589					11,577	2	468				Venezuela
														Asia
[illegible]	892	48	75											Aden
						11	4,905	443						Armenia and Kurdistan
65	785	20	37											Ceylon
646	10,078	327	633	58	1,225				4	1,780				China
219	1,900	207	609											Chosen
567	6,224	451	1,589	110	2,781			10,712	3	811				British India
509	5,214	139	368	6	144									Straits Settlements
														Other British East Indies
														Other Dutch East Indies
605	11,694	70	210	31	705			1,562						Java and Madura
30	210	30	60											French Indo China
10	108	12	[illegible]											Hejaz, Arabia and Mesopotamia
														Far Eastern Republic
30	[illegible]													Hongkong
1,155	17,142			28	538	2	686	90	75	21,915				Japan
587	6,822	364	785			3	939							Palestine and Syria
														Persia
3,054	40,689	[illegible]	[illegible]	108	2,481			679						Philippine Islands
						[illegible]	385							Greece in Asia
18	486	34	102			3	17,190	1,468						Siam
														Oceania
[illegible]	[illegible]	[illegible]	3,100	301	8,862	6	5,558	1,601	70	19,085				Australia
3,148	50,602	2,777	5,764	291	10,173			196	31	8,250				New Zealand
11	[illegible]	[illegible]	76											Other British Oceania
35	[illegible]	44	76											French Oceania
4	77	6	15						1	500				Other Oceania
														Africa
								580						Algeria and Tunis
944	20,271	1,220	4,194											British West Africa
2,039	[illegible]	1,132	2,202	21	600				9	2,715				British South Africa
465	[illegible]	70	122											British East Africa
187	[illegible]	45	150											Canary Islands
[illegible]	[illegible]													French Africa
751	7,020	636	[illegible]	[illegible]	1,225	5	[illegible]	[illegible]						Egypt
														Morocco
														Portuguese Africa
														Portuguese East Africa
99,662	$1,374,343	73,176	$154,422	4,489	$100,639	3,121	$537,396	$118,723	1,248	$332,215	1	$3,000	$1,412	



Changes in Design Make Foreign Service Difficult

Service and Sales Conditions in China. Orientals Like Magneto-Equipped Cars. Clearly Written Parts Books Are Essential.

Editor, AUTOMOTIVE INDUSTRIES:

I desire to express some views regarding ways in which manufacturers could facilitate overseas service, gleaned through three years of experience in China and the Philippines.

Omitting the element of time, Chinese mechanics are most satisfactory. Put a car which is new to them in their care for repair and they will spend hours in consultation before taking anything apart; but when repaired and assembled, parts will be in place and lock washers and cotter pins will not be forgotten. I have seen old cars sold for new after having been overhauled and refinished by Chinese workmen, and only an expert could distinguish between the old and the new.

Service facilities in China can easily keep pace with increasing demand for automobiles, as growth of the automobile business in China will necessarily be slow because of the scarcity of roads there and the bad condition of most of the existing roads.

In the center and south of China there is very little wheeled traffic except for wheelbarrows, nearly everything is borne on the shoulders of coolies. Heavy carts in the north keep the roads there in nearly impassable condition. Occidentals have built the roads most used by automobiles in the vicinity of treaty ports, and these are well maintained, and are kept free from anything that might puncture tires by the barefoot coolies carrying the human and freight loads through the street.

When an automobile suffers an accident which would ordinarily require floating, and a float cannot be easily obtained, a dozen coolies with bamboo poles and grass rope can easily be found who will carry the car, with a rapid swinging gait, and the while singing some boisterious cant, to the service station.

Service problems are not difficult in China when adequate stocks of spares are obtainable, in view of the grouping of most of the cars in large cities and the low salaries paid to competent native workmen. Undoubtedly road building will extend from these cities and existing service facilities can be expanded and branches established in the provinces even more rapidly than the increased demand created by road building will necessitate.

The greatest obstacle met in overseas service is caused by the frequent change in design and equipment, especially the latter. Generally, the dealers are obliged to service all the accessories supplied with the cars they sell, and each dealer often handles several makes.

Car owners are not pacified by being told that many different types of speedometer heads and shafts, electrical parts or units, carbureter parts, etc., have been used on cars of the model he owns, and that all types are in stock except the ones he needs. The car owner wants parts to fit his car and is very likely to buy his next car from the company with a reputation for being able to supply spares when needed.

Whatever equipment is furnished with an export job should be retained for at least a year and preferably, from the importer's standpoint, irrespective of improvement, should be standardized throughout the production of that model. Then the distributor could safely stock an adequate supply of spares.

Confusion of policies of automobile manufactures and accessory manufactures is frequently encountered, one referring to the other on export service, and each refusing to sell certain parts or sub-assemblies. Owners complain about being deprived of their cars or some unit thereof for four months or more. this being the time consumed in having certain repairs made at the factories.

Changes in design are frequently made for no apparent reason; in one case a manufacturer of a six-cylinder car brought out a four, the engines of both being made in their own works, the six has a very satisfactory oil gage, but the four has a different and troublesome one; the parts of the six could have been used in place of the

A FEW weeks ago we published some pictures of Chinese service stations which H. A. Trussell, the writer of the accompanying letter, felt were not properly representative of the kind of service American cars might expect in the Orient.

Since Mr. Trussell has had considerable practical experience in selling American cars to China, we asked him if he would write us more fully about his experience, so that various manufacturers in the automotive industry might learn more details about the Chinese market. The following letter is the pleasing result.

* * *

You will be interested in the intimate and practical details which are given. "The greatest obstacle met in overseas service," the writer says, for instance, "is caused by the frequent change in design and equipment, especially the latter."

trouble-making parts of the four with a little forethought in design and without any added cost.

To exhume the question of whether export machines should be magneto equipped: Greater opposition is met in selling a vehicle without a magneto than in selling one with a left-hand drive. The first questions from a prospective owner are: "What is the mileage per gallon of fuel?" "Is it equipped with a magneto?"

Magneto ignition is preferred because it is independent of a storage battery and more generally satisfactory in service. Modern magnetos are self-contained, simple and more often interchangeable. Much of the dislike for battery ignition distributors could be overcome if they were made interchangeable.

A fleet operator or small dealer can stock one magneto and one extra breaker mechanism to provide for change in direction of rotation, and have a spare ignition system for any of his tractors, trucks or four-cylinder passenger cars which are magneto equipped.

Electrical devices demand more service in the Orient than in our domestic service, due to the hot, humid climate and to the fact that many of the cars are used on islands or at seaports where the ocean breezes must be contended with. And battery service stations with the many loan batteries necessary to service all the different makes of cars are not to be found outside of the larger cities. More than 100 service generator armatures are carried by a distributor in Manila to care for about 1200 cars of a single make in the Philippine Islands.

The people are willing to pay a reasonable extra charge for magneto equipment, and it seems strange that the manufacturers should oppose it so strongly.

I have been in several factories where the feeling seemed to exist that the export business is a necessary evil, and that domestic cars would have to do for export until it reached a certain percentage of their total output. Exported cars are often operated under conditions unknown to this country and it would be a great satisfaction to see American cars meeting them.

Frames and obscured body parts should be better protected and rustproof metal used for fenders, etc., to protect against unfavorable climatic conditions.

I have known rain to fall incessantly for a month in Manilla and the rainfall for each of ten consecutive days during this period to exceed the average total rainfall of the United States for an entire year.

One of the oldest American manufacturers, one of the very first to be a big factor in export trade, recently revised their parts books and consolidated all models in a master parts catalogue, which included many changes in part numbers; parts bearing the new numbers came through a month or more ahead of the revised parts books which upon their arrival were found to be printed on paper glazed with some glutinous sizing, with the obvious result that the sheets adhered, and extreme precaution was necessary to preserve at least one of these books.

Parts books, in many cases, seem to just happen; many of them contain erroneous information, omit very important details, lack continuity and do not show the proper relation of various models. With proper forethought one parts book could be used for every model ever built by any one company, excepting fundamental changes in design; slight addenda would be necessary, with the advent of unforeseen development, to care for new models and could be included in a few additional sheets bearing the necessary information regarding technical changes.

Briefly stated, the catalog should be arranged and the parts numbered so that part numbers would indicate the group and approximate relation of the parts, and the relation of a part to its assembly and the assembly to the whole should suggest an approximate number and indicate its position in the parts book, in the card file and in the stock room. Groups of numbers should be skipped in every assembly and sub-assembly to provide for expansion and addition of equipment, etc.

Part numbers should be retained, any similar part bearing the same number for all models regardless of structural and design changes. Each lot of cars differing from former models should bear a different symbol in a conspicuous place so the owner and operator would be able to tell a parts service salesman all the characteristics of his car by stating a single letter, or any other appropriate symbol, shown on his car.

Each part should have a letter, or appropriate symbol, cast, forged, stamped or painted thereon, corresponding with the symbol borne by the model or lot of cars in which this part was first used. Parts which are difficult to distinguish, such as gears and pinions of various pitch or ratios, should bear the full part number and symbol.

In filling an order for a part, one could, without reference to an index, open the book at nearly the correct page and quickly ascertain the exact part number. Knowing the part number, reference would be made to the price book or appendix, which I choose to have separate from the parts book to encourage frequent revisal to keep the prices on an equitable basis, new price books or sheets to be issued at least as often as new models or series of cars are produced; symbols denoting various models on which different parts were introduced to be shown in connection with the prices; that is, a part bearing a certain number desired for a "C" series car will be found in the proper numerical location in the price book which may show different types of this part to have been first used on "A"-"D"-"G" cars, indicating that an "A" part is used in this connection and showing the current price of same.

Yours very truly,

H. A. TRUSSELL.

Plowing with Garden Tractors

Editor, AUTOMOTIVE INDUSTRIES:

In your April 23 issue, Mr. Lon R. Smith takes exception to statements contained in my garden tractor article of March 2.

With reference to the plowing ability of the small tractor, it is my humble opinion that undue emphasis has been placed upon this feature in the marketing of garden tractors, and that the importance attached to plowing is an inheritance from the larger tractors which are designed primarily for plowing and are capable of little else. The main usefulness of the small tractor lies in its ability to do work that the larger tractor cannot do—namely, the cultivation of row crops.

The small farmer who does not have a large tractor or other means of plowing is not interested in the garden tractor primarily as an instrument for plowing, for he has plenty of neighbors who do have plowing equipment and are only too glad to do his plowing for him.

Farms are overstocked with plowing equipment now. One cause assigned for the depressed market for farm products which has resulted from surplus production is that every tractor owner has attempted to make the tractor pay for itself by plowing an increased acreage. This condition has created an active demand for cheaper methods of cultivation so that the crops may be marketed at a profit.

FRED C. ZIESENHEIM.

Lawbreaking Doesn't Settle Labor Troubles

Coal strike reaches critical stages. Both employers and employees have broken the law when they felt strong enough to do so with impunity. Labor unions are autocratic. Many employers are autocratic. Autocracy opposed to cooperation.

By Harry Tipper

IN the unfortunate occurrences which have happened at Herrin, Ill., through the complacency of the town and county officials; the inaction of the State and the mistakes of the miners' leaders and the operators, the dangers in the continuance of the coal strike have been brought to the fore again. The fact has become apparent that in a strike of these proportions, under the calm surface, the turmoil is sufficiently seething so that any little thing breaks the surface and causes a violent eruption.

This sort of lawless eruption is not only bad in its effects upon the present strike but is entirely bad in its effect upon the future relations of industry and the way in which the future problems will be considered. This lawlessness is not confined to the unions or the operators. Both sides have broken the law at all times where they have felt sufficiently powerful to do it with impunity. The complacency of the elected public officials of the vicinity and the inactivity of the State officials, are more than serious. Apparently, no punishment is to be visited upon anybody for the Herrin disasters, and no action is to be taken with the officials who are obviously derelict in their duty in permitting the disturbances to exist.

The most disturbing fact in the whole situation is that powerful bodies of men in this country can, within certain localities, disregard the law of the country and base their actions entirely upon their own interests, confident that the officials will excuse the action by cloaking it with a veneer of legality. Not many months ago in West Virginia, we had the spectacle of the coal operators running the county government, paying deputy sheriffs and other people who were supposed to protect the rights of the citizens, and generally supplying all the sinews of war for the government of the localities, and operating this control obviously for their own benefit regardless of the fundamental laws.

The same situation is apparent in the Herrin, Ill., disaster, the only difference being that the leaders and law breakers in this case belong to the employees and not to the employers' ranks. In the Herrin district it so happened that the union officials and the employees' representatives controlled the elected officers and the political conditions of the neighborhood; consequently, this control has been used to subvert the law for the purposes of the union just as the control in West Virginia was used to subvert the law for the purposes of the employer.

Nothing could illustrate quite so thoroughly the uselessness of attempting to produce an agreement and an orderly organization of industry through the arrangements made between the union leaders and employer's organizations. Leaders who are incapable themselves of adhering to the laws to which they are subject are equally incapable of standing by an agreement unless it proved to be to their own advantage, and this has been true of the recent history of the organized forces on both sides in the controversy between employers and employees.

The recent history in the actions of labor unions and of employers' groups shows that there is a tendency on both side to over-ride agreements for the observance of law wherever this is not sufficiently partisan to serve the purposes of the leaders on either side. Primarily, the leaders of the employers' groups do not desire a fair agreement on a fair and reasonable basis, although many individual employers are very anxious to secure such a basis. Similarly, the leaders of the unions are not particularly interested in a fair and just settlement of a case, although a majority of the members of the unions would be satisfied with any agreement approaching such a consideration.

The leaders of these factions are inclined to be more stubborn and fanatical in their approach to the question than the ordinary rank and file on either side.

The experience of supervisors and workers shows amply that the average employer is anxious to give his men fair treatment, and the average employee is anxious to do his bit fairly and honestly. Apparently, in the United States, the fact that individuals are members of an organization for the purpose of furthering some definite ideals, methods or processes, by which improvement may be expected, permits the members of an organization, as members, to en-

THE coal strike affects the automotive industry in more ways than one. It affects the supply of coal needed to keep automotive factories running. And it furnishes an excellent example of the varied interplay of forces which exist in industrial relationships.

* * *

These forces are at work in automotive plants. The relations between employer and employee revolve about the same set of fundamentals throughout the country.

* * *

What do you think about the coal strike?

force attention to the organization by means which, as individuals, they would condemn for their illegality and tyranny.

This is not confined entirely to labor organizations or manufacturers' groups. We have had the same spectacle exhibited by the actions of the Ku Klux Klan, which has evidently regarded itself as above the law, and mentor to the law in some cases.

THE same disregard of fair processes of consideration is to be observed very often in the actions of the labor union and in the actions of the employers' associations. It is this disregard of law by group organizations which distinguishes trade unionism in the United States from the later history of trade unionism in Great Britain, and which makes it impossible for us to consider using trade union machinery if we are to arrive at a peaceful condition in industry and thorough co-operation in the industrial establishment.

The present agitation for the open shop is necessarily corrective to the situation, although a good many of the people who are agitating it are filled with a bitter desire to quash the unions rather than with any real idea of providing an agreement and an improvement. The propaganda which is directed against the unions, and is an attempt to make a closed shop against the unions, is of course dangerous and useless.

But the open shop—the shop which is open to all comers who are skillful regardless of their affiliations in any way whatsoever—is necessary to the proper development of co-operative peace in American industry, and cannot be secured except by making the open shop an example of fair treatment, fair consideration, and ahead of either the union or the ordinary shop in the justice it exacts and considers.

The labor union is autocratic. The average employer is autocratic. Autocratic leadership will not provide a continuous peaceful co-operation.

Meantime, the Government has decided to interfere in the coal strike. The ugly showing of the Herrin circumstances demands the interference of the Government if law and order are to be decently maintained. It is probable that the Government will have to consider the pending railroad strike vote, regardless of whether the Government desires to interfere or not. The conditions obtaining in the mining business and those obtaining in some localities in the railroad business are likely to demand Government interference and action as a natural consequence.

Organic Accelerators for Vulcanization

THE degree of vulcanization depends upon three factors, viz., the proportional amount of sulphur added to the crude rubber, the temperature at which the reaction is effected and the duration of the reaction.

It is easily understood that the manufacturer is greatly interested in completing this basic operation in a minimum of time. To this end he may act on the first factor, by increasing the proportion of sulphur in the mixture. But for soft rubber articles, which constitute the great majority of rubber products, he cannot exceed 15 to 20 per cent without risking inequality of the vulcanization and without loading the mass with a great excess of sulphur, which, after vulcanization, acts like an inert constituent which is sometimes rather objectionable.

He can also increase the temperature. As a matter of fact, the temperature used has a mean value of 285 to 300 deg. Fahr. and rarely attains 340 deg. As the heat necessary is generally furnished by water vapor (steam) an increase in temperature involves added fuel expense.

The time of the reaction varies in practice between twenty minutes and an hour and a half. It may be even still longer if large masses are being vulcanized, and also in the case of ebonite (hard rubber).

It will be seen from this discussion that the consumption of steam is an item of expense which has an important influence on the manufacturing cost of rubber articles, especially at times when coal is selling at high prices.

For many years there have been known a number of substances possessing the property of accelerating the process of vulcanization. Litharge and calcinated magnesia, when added to the mixture of crude rubber and sulphur, permit of attaining the desired degree of vulcanization in a shorter time and at a saving of 30 to 50 per cent in the consumption of steam, while at the same time increasing the output in the same proportions. These substances, the action of which is as yet little understood, are commonly used by the manufacturers.

Since 1912 new types of accelerators have been discovered, and their number increases from day to day. In some instances their effect is so rapid that they are useless for that very reason. The history of the discovery of these new accelerators is quite interesting, says a writer in the *Revue Universelle des Mines*.

In experiments with synthetic rubber, it was observed that this material had the serious defect that it reacted very slowly with sulphur, some grades vulcanizing hardly at all. The experiment was then tried of adding materials which were thought to exist in small quantity in natural rubber and which acted as catalysers in the vulcanization. Eaton and Grantham proved that the proteins, which are always present in crude rubber, accelerate vulcanization.

The first patent dates from November, 1912, and is issued to the Elberfelder Farbenfabriken vorm. Bayer. It covers the use of piperidine in small quantities. This substance has an accelerating effect on the vulcanization of not only synthetic but also natural rubber. Now that synthetic rubber has lost all commercial interest, in view of the enormous production of plantation rubber, these new catalysers, a product of the researches on synthetic rubber, are made to serve with an unexpected success in the vulcanization of both wild and plantation rubber.

The great majority of the organic accelerators discovered so far are nitrogenous compounds. Among them will be found the amines, the imines, the amides, and nitrogen derivatives. It must not be concluded that all of the members of these various chemical groups are capable of accelerating vulcanization. This phase of the problem is still obscure.

Another almost general characteristic of these substances is their basicity. Bayer in his patent of Jan. 1, 1915, says on this subject:

"The property of accelerating vulcanization seems to be common to all organic bases having a dissociation constant of more than 1×10^{-5}." Since then, however, some exceptions to this rule have been found. Certain accelerators are not basic, but the rule given by Bayer is still valuable. It recalls the same properties of litharge and magnesia mentioned above. It may be added that caustic soda is a very powerful accelerator, but is not well adapted to industrial use, as it does not mix well with rubber. The Dunlop company has patented its use in the state of a solution in glycerine.

AUTOMOTIVE INDUSTRIES
AUTOMOBILE
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Secondary Inflation

HERE is what D. R. Crissinger, Controller of the [illegible]rency, said about so-called secondary in[illegible]her day. His remarks are pertinent to [illegible]dustry:

"[illegible]rainst any tendency to what I believe the economists refer to as a secondary inflation. If I understood them, we had a primary inflation during and immediately after the war. I take it that, in the realm of prices, they mean by primary inflation a general advance of prices, in a time when demand is greater than supply, the purpose being to check the demand and therefore make the supplies go farther.

"A secondary inflation, I take it, is quite a different affair; a tendency to advance prices at a time when there is a surplus of producing capacity, but a deficit in buying and consuming capacity; the theory being that as the public tends to buy on a rising market, the one effective way to make it buy is to make the market rise. Now, it occurs to me that there are proper exceptions to all rules; and for myself, I do not believe that a public which finds itself unable to buy at a lower price level, is likely to be better able to buy at a higher level, unless its income goes up at least a little faster than prices advance.

"I saw it announced the other day that owing to the advancing price of wool there was likely to be a general, though for the moment moderate, increase in the price of woolen clothing; that on account of the condition of the cotton market, we might anticipate some advance in the price of cotton fabrics; and, finally, that some factors in the metal market were disposed to discourage orders at this time, hoping thereby to secure better prices later on.

"There is no use telling me that the man who is too hard up to buy a new suit at $25, is going to rush around to the shop and buy the same suit when he finds it has gone up to $35. That might be true of an occasional individual with an income so big that the difference between $25 and $35 is rather academic; but it is not true of whole communities, of the consuming mass of people at a time when they have fallen more or less into the habit of cutting the garment of expenditures in accordance with the cloth of income."

More Efficient Airship Travel

ONE of the difficulties in connection with lighter-than-air craft is due to the fact that as the fuel is used up gas must be allowed to escape from the envelope in order to keep the buoyancy the same. For long trips the weight of the necessary fuel supply represents a considerable fraction of the weight of the whole machine and there is therefore a great waste of gas. This matter will be of far greater importance than it has been so far, if the expensive helium gas should come into use. It is therefore a fortunate thing that a way has been discovered to eliminate this waste. This consists in condensing the steam of the exhaust gases and carrying the condensate on the machine as ballast.

The water of condensation from a certain amount of gasoline, if the latter were completely burned in exactly the right amount of air necessary for the process, is 46.5 per cent heavier than the fuel. With some of the fuel not burning as a result of incomplete vaporization and with either too rich or too lean a mixture the proportional weights of fuel and water of condensation will be slightly different, but in any case there will be an excess of water vapor and it is not necessary to condense the last drop. Whatever excess there may be can easily be gotten rid of by suspending the operation of the condenser temporarily.

Thus with an airship fitted with an exhaust products condenser the machine will not rise to constantly higher altitudes as the fuel is used up, but will remain at a substantially constant altitude, provided there is no change in atmospheric temperature.

Unless some of the exhaust gas is allowed to escape the ship gets heavier right along, and the altitude of flight can be readily controlled by discharging some

of the water of condensation or other ballast carried. What is holding up the use of the non-inflammable helium gas in airships is its high cost of production, and it is gratifying to learn that a method has been developed for using this gas economically once it has become available.

Cost of Human Unrest

A RECENT strike of the employees of the Brooklyn Rapid Transit Company in New York is said to have cost that organization $2,483,483. This is a tremendous sum of money. The effect of such a loss on the profit and loss account of even the largest of industrial organizations can well be imagined.

The figures are of interest to the automotive industry because they serve to visualize again the actual cost of friction in industrial relationships. Losses of a similar character occur constantly in automotive production, even though few strikes actually take place. It is easier to visualize the cost of labor discontent when a strike is held, because the whole situation is brought to a focus by such acute difficulties. But minor irritations reflect in lack of production effort and lowering in efficiency and produce extra expense exactly similar to that caused by strikes with consequent tie-up.

Constant and close attention to the human factors affecting production will reduce these losses to a minimum.

Crankshaft Lubricating Holes

THERE are two general methods of arranging the oil holes in crankshafts with pressure lubrication. One consists in providing all of the bearings with drill holes either co-axial or parallel with the crank axis and then drilling connecting holes centrally through the length of the crankarms, the open ends of all holes being plugged. The other method consists in drilling single inclined holes through adjacent main and crankpin bearings and the intermediate crankarm. The former method was the first to come into extensive use, but recently it has been practically displaced by the second.

Our reason for referring to this subject here is that in a recent technical paper issued by the Motor Vehicle Engineering Institute of the Saxon Technical College, Prof. Wawrziniok sounds a warning against the use of the inclined oil hole and recommends a return to the old method of drilling. His action seems to have been induced by the failure of a single crankshaft through its inclined oil hole, of which a photographic illustration is shown. He claims that the oil holes at the junctions of the journals with the crankarms come too near the surface, and that conditions are rendered still worse by the fact that very frequently, owing to scanty dimensions of the bearings, the fillets at these points are made entirely too small.

In the particular case cited a crack developed at the point on the inner side where the oil hole enters the crankarm, which first extended toward the surface of the crankpin and then produced a helical permanent fracture corresponding to the torsional stress on the pin. The crankshaft was of the case-hardened type, and one more objection urged against the method of drilling is that the oil hole lies at the junction of journals and crankarm in the hardened case at a point which, on account of the great aggregation of material, does not permit of change of form in quenching.

The author concludes that this method of drilling the oil hole is undoubtedly somewhat cheaper, still it is better to stick to the old method and drill only in the direction of the crankshaft axis and perpendicular thereto.

It is always dangerous to reason from the particular to the general, and we believe that in this case the conclusion drawn is absolutely unsound. It is perfectly true that a crankshaft with inclined oil holes may break if the dimensions are inadequate or the shaft is injured in the process of manufacture. Without these defects of design and construction, however, the shaft with inclined oil hole is stronger in every way, and therefore less liable to break than the other type. The radial oil hole removes a good deal of metal from one particular section of the pin and that a section where the stress is either a maximum or at least materially greater than at the junction of the crankpin and crankarm, where the inclined hole comes near the surface. Therefore, the shaft is less weakened by the inclined than the radial oil holes, and this was one of the considerations which led to the adoption of the former. That one crankshaft with inclined oil hole should have failed is far from proving that this particular method of drilling is inferior.

It Works Both Ways

SALESMEN too often regard market analysis as a cold-blooded study of a territory with the human equation carefully omitted, thus enabling the factory to apply pressure to obtain the desired sales results. This is true to the extent that a knowledge of production costs enables pressure to be applied to factory workers. Needless to say, production costs must be known.

Ignorance of actual demand for a product within a territory sometimes acts to the disadvantage of the selling organization and salesmen as well as to the parent organization.

An Eastern factory branch had difficulty in obtaining the necessary quota of sales from part of its territory, and three salesmen had come and gone in rapid succession through inability to get results. At this time a research department was established and its first undertaking was to analyze this territory. It was found that there was not enough business to be had in the territory to keep one salesman alive.

This example helped to convince a skeptical sales force of the value of market research and gained for the manufacturer a much needed co-operation from the entire selling organization for further analytical work.

June Output Likely Better Than 250,000

May Exceed Previous Month—Second Quarter Will Approximate 725,000

By JAMES DALTON

NEW YORK, July 3.—There is substantial reason to believe that production of passenger cars and trucks for June exceeded a quarter million. A preliminary survey of the shipping figures for the first three weeks of the month indicates that the total will be larger than in May, when it reached 256,000. It is almost certain to be as large. Output for the second quarter, therefore, will approximate 725,000.

Even to those within the industry it seems almost unbelievable that so many motor vehicles could have been absorbed in three months. With the country just recovering from a long period of depression, sales have been larger than ever before for a like period.

Seasonal Decline Expected

In the face of the tremendous business of the quarter just closing, it seems inevitable that there will be a seasonal decline this month. Spotty retail sales conditions in certain sections indicate that it already has begun, but there are no signs that it will approach the proportions of a slump.

The falling off in sales already apparent has been largely the result of local conditions and is by no means general. It has been in certain sections of the South and in some industrial cities. On the other hand, trade still is brisk in Tennessee and North Carolina and in many of the manufacturing centers.

Buying of passenger cars in the farm districts, up to this time, has been chiefly by business and professional men. The real farm market has not opened, and when this agricultural buying gets under way it may do much to hold up the volume of business. July is certain to be a big month, although production will be smaller than in June because several companies will close the first half of the month for inventory, and all were down over the Fourth of July.

One of Best Year's in History

No matter what happens in the remaining months of 1922, distributors and dealers will have had one of the best years in their history, and many of them will do better than ever before.

The parts and accessory branch of the business still is running at top speed. Many manufacturers have commitments running through September and some of them into October. Vehicle manufacturers are displaying caution, however, and will govern production by demand. In the face of an unprecedented demand, there is no disposition to be reckless.

Maxwell Acts to Retire Notes Year Before Due

DETROIT, June 30—The Maxwell Motors Corp. has invited tenders for the immediate sale to it of its 7 per cent series D gold notes aggregating $1,000,000, the maturity date of which is June 1, 1923. This step to retire the notes almost a year before they are due is declared to be in line with the action of the company in March last, when it retired $4,000,000 of series A gold notes from 60 to 75 days before maturity.

The gradually increasing ratio of current assets as compared with current liabilities and the quick surplus thereby available enables the Maxwell company to take this action. Much of the credit for this gratifying position is given by President Wilson to the executives in the various departments who have made it possible to reduce operating costs and expenses to a minimum without sacrificing quality.

Underwriters to Conduct Anti-Accident Campaign

NEW YORK, July 3—The National Bureau of Casualty and Surety Underwriters, of which Jesse Philips, former state superintendent of insurance, is general manager, has decided to conduct for its members an automobile accident prevention campaign and has appropriated a substantial sum for the purpose. The bureau makes the rates for automobile insurance other than fire and theft, and its membership includes 23 of the leading stock casualty companies.

The campaign was decided upon for business reasons. Statistics for the year 1921 show that there were 12,500 deaths from automobiles in that year and more than 300,000 other accidents. The efforts of the bureau will be directed along fundamental lines such as expert studies looking toward better control of traffic conditions, development of safety education in public schools and among drivers and stimulation of intelligent treatment of the subject by local authorities.

DYNETO SOLD TO OWEN

SYRACUSE, July 3—The Dyneto Electric Corp., which manufactures electric starting and lighting systems for automobiles, has been sold for the benefit of creditors to R. M. Owen of New York for $205 000. AUTOMOTIVE INDUSTRIES announced several months ago that Owen had made an offer to the creditors for their claims and that he would take over the property.

Many Plants Close to Take Inventory

This and Other Factors Will Prevent High Marks for July—Shortage of Materials

DETROIT, June 30—Many leading factories will close down for inventory in the first week or two of July, and practically all will be closed for July 3 and 4. Because of this and because there are five Saturdays in the month, there will be no production marks established, but practically every factory, and certainly the leading ones, will operate on the same daily schedule as set in May and June.

This means that Ford will be on a 5000 daily schedule, Dodge Brothers, 600; Maxwell, 350; Hudson-Essex, 300; Paige-Jewett, 160; Hupp, 150; Studebaker, 440; Buick, 400; Oldsmobile, 120; Chevrolet, 1100; Cadillac, 100; Packard, 80; Wills Sainte Claire, 50; Lincoln, 35; Liberty, 35; Oakland, 100; Dort, 80; Columbia, 50; Rickenbacker, 30; Reo, 100; Earl, 60; Durant, 100; Chalmers, 25, and Gray 20.

Parts Releases Large

Releases on parts and material are on a par with releases for the two leading months of the year, parts makers declare, and leading unit makers assert their factories will operate on a full schedule throughout the month. That these parts will go into finished cars and will not be stored is indicated by the releases on parts that go into cars just preliminary to their shipping.

Continental Motors will get large production on its light six engine and will be in a position to make deliveries on a basis approximating the demand from customers using this model. The demand is running heavily on all models, truck factories showing steady increases and special models in the passenger car field maintaining steady demand. Production on the Star engine will increase steadily throughout the month.

There is some shortage of materials, but it is mostly on small parts and fittings and differs in different factories. There has been a steady evening-up of inventories until at this time a satisfactory balance has been established. Though releases are for the most part on a 30-day basis, some factories are ordering through the August period and these releases reflect a great deal of confidence on the continuance of buying through the summer.

Experiment with Light Cars

A number of factories are experimenting with light cars which may be introduced for the fall market. These specialized unit cars are by makers formerly exclusively in the $1,800 to $3,000 field and will be supplementary to their usual lines. The cars will be priced from $1,200 to $1,500.

Parts Orders Gain With Bus Demand

Business From Car Makers Sustained But Not Rushed as in Past

MILWAUKEE, July 3—Added to the pressure which continues to be exerted upon automotive parts industries in Milwaukee and vicinity by the requirements of passenger car manufacturers, is increasing pressure from the builders of commercial cars, notably those making a specialty of passenger-carrying vehicles. This is reflected by the gradual turn of commercial car demand upon local manufacturers and distributors for coaches, buses and stages, rather than trucks for purely freight transportation.

Good Market for Trucks

There is a good market here and elsewhere for motor trucks of all classes, with the lighter types, ranging from ¾ ton to 2 ton, in best call. But judging by the turn of demand which has been going on several months, a field heretofore only slightly touched by local truck factors is opening wide. This is that of passenger vehicles which compete with electric and steam railroads in quantity transportation of persons. The truck industry here looks to see this become one of the principal sources of demand pending the gradual resumption of ordinary business, such as more or less standardized types of freight vehicles.

The feverish tone of demand for automotive parts from passenger car factories has been relieved to some extent, although volume is well sustained. Manufacturers now seem content to spread their needs over a longer period, and the characteristic "rush" orders of February, March, April and May were supplanted during the greater part of June by less insistent specifications. Some take this to mean that during the last half of the year passenger car production schedules may show a decline, which would be only a more or less seasonal development.

Parts Schedules Sustained

On the other hand, parts production schedules not only are sustained, but most manufacturers are still making increases to meet the better call for commercial car factors. If the tractor trade continues to make the better showing registered in the last 30 to 60 days, refreshing volume is likely to result for the parts industry.

The supply of skilled labor is now below the demand, although there is a plethora of semi-skilled workers who in 1919 and the early part of 1920 were accepted as skilled men due to urgent necessities. Strict discrimination is now the rule, due to the demands of the newer times.

TEXAS CO. PROTECTS PRODUCT

DETROIT, June 29—An order restraining the sale of a type of oil refined and sold by the Texas Co. as "gun oil," as automobile motor oil, was issued by Judge Tuttle in Federal Court against David Berlin, an accessory dealer here. The order temporarily restrains the sale or the use of the Texas trade mark or name. The oil was purchased from the Government.

Automobile Distributor Will Function as Jobber as Dealers Multiply

By W. J. DRUMPLEMAN,

Sales Manager of the Rickenbacker Motor Car Co.

DETROIT, July 3.

DEVELOPMENTS in the field of automobile distribution indicate that in five years from now the distributor as we have known him to this time in the industry will have passed completely out of the picture. Instead we will have in the large cities the same man perhaps, but he will be nothing more than a high-class jobber with scores of retail establishments in all sections of his districts.

The developments of the community dealer in the large cities sounds the knell of the former distribution system where one company held sole responsibility for the sale of a car in a city whose population ranged into the hundreds of thousands or into the millions. The intensive development of sales territories in the cities is the biggest progressive movement in the industry to-day with dealers in all sections of the cities.

The convenience of the automobile is greatly enhanced, service is brought much nearer home for the owner and he is enabled to have his car taken care of without going miles to the central automobile district. Prospects have been found to drop into the smaller retail establishments who were timorous about entering the large places.

The success of the companies which have multiplied their dealers in the cities up to this time indicates the soundness of the movement. There will be a tendency to price cutting with the increase in dealerships and this will require counteracting. An important feature of the development of numerous dealers is that it will give buyers with cars to trade an opportunity to place their car to the best advantage.

Only this month there was a sale in Detroit that would have been lost to one of the factories because their distributor was long on used cars and could not offer an advantageous allowance. One of the sub-dealers was short and took in the car at a reasonable price and the sale was saved to the factory.

Under this increased dealer plan the distributor will continue to do a retail business, but his main work will be as a jobber. It will be his particular province to look after his retail dealers rather than his own retail sales. I do not look for a drawing of the line on sections in a city in which dealers will be required to restrict their operations, but rather that they will be permitted to make sales wherever possible buyers will buy in their own localities because of the general convenience afforded.

Columbia Motors Dines Bankers and Parts Men

DETROIT, June 29—Columbia Motors Co. had as dinner guests at the Columbia Club this week bankers and representatives of parts makers who will supply materials for the new Columbia light six. The purpose was to urge adequate deliveries to meet the production plans of the company.

The slogan of the evening was "1650 cars in July or bust." President J. G. Bayerline was the host of the supply men. Those who spoke were W. E. McConnell of the Detroit National Bank of Commerce; W. N. Nesbit, Peninsular State Bank; John G. Painter, Detroit Pressed Steel Co.; Norman I. Taylor, Albee Corp.; W. A. Fredericks, vice-president and chief engineer, Continental Motors Corp., and E. F. Kellum, purchasing agent of Columbia.

Allen Personal Property, Not Real Estate, Is Sold

COLUMBUS, July 3—The sale of the assets of the Allen Motor Car Co., which was started June 27 under the receivers, George A. Archer and W. C. Willard, progressed satisfactorily with the exception of the real estate. The personal property was sold out in about 100 different lots at fairly good prices.

Service rights were sold to A. O. Dunk, Detroit, for $66,000. A bid of $150,000 on the Columbus plant was not accepted, as it has an assessed valuation of $303,830. Steps will be taken to offer the plant for sale at a later date, according to the receivers.

STAR OF MICHIGAN FORMED

DETROIT, June 29—Articles of incorporation of the Star Corporation of Michigan were filed in Lansing this week. Capitalization is for $20,000, but this amount is to be increased, it was declared. The Michigan company will be the sales organization for the Star cars made at the Lansing plant of Durant Motors. It was announced that a distributing plan entirely new in the automobile field would be made public soon in connection with the new car.

PLANTS EXPECT SEASONAL DECLINE

Business Falls Off in Certain Sections

No Signs Apparent, However, That Decline Will Be in Nature of Slump

NEW YORK, June 29—Indications that retail sales of automobiles are due to fall off in the near future is found by factory executives in the increase in the number of spotty sections and the appearance of some points at which business has shown a decided falling off. By this time, however, the losses in some sections have been overcome by increases in others so that factory production for at least another month will be close to capacity.

Southern districts are showing the greatest decrease in business at this time. This is not general throughout the South, however, as some sections are maintaining a very brisk buying, this being especially true in Tennessee and North Carolina.

Farmer Not Buying Yet

Industrial cities in the East and Middle West which have been slow in overcoming the after-war depression and which have been affected by strikes and other causes are showing recessions in sales, buying in some places having come to an abrupt halt. Other industrial cities which have been favored with good business throughout the year continue to absorb cars steadily. Many of these good and bad spots are located within a few miles of each other, as, for instance, Baltimore and Washington, the former falling off and the latter increasing.

Buying in the farm districts to this time has for the most part come from professional and business men rather than from the farmer himself. This buying has been relatively light, but scattered through every farm section in the country. The real farm buying is not expected to get under way until August or September when the turnover of crops is well under way.

Manufacturers do not look for a severe falling off during the summer, but take the attitude that if there is an unusual drop in sales they must shape their policies to meet a lighter business.

Year Will Exceed 1921

Almost any sort of buying will bring the industry to a point where it will exceed the business of 1921, and fair business the remainder of 1922 will mean a very profitable year for the industry as a whole. Most leading companies have done more business in the first six months of this year than they did in all of 1921. With good normal business in the summer and fall months the industry will create a new yearly production mark.

A leading sales executive declared this week that the buying of the year has been due more to a belief on the part of general business that good times were coming rather than that they were here. He takes the position that there has been little buying on the part of the conservative busines man and worker, and that this business will manifest itself in 1923, when the other industries of the country are on a more stable basis.

A summary of retail sales conditions in twenty representative cities follows:

BUSINESS HOLDING UP

BERKELEY, CAL., June 27—Retail automobile sales are keeping up with last month. Sales of Fords and medium priced cars are best.

PHILADELPHIA, June 27 — Automobile sales are holding up and no decline is apparent yet. Used cars are selling well.

ST. LOUIS, June 27 — Retail automobile sales are holding up remarkably well and June will be as big as April and May for most dealers. A decline is expected in July.

BOSTON, June 29—Boston distributors and dealers report that there seems to be no letup in buying. April was good because it followed the show in March. May was even better, and June has been exceptionally good.

LOUISVILLE

LOUISVILLE, KY., June 27—Automobile sales are keeping up the high mark set in April and May, according to a report issued to-day by the Louisville Automobile Dealers Association. Sales for the first five days of last week amounted to 364 cars, of which 143 were new cars and 221 used cars. This period is in excess of any week yet established this season.

With the probable sales of Saturday included the total will no doubt exceed 400 for the week, which is 12 per cent more than any week of the season. Of the 143 new cars sold, 19 were in the high priced class, 26 in the medium priced class and 98 in the low priced class. This is practically the same proportion of the high, medium and low priced cars that has prevailed during the current season.

CHICAGO

CHICAGO, June 27—Retail sales of automobiles in Chicago continue at a high volume. Taken week by week, there has been some fluctuation through June. Some dealers are having a number of cancellations because of their inability to make deliveries. These sales usually are not lost to the industry because the purchaser immediately buys some other car upon which he can get prompt delivery.

DETROIT

DETROIT, June 27—Retail buying in the Detroit district is declared by dealers to be normal for this time of the year, but not as good as earlier in the spring and tapering off with the approach of the mid-summer months. Deliveries on standard lines of cars are still from two to six weeks behind, but are expected to be fully caught up on all models by Aug. 1. Sales of used cars have slowed down considerably since June 1 and a number of dealers have declined to accept any more cars in trade. The shortage of new cars through the spring aided materially in keeping used car stocks low, but these have been slowly increasing during June. Used car prices are high. The summer months will witness a special effort to clean out used stocks in preparation for fall business.

BUFFALO

BUFFALO, June 27—Retail automobile sales in this city have shown no sign of falling off, according to information obtained from Executive Secretary Proctor of the Buffalo Automobile Dealers Association.

"The retail business during June," he said, "was easily 100 per cent better than in the corresponding month of last year. The same thing is true with reference to the business done by Buffalo's automobile retailers during May of this year, and their business in April was at least 45 per cent better than in April, 1921. A number of the dealers here report trouble in getting enough cars to meet the demand. Some models, they say, they cannot get at all. Of course, this is to be expected. The regular seasonal decline in demand will come in midsummer, but up to date business has been fine."

DENVER

DENVER, June 27—Although some dealers report that there is a beginning of a slight sales decline and expect moderate trade in July, June far surpasses May and also last June, and some say it is the best month in two years or more. New car sales are holding stronger than used cars and July is predicted to exceed last July. The general feeling is optimistic for the following months.

CONDITIONS THROUGH COUNTRY DAILY

LOS ANGELES

LOS ANGELES, June 27—Such cars as Ford, Chevrolet, Dodge, Buick, Studebaker and other makes of corresponding prices show an increase in sales. Hudson and Chandler are fighting hard to hold their own. Packard single six and Cadillac continue to gain. Other high price makes are running behind last year's business. Registration for June undoubtedly will be larger than the same month a year ago, but it may not equal May.

TOLEDO

TOLEDO, June 28—Automobile sales have declined here only slightly in the last two weeks. Some dealers report that they are holding up as good as they have for the last two months. All are considerably behind in the delivery of cars. The demand for light used cars is big now. The Willys-Overland branch here reports that sales are considerably ahead of deliveries and while declining slightly in the last ten days they are far ahead of the same period in other years.

FORT WAYNE

FORT WAYNE, IND., June 27—Business has taken a spurt in this locality. Dealers in popular priced cars state that they cannot get enough to supply the demand. Deliveries on certain models, particularly sedans, are not guaranteed under a month. Not only are the dealers experiencing greatly increased business, but all the manufacturers turning out automotive equipment are also feeling the same spurt.

SPOKANE

SPOKANE, WASH., June 27—No material reduction in retail sales is apparent here. Many firms will establish new high retail records this year while others will be hampered because of the inability of their factories to supply the demand. Lower priced car dealers are doing a land office business. The president of the Spokane Automobile Chamber of Commerce expects the heavy retail sales to continue during July.

DALLAS

DALLAS, TEX., June 29—June was the best month of the past year and a half, automobile dealers say. More than 1000 new automobiles were sold by the Dallas retailers. Something like 1000 used cars changed hands. There was an increase in truck and tractor sales and a decided increase in sales of tires, tubes and accessories. Some of the dealers reported business increased more than 50 per cent over the same month for last year.

SALES DECLINE NOTED

ATLANTA, June 28 — Dealers and distributors advise that sales during the last two weeks of June fell off somewhat as compared with the first half of the month, but that business as a whole continues entirely satisfactory as compared with the same period of a year ago.

DES MOINES, June 28 — Any change in retail conditions noticeable is toward slackening, but it is very slight and applies only to cities and larger towns. The farmer and small town business is showing signs of improvement.

MILWAUKEE, June 27—Dealers say that the retail demand is more spotted, having skimmed the cream of prospects, but that the June volume nearly equals May which was the heaviest month on record. A seasonal decline is looked for in July and August, but no marked slump is expected.

KANSAS CITY

KANSAS CITY, MO., June 27—Motor car dealers almost unanimously say that sales of passenger cars have been better the past week than any time this year, and that June has been a good month. This is true both of firms selling high priced cars and those selling low priced cars.

Special conditions have helped some firms to build a really important volume of business in the past two or three weeks, such as announcements of new models and the entrance of new firms into the distribution, and the extraordinary efforts at publicity and selling that accompany such changes. But both for those who have these special reasons for expecting increasing trade, and for the old established companies, the volume has been steadily growing in June.

BIRMINGHAM

BIRMINGHAM, ALA., July 2—Stimulated by the industrial revival in the Birmingham district, automobile sales have shown an increase here of 15 to 25 per cent during the last thirty days, according to local dealers. Business is declared to be better on July 1 than for twelve months or more.

Virtually every mine, furnace, factory and industrial plant in the Birmingham district, which includes many miles surrounding the city, are in operation now, after a period of inactivity which lasted nearly two years, according to the Birmingham Chamber of Commerce.

Ford Output, 79,196 Better Than in 1921

Total Production for First Five Months This Year Reached 409,309

DETROIT, June 30—Production of the Ford American and foreign plants in June, excluding the Ford Motor Co. of Canada, will carry the total production for 1922 to date over the half million mark. Excluding any of June's output the American and foreign plants have turned out exactly 409,309 cars and trucks, while the total for the same period in 1921 was 329,813. This establishes a lead of 79,496.

Of the May production of 134,762, the Kearny, N. J., branch led with 14,706, about 3000 more than the April total. Detroit produced 11,524, with third place about equal for Philadelphia, Buffalo and Chicago, with 6500 each. The business of the Buffalo plant is declared to have shown considerable increase. The highest single day's assembly mark was made May 31 when 5099 cars were built. This mark was moved up on June 5 to 5281.

Tractor production at the River Rouge in May reached 8950, and 155 were built at the Cork, Ireland, plant. The River Rouge output represents an increase from 7466 in May. Total production of Fordsons for the year to the end of May was 25,011. The total for the same period in 1921 was 20,936.

Without the receipt of any additional orders, the Lincoln Motor Co. plant will be at capacity for four months to meet the business now on hand, the company reports. Despite demand, it is declared, production will be kept down to a point where it is possible to give each car painstaking attention. The present production rate is approximating 35 daily.

Truck Outlook Promises Record Breaking Months

PONTIAC, MICH., July 5—The best June in the history of the plant and one of half a dozen leading months at any season, says Sales Manager Vance H. Day, of last month's General Motor Truck Co.'s business. Prospects for July he declares to be very good, although there was a tendency last week toward a lull in orders. Special activity among agents offset this, however.

August, September and October are likely to be record-breakers in truck business, Day says. Increased business on heavier models, Day says, indicates that industrial concerns are back in the market for trucks.

A similar outlook is reported by the sales department of the Oakland Motor Car Co.

Discontinue Maxwell Branch in New York

New Distributor Takes Its Place —No Change in Policies, However

DETROIT, June 29—With the organization of the Colt-Stewart Co. in New York City by William L. Colt and William D. Stewart to take over the distribution of Maxwell-Chalmers cars in that territory, the former Maxwell-Chalmers branch has been discontinued and placed in the hands of a distributor.

William L. Colt has been identified with the automobile business since 1904 when he was associated with the Cleveland Motor Car Co. In an executive capacity, five years later he organized the Colt-Stratton Co. in New York as general Eastern distributor for the Cole Motor Car Co. of Indianapolis. This concern attracted the attention of Dodge Brothers by its success and in 1914 it was named metropolitan dealer for the Dodge car.

Dodge and Cole were handled jointly by the company until 1917 when Colt withdrew from active work in the company to accept the position of Eastern division manager for the Willys-Overland Co., from which he retired to form the Colt-Stewart Co. to take over the Maxwell-Chalmers sales.

Colt with Overland

During Colt's association with Willys-Overland he formed a close association with Stewart, who in 1917 was made manager of the New York branch of the New York branch of the Willys-Overland Co. Stewart joined the Willys organization in 1916 after a varied business experience, and after fourteen months of service was appointed to the New York managership.

In announcing the change in its New York distribution, Vice-President A. E. Barker of Maxwell-Chalmers said that the new company would carry out the same general policies that were in force during the branch operations. The business will continue at the same address and the sales organization will continue as formerly.

TEST-HOUSE PROGRESSING

PONTIAC, MICH., July 3—Rapid progress is being made on the test-house at the plant of the General Motors Truck Co., where extensive electrical apparatus purchased for utilization of power developed in the testing of machines will be installed. The completion of the test-house will make possible largely increased production. The electrical equipment is on hand, awaiting completion of the building.

LA FRANCE TRUCK UNCHANGED

NEW YORK, June 30—Walker Motors, Inc., which has purchased the assets of the Ward LaFrance Truck Corp. of Elmira and will remove the plant to this city, especially for the New York market, announces that no radical changes will be made in the design or construction. The truck will be known as the Walker-LaFrance. A. Ward LaFrance, formerly president of the Ward LaFrance Truck Corp., will be in charge of production.

EMPLOYMENT GAINS 2,497

DETROIT, July 3—Members of the Employers Association report the addition of 2,497 workers to their payrolls last week. The total now is 180,971, as compared with 109,000 in the same week last year and 189,000 for the same week in 1920

Firestone Will Operate Canadian Plant, Sept. 15

AKRON, July 3—The new Canadian plant of the Firestone Tire & Rubber Co., at Hamilton, Ont., will be ready for operation about Sept. 15, officials of the company here have announced. The site at Hamilton consists of 60 acres of land located on the Hamilton Bay. The main plant, already nearing completion, will be a five story building of fireproof construction. Machinery is now being installed.

The Canadian factory will start with an initial production of 1500 tires a day and later will manufacture numerous lines of rubber goods, including tubing, belting, hose and possibly rubber boots and shoes.

Firestone expects its Hamilton plant primarily to serve Canadian dealers, having 2200 dealers under contract in Canada. A large export business is also assured for the Canadian plant by reason of the preferential duties enjoyed by Canadian manufacturers.

College to Hold Annual Summer Industrial Course

STATE COLLEGE, PA., June 30—The seventh annual summer session in industrial organization and administration will be held at the Pennsylvania State College here from Aug. 28 to Sept. 9. The course is designed to meet the needs of manufacturers and factory executives. Its purpose is to assist men in the development of their jobs and to broaden their horizon.

The work will be divided into discussions on industrial organization, manufacturing methods, employment, industrial relations, factory planning, material and production control, scheduling and dispatching, purchasing, cost accounting and kindred subjects. The greater portion of the time will be devoted to practical installation methods, using the equipment of the five shops and the other facilities of the department that have been especially designed to handle this type of work.

Sanctions Maibohm Sale to Creditors

Arrow Motors to Take Over Property—Former President Will Appeal

TOLEDO, June 30—Federal Judge Killits confirmed to-day the sale of the property of the Maibohm Motors Co. to a creditors committee which has incorporated the Arrow Motors Co. as a successor. Minority creditors who did not come in under the plan for acceptance of preferred stock in the Arrow company will be given until July 20 to prove their claims. H. C. Maibohm, former head of the Maibohm company, is included in this group. The creditors committee which took over the property is headed by E. G. Kirby, trust officer of the Commerce Guardian Trust & Savings Bank of Toledo.

After a hearing yesterday afternoon Judge Killits said he favored confirmation of the sale and the general plan adopted for organization of the new company, but that he would take the case under consideration before signing the order. H. C. Maibohm had made an offer to the court to bid $100,000 cash for the assets. Many of the creditors doubted his ability to make possible a cash distribution, however. Under the present plan creditors will be given preferred stock in the Arrow company.

Maibohm Will Appeal

Maibohm asserted that an appeal would be taken from the order by Judge Killits confirming the sale on a stock settlement basis. He declared the majority of creditors want the sale made for cash.

Arrow Motors, with A. C. Burch as general manager, is preparing to put the plant into operation soon.

Claims against the Maibohm company aggregate $600,000, and all but $60,000 are represented by the creditors committee.

National Safety Sections Will Hold Joint Meetings

CHICAGO, June 30—Subjects of interest to the industry will be discussed at a joint meeting of the automotive, drop forge and metals sections of the National Safety Congress in Detroit, Aug. 28 to Sept 1. The chairmen of the different sections will be:

Automotive, A. L. Kaems, safety engineer, Simmons Co., Kenosha, Wis.; drop forge, E. C. Evans of the Wyman-Gordon Co., Worcester, Mass.; metals section, J. R. Mulligan, safety inspector of the Bethlehem Steel Corp.

The program follows:

"Safety in Handling Material," C. E. Ralston, Equitable Life Assurance Society, New York; "How the Plant Surgeon Can Help in Accident Prevention," Dr. L. A. Shoudy, Bethlehem Steel Corp.; "Safe Practices in Acetylene and Oxygen Welding," H. S. Smith, Prest-O-Lite Co., New York,

Tire Sales Reached High Mark in June

Surpassed Period of Normal Production in 1920—No Decline in July

AKRON, July 3—June was the greatest month from the standpoint of volume of sales, in units, in the entire history of the tire industry, in so far as the Akron district is concerned, not even excepting the short-lived period of abnormal production during early 1920.

Estimates show over 2,500,000 tires of every size and description manufactured in the Akron district, which includes the Mason company at Kent and the Seiberling Co., at Barberton during June.

The Firestone Tire & Rubber Co. reports June was the biggest month in the company's history, with sales in units larger than ever before. Firestone produced nearly 750,000 tires in June, averaging 25,000 a day and running in excess of that mark during the latter half of the month.

The Goodyear Tire & Rubber Co. states that its June sales of cord tires exceeded June sales of 1921 by nearly 100 per cent. Practically all other tire companies here report sales showing from 50 to 100 per cent increases over the corresponding period of last year.

Demand Is Widespread

"We sold more tires in June than in any previous month in our history," state Firestone officials. "The demand seems very general for our products and comes from all sections of the country, the inquiries being mostly from dealers who have been carrying low stocks and are now in their full selling season. Manufacturers' business and export shipments are also increasing. With tire prices on so low a basis, the consuming public is purchasing freely, knowing that tire values are in accord with the times."

Akron companies report July orders so far booked do not indicate that there will be any appreciable diminishing of sales at least during the fore part of the month, although a slight tapering off of production during the latter weeks is anticipated. The usual seasonal slump in sales which comes in August, it is stated, will cause manufacturers to reduce production and perhaps to stabilize the industry on a basis of about 75 per cent of present aggregate production.

Fisher Plans Building for Shepard Art Metal

DETROIT, July 3—The Fisher Body Corp. has decided to erect a large new factory building for the Shepard Art Metal Co., which is now located at Grand Boulevard and Hastings Street, and which is owned and operated by the corporation for the production of hardware fittings.

Work already has begun at Junction Avenue and Michigan Central railroad, and the first unit will contain more than 100,000 ft. of floor space. It will be completed by Aug. 1. The plant ultimately will contain not less than 250,000 sq. ft. of factory space. The buildings will be of brick and steel construction and of the most modern type. There will be no exposed belting, and transmission equipment will be placed beneath the floors.

IN LAST NINE YEARS AMERICAN MAKERS SOLD 5 PER CENT OF OUTPUT ABROAD

WASHINGTON, July 3—Exports of passenger cars and motor trucks during the past nine years show, according to estimates based on figures compiled by the automotive division of the Department of Commerce, that the American car manufacturers have sold abroad approximately 5 per cent of their total production.

The exact amount of foreign business during this period cannot be definitely determined, because of the fact that motor trucks exported during 1915, 1916 and 1917 were largely United States war supplies. In arriving at the 5 per cent estimated, the trucks sold during these years and shipped to the allies are not included in the compilation.

The following table shows the percentage:

	PASSENGER CARS			MOTOR TRUCKS		
	Export	Production	Percentage of Exports	Export	Production	Percentage of Exports
1913	24,293	461,500	5.28	993	23,500	4.21
1914	28,306	543,679	5.21	784	25,375	3.10
1915	23,880	818,618	2.92	13,996	74,000	18.89
1916	56,234	1,493,617	3.76	21,265	90,000	23.70
1917	64,808	1,740,792	3.72	15,977	128,157	12.40
1918	52,312	926,388	5.65	12,200	227,250	5.38
1919	67,145	1,657,652	4.05	15,585	316,364	4.93
1920	142,508	1,883,158	7.56	29,136	322,039	9.02
1921	26,592	1,514,000	1.75	7,480	154,550	4.85

Miller Rubber Co. Sells Service Stations in Ohio

AKRON, July 1—The Miller Rubber Co. has sold its tire service stations in Akron and Canton, Ohio, to the Instant Tire Service Co., an Ohio corporation. The new company acquires the entire fleet of service cars in both cities and continues the tire service offered local motorists. In these stations experiments looking toward improved service were tried out and the results broadcasted to all dealers throughout the country.

Service on Miller tires is now given exclusively by dealer sales and service agencies throughout the United States. The company has completed its service work and does not intend opening service stations in other cities.

NEW IRON MOUNTAIN UNIT

MILWAUKEE, July 3—The Ford Motor Co.'s body plant and principal woodworking factories, established a year ago at Iron Mountain, Mich., under the name of the Michigan Land, Lumber & Iron Co., will be doubled in size at once by the erection of a second unit. This has come to light through the letting of a contract to the Worden-Allen Co. of Milwaukee for the structural steel work on the new shop. The Iron Mountain plant is in the heart of the best growth of hardwood timber, as well as an extensive softwood belt in the upper peninsula of Michigan.

E. V. Hartford, Shock Absorber Maker, Dies

Did Much Toward Improving Automobile and Service Given by It

NEW YORK, July 3—Edward Vassalo Hartford, an outstanding figure in the automotive industry whose accomplishments will be long remembered, died Friday at his city home, the Hotel Devon in West 55th Street. He was buried from the home of his parents at Orange, N. J. He was 52 years old. He is survived by a widow and two children.

As the manufacturer of the Hartford shock absorber, which he put on the American market in 1904, the producer of one of the early electric starters, together with various other inventions, Hartford scored high in his efforts to better the modern motor car and the service it supplies.

Besides heading E. V. Hartford, Inc., he was many years vice-president of the Great Atlantic and Pacific Tea Co., a leader of the chain store system in this country.

Hartford had a pronounced touch of sentiment in his make-up, with a heart that went out to help anyone in distress. His friendships were legion, not only in the automobile industry but in his social life.

Four-Passenger Coupe Added to Jewett Line

DETROIT, July 3—A four-passenger coupe has been added to the Jewett line. The price of this new model is $1,395. The body is 77 inches long and 57 inches wide. All metal panels are used over a wood frame. Production will start during July.

Air Engine Record May Come from Test

Navy Department Completes Endurance Trial of Wright Aeronautical Product

PATERSON, N. J., June 30—The Wright Aeronautical Corp. of this city has announced the completion by the Navy Department of an endurance test which is believed to have established a new record for the continuous running of high duty aircraft engines.

The engine used is the model E-2 eight-cylinder type in which were made certain changes to be incorporated in future engines. The total duration of the test was 250 hrs., made in two periods of 125 hrs. each, during which the engine ran wide open at 1800 r.p.m. At the end of the first period the engine was torn down for inspection and again reassembled, the pistons, which had not been designed for such long service, being replaced by others with a slightly heavier head. No other parts were replaced.

The valves, which were of the Thompson "Silchrome" alloy, were touched up, but it is believed this would not have been necessary had the run been continuous, since the valves of this material have shown unusual heat resisting characteristics and are said to have proved the most durable of any valves used in this severe service. Only two stops were made in the first 125 hrs., and these were due to accidental shutting off of the gasoline in one case and to breaking of an external oil radiator in the other, neither being attributable to the engine itself.

Further Stops Made

In the second 125 hr. run there were three stops, one for change of plugs and magneto, and the other two for changing the pitched clubs used for loading the engine, none of these stops being attributable to the engine itself. When the engine was torn down on completion of the run, it was found to be in substantially perfect condition, pistons included, indicating that the run could have been continued for a much longer time had it been desired to do so.

ACCEPT ALUMINUM OFFER

CLEVELAND, July 3—Stockholders of Aluminum Manufactures, Inc., decided unanimously at a special meeting here to accept the proposal of the Aluminum Company of America to lease its plant and purchase corporate stocks of subsidiaries as well as inventories.

ELECTRIC TRUCK BANKRUPT

SYRACUSE, July 3—The Binghamton Electric Truck Co. of Binghamton has filed a voluntary petition in bankruptcy in Federal Court at Utica, showing liabilities of $14,234 and assets of $15,379. When the company was formed, $100,000 worth of stock was sold, and all that remains of this is the machinery in the plant at Binghamton.

The petition states that the reason for the action is the failure of the city of Hudson, N. Y., to pay the company $8,000 which it promised if the concern moved its plant to that city.

Hill Creditors Grant Extension of Claims

CHICAGO, July 1—The creditors committee of the Hill Pump Valve Co. of this city, manufacturer of automobile accessories and standard parts, has issued a letter to all creditors announcing an extension of claims under a creditors agreement and stating that the company is now operating at capacity with prospects of ultimate success.

The creditors are accepting notes due Dec. 1 in settlement of their claims, but further extension may be granted at the discretion of the committee, of which Fred J. Greenebaum is chairman.

The letter states that $20,000 of new funds has been advanced to the company to enable it to care for its increasing business and that other advances will be made if needed.

Former Auburn Officials Secure Control of Elkhart

FORT WAYNE, IND., July 3—The controlling interest in the Elkhart Carriage & Motor Car Co., manufacturer of the Elcar, has been secured by four Auburn men—A. M. Graffis, G. W. Bundy, F. B. Sears and W. H. Denison, who are now managing the plant. W. B. Pratt and George B. Pratt have retired from the company.

In the reorganization Sears will become president and general manager; Graffis will be secretary; Denison, treasurer, and Bundy will act as general superintendent.

All the new executives are experienced in automobile manufacture. Sears was connected with the Auburn company for 14 years, for a large part of this time as assistant general manager and treasurer. Denison served as secretary of the same concern, and Graffis and Bundy were respectively chief engineer and designer and general superintendent.

STUTZ HAS BEST MONTH

INDIANAPOLIS, June 29—A complete check-up of Stutz retail sales and factory output for May shows that it was far and away the best month for a long time. June factory records show that brisk business in the retail sales of Stutz cars continues. Complete reports of retail sales for June are not yet available.

FORD TO HEAR OF MEXICO

DETROIT, July 3—A. J. Lankford, manager of the Ford southern branches, is on his way here after a three weeks' inspection trip into Mexico to report on the advisability of building a plant at Tampico.

Accessory Upturn Noted in Indiana

June Will Probably Surpass May, Best Month Thus Far in 1922

INDIANAPOLIS, June 29—Wholesale and jobbing accessory business for Indiana during May was far ahead of any month during the last year. June business appears to be as great as May, and in many cases probably will exceed it. The general report of the leading jobbing houses in this city which sell throughout the state is that for the first three months of this year the business was on a general level, being quite low in some sections.

During April the upturn came, but it was not until May that the sales and shipment curve made a sharp upward line.

In this connection the record cannot be estimated correctly unless the fact is considered that there are considerable portions of the state where business in general is at a low ebb. The coal producing portions of the state are way off in the consumption and sale of accessories.

Dollar Value Increases

The fact that present records surpass those of last year in dollar value, in spite of decreased list prices and in the face of a considerable portion of the state where business is considerably affected by idleness, makes the new record highly satisfactory to the jobbing houses.

The volumn of sales from the standpoint of the number of units of accessories and equipment sold is running well over 150 per cent as against the same months last year, and some of the jobbers look for a steady pull at this rate and possibly better for the next month and a half or two months. The early months of the year did not come up to conservative expectations of some of the leaders, but May and June have turned the tables, and the whole jobbing outlook for Indiana is very cheerful.

COMMITTEE FOR GEAR MAKER

SYRACUSE, July 5—The Weekes-Hoffman Co. of this city, manufacturer of automobile gears for replacement purposes, is in financial difficulties. Its future is to be determined by a committee representing the preferred stockholders and the board of directors. At a special meeting of the preferred stockholders recently a committee was named to decide whether to liquidate the business or continue it.

PROFIT FOR GERMAN BOSCH

PARIS, June 16 (by mail)—The Robert Bosch Magneto Co. of Stuttgart, Germany, shows a profit for the past year of 7,800,000 marks and has paid a dividend of 25 per cent.

Men of the Industry and What They Are Doing

Raskob and Swayne to Sail for Europe

J. J. Raskob, vice-president of the General Motors Corp. and chairman of the finance committee, and Alfred H. Swayne, vice-president in charge of banking relations, will sail for Europe Saturday. Their trip will be half for pleasure and half for business. They will inspect General Motors interests in England and France while abroad.

Osborne Succeeds Montayne

James Montayne, who has been service manager for General Motors, Ltd., at London, will return to the United States and will be succeeded by Frederick Osborne, a member of the technical staff attached to the New York offices. Osborne, who will sail about July 15, has spent several weeks studying the production and service at General Motors factories.

Goldie Now With Ruggles Truck

R. J. Goldie, for six years manager of the Columbia Axle Co., has been appointed general manager of the Ruggles Motor Truck Co. Frank W. Ruggles, who has been functioning as general manager since the foundation of the company, will remain as president, but will devote himself to the wider interests of the business. Goldie has been identified with the industry for a number of years. Years ago he built one of the first 1500 lb. motor trucks ever used in Detroit. He was connected with the Oakland organization for two years when he became chief inspector and superintendent for Chalmers. He remained with Chalmers for five years when he joined the Timken-Detroit Axle Co. as manager of the east side plant. He spent five years with the Timken-Detroit organization and in 1916 became factory manager and member of the board of directors of the Columbia Axle Co. He still retains his place on the directorate of that company.

Weiss Retires from Hyatt

J. G. Weiss has retired from active duties as general manager of the Hyatt Bearings Division of the General Motors Corp. on account of his health, but remains in the Hyatt company in an advisory capacity. H. J. Forsythe, formerly assistant general manager of the division, has been appointed general manager. B. G. Koether, in addition to his duties as vice-president in charge of sales, becomes assistant general manager.

Sloan Sails for Europe

Alfred P. Sloan, Jr., vice-president of the General Motors Corp. in charge of operations, and Mrs. Sloan sailed for Europe July 4 on the Aquitania to visit England, France and Switzerland. His trip is in the nature of a vacation, although while in London and Paris he will look over the General Motors interests in those cities.

Willoughby Goes With Columbia

David J. Willoughby has been appointed sales manager of the Columbia Motors Co. Before going to the Columbia, Willoughby served as Eastern sales manager of the Lally Light Corp. and before that was associated with Dodge Brothers for three years as traveling sales representative and with the Studebaker for six years in a like capacity. With the appointment, W. L. Daly, who was formerly sales manager and, previous to his connection with the Columbia, sales manager of the King Motor Car Co., becomes vice-president and director of sales and advertising.

Tracy Leaves Globe Rubber

R. B. (Dick) Tracy has resigned from the Globe Rubber Tire Manufacturing Co., Trenton, N. J., where recently he has had charge of the sales in general. Tracy is well known in the automobile tire industry, having served for sixteen years as factory representative for the Michelin Tire Co. He has returned to his former home at Norwich, Conn.

Falter Joins Electric Furnace

P. H. Falter has been elected vice-president and treasurer of the Electric Furnace Construction Co. Until recently he has been vice-president and general manager of the Canadian Electro Products Co. at Shawinigan Falls, Quebec. Prior to that time he had been general manager of the Baltimore Electric Alloys Co. Frank Hobson remains as president.

Beckman Resigns from Richelieu

William Beckman has severed connections with the Richelieu Motor Car Co. and the Richelieu Motor Corp. His plans for the future are indefinite.

Mason Rubber Plans Tire Fabric Plant

ATLANTA, July 6—Following the recent acquisition of the Owen Tire & Rubber Co. of Bedford, Ohio, by the Mason Tire & Rubber Co. of Kent, Ohio, H. R. Whitehead, of Millen, Ga., vice-president of the Western Reserve Cotton Mills Co., a subsidiary organization of the Mason company, advises that negotiations are under way for the acquirement of a third textile plant in the southern territory, to be used by the Mason company for the manufacture of tire fabric. The company now operates large textile plants at Millen and Quitman, Ga.

Good Road Sponsors to Start "Pike" Tour

Party Will Leave Detroit for 14-Day Swing Around Lake Michigan

DETROIT, June 30—The eighth annual "Pike" tour will leave Detroit next Friday noon for a fourteen-day swing around Lake Michigan, with the copper country of Michigan as its northern terminus. The tour, as in former years, is conducted by the Michigan Pike Association. During the two weeks' tour, Captain W. S. Gilbreath, manager of the Detroit Automobile Club and president of the M. P. A., will conduct seventy-seven good roads meetings. The object of the tour is to create interest in improved highways and to popularize through touring routes. Out of the 13½ days spent on the road, all but two days will be in Michigan territory.

Captain Gilbreath is organizing a staff of speakers for the tour and expects to have a half dozen prominent men from Michigan as speakers. The line-up includes Horatio S. Earle, "Father of good roads in Michigan," and Inspector Harry H. Jackson, head of the traffic division, Detroit police department, also Dr. P. E. Doolittle, Toronto, president of the Canadian Automobile Association and honorary vice-president of the M. P. A.

A large delegation from the copper country will meet the tour at Michigamme and passengers will be exchanged for the drive to Calumet. The tour will reach there at noon on Wednesday, July 12.

Itinerary of Tour

The itinerary of the tour, with the noon stops, the first name follows: June 7, leave Detroit at noon, Owosso; July 8, Kalamazoo and Michigan City, Ind.; July 9, Chicago and Milwaukee; July 10, Manitowac and Menominee; July 11, Iron Mountain and Crystal Falls; July 12, Calumet; July 14, Marquette; July 15, Munising and Newberry; July 16, Sheboygan; July 17, Petoskey and Traverse City; July 18, Manistee and Muskegon; July 19, Holland and Grand Rapids; July 20, Jackson and Detroit.

REPUBLIC EXPECTS BIG JULY

ALMA, MICH., July 6—The Republic Motor Truck Co. reports that its factory is now working at about 50 per cent capacity, and that during July it will build more trucks than for any month in two years. Colonel Frank E. Smith, president of the company, declares that farmers in Kansas and Nebraska have started buying and that the farm demand promise good business throughout the summer.

Merger of Nine Companies Formed

Associated Motors Plans to Buy More

Payment for Assets Made in Stock on Basis of Inventory Valuation

CHICAGO, July 1—Announcement was made here to-day of the completion of the organization of the Associated Motor Industries, negotiations for which have been in progress for about 10 months. Preliminary plans for the formation of the merger were published exclusively in AUTOMOTIVE INDUSTRIES of Sept. 29, 1921.

The company as now organized is an $80,000,000 corporation chartered in Delaware and has acquired by purchase full ownership of nine companies manufacturing automobiles, trucks, parts and equipment. The companies are:

National Motor Car & Vehicle Corp., Indianapolis, Ind., manufacturer of National cars.

Covert Gear Co., Lockport, N.Y., manufacturer of transmissions, clutches and other car controls.

Recording & Computing Machines Co., Dayton, Ohio, manufacturer of ignition systems, starters, magnetos and other electrical equipment.

Jackson Motors Corp., Jackson, Mich., manufacturer of Jackson automobiles and trucks.

Kentucky Wagon Manufacturing Co., Louisville, Ky., manufacturer of Dixie Flyer automobiles, and of trucks, wagons, wheels and bodies.

Saginaw Sheet Metal Works, Saginaw, Mich., manufacturer of sheet metal parts for automobiles and trucks.

Traffic Motor Truck Corp., St. Louis, Mo., manufacturer of Traffic trucks.

Murray-Tregurtha Corp., Boston, Mass., manufacturer of gasoline engines.

H. F. Holbrook Co., New York City, manufacturer of automobile bodies.

The officers of the corporation, offices of which will be at Dayton, Ohio, are: Chairman of the board, Will I. Ohmer, president, Recording & Computing Machines Co.; president, Louis Ruthenburg, formerly general manager of Delco Light plant of General Motors Corp.; vice-presidents, A. A. Gloetzner, president, Covert Gear Co.; Robert V. Board, president, Kentucky Wagon Manufacturing Co.; T. C. Brandle, vice-president in charge of merchandising of Traffic Motor Truck Corp., and George M. Dickinson, president, National Motor Car & Vehicle Corp.

Ohmer will have entire charge of the operations of the company. In an interview to-day he stated that all the plants will be operated and that for the present the products of all of them will be continued. These include the Jackson, National and Dixie Flyer automobiles and Traffic trucks. It was said also that trucks would be manufactured at the Kentucky Wagon and Jackson plants. Development of a standardized line of cars and trucks is the ultimate object of the company, Ohmer said. This line is to include a four cylinder, a light six and a deluxe six-passenger car, and trucks of various capacities.

The companies in the merger have been acquired by purchase, payment being made in stock of the new corporation on the basis of actual inventory valuation of the various companies. Ohmer said that all companies taken in had to show assets having a ratio of three to one over liabilities. Although it was not divulged just what amount of capital stock was issued in absorbing the member companies, it is understood the combined net assets of the companies were listed at about $23,000,000.

More to Be Acquired

Negotiations are now in progress for the purchase of another group of companies, Ohmer said, for which additional stock will be issued. He said that in acquiring the first group no cash was spent except in taking up bonds and paying off some bank indebtedness of member companies. A $6,000,000 bond issue is being arranged to aid in paying bank loans and to give additional working capital. It is also understood that some preferred stock will be offered to the public.

Detailed plans for operation of the plants have not yet been worked out. Ohmer and other officials will begin a tour of inspection of the various properties next week to determine the most

(*Continued on page* 47)

"Copper Cooled" Car Production Delayed

NEW YORK, July 5—Quantity production of the line of "copper cooled" cars which General Motors Corp. proposes to put on the market probably will not be started for several months.

It had been expected that they would be turned out in limited quantities by September, but C. F. Kettering, who has charge of their development, insists upon considerably more experimental work. He wants the new line tested under all kinds of weather conditions and on all kinds of roads.

To Operate Premier Under Receivership

Steps Taken to Conserve Assets Pending Reorganization of Company

INDIANAPOLIS, July 3—The Premier Motor Corp. was placed in the hands of a receiver July 1 by Judge Linn D. Hay of the Superior Court of this city. The Fletcher Savings & Trust Co. was appointed receiver.

The suit, said to be a friendly one, was filed earlier in the day by the American Foundry Co., a creditor. The petition sought judgment of $2,970.82 and asked that the Premier officers be enjoined from interfering with any property or control after the receiver had been appointed. The amount involved is alleged to be due on a note signed by Charles S. Crawford, then vice-president of the Premier company.

$1,000,000 Debts Charged

The suit claimed that the Premier organization is indebted to many creditors to the amount of more than $1,000,000. The assets are said to be sufficient to pay off the indebtedness under ordinary circumstances, but it will involve a great sacrifice if the assets are exposed to public sale. It is said in the suit that a large number of creditors and stockholders have formed a reorganization committee and that many of the creditors have agreed to the plan. The committee has taken steps to obtain the investment of new capital and to reorganize the company, and it will be able to consummate these plans if the property is not sacrificed.

E. E. Gates, attorney for the plaintiff, declared that the proceedings were decided upon last Friday at a meeting of the reorganization committee consisting of J. A. Price, Okmulgee, Okla.; Newton P. Hutchinson, Providence, R. I.; R. L. Craig, Detroit, and B. Hottel, Indianapolis. He stated that the plan of reorganization has received the approval of 95 per cent of the creditors, leaving but 5 per cent whose sanction of the plan has not been obtained.

Will Hasten Reorganization

It is said that because five per cent of the creditors did not agree to the plan, it would have been necessary to have a judicial sale of the properties. Therefore the "friendly receivership suit" was decided upon as the means of hastening the proposed reorganization. The receiver will continue to operate the plant pending the effort of the reorganization committee to complete the plans now under way.

Tire Dealers Seeking Conference

Makers Will Assent, Probably, to Meeting

Preliminary Discussions Draw Out Views of Both Branches of Industry

CLEVELAND, July 5—The board of directors of the National Tire Dealers Association and the tire manufacturers division of the Rubber Association of America probably will meet soon to discuss certain phases of the adjustment and stabilization of the distribution of tires.

This important meeting will be the result of a series of conferences in this city which preceded and followed a meeting of the Cleveland Retail Tire Dealers Association last Friday, presided over by R. F. Valentine, president of the National Tire Dealers Association. It was the largest gathering of tire dealers and tire makers ever held in Ohio, and the plain talking indulged in by both dealers and makers sent both sides from the room with information that was most enlightening.

The ball room of the Winton was crowded with approximately 350 dealers, manufacturers and makers' representatives when Valentine called for order. Men were present from New York, Philadelphia, Washington, Seattle, Minneapolis, Milwaukee, Baltimore, St. Louis, Kansas City, Indianapolis, Akron, Canton, Detroit, Chicago and Cincinnati.

Viles Sure of Co-operation

A roar of approval greeted the announcement by President Valentine at the start of the meeting that A. L. Viles of New York City, general manager of the Rubber Association, who was in Cleveland for the meeting, had stated that when the tire dealers named a committee and requested a conference, the Rubber Association representatives, he was sure, would gladly meet with them and give consideration to what they had to present. Viles made it plain, however, that his association could not discuss price questions under any circumstances as that is one of the functions the trade associations must not take up.

Judging by the statements made by the speakers, who came from all parts of the country, the question of making exclusive tire dealers and automotive dealers compete with department stores, dry goods stores, barber shops and other concerns which carry tires as a side line and cut tire prices to attract trade to the other departments of their businesses will be one of the important subjects discussed when the dealers' committee and the Rubber Association executive committee get together. That method of disposing of tires by makers was criticized.

The national accounts of the tire makers, the direct accounts with fleet owners, the system of discounts, sales of tires to employees and the selling of the same tires to several dealers in the same trading radius were scored by the speakers representing dealers.

Manufacturers came right back and charged that dealers watched their competitors and if they found one prospering in a certain neighborhood they would open a store next door or across the street; that although the leading tire manufacturers of the country had discontinued the mileage guarantee practically every issue of every paper in any city of size contained advertisements of dealers with 6000, 8000 and 12,000 mile guarantees.

F. A. Seiberling of the Seiberling Rubber Co. was optimistic. As costs are lowered and more improved roads are built the tire industry will expand, he said.

Speaking of dealers' problems, Seiberling stated that there are far too many of them in business. He stated there are 50,000 tire dealers: 40,000 selling tires as a side line and possibly 30,000 others. With such a situation existing, the dealers are bound to have trouble.

Manufacturers Have Problems

The manufacturing end is in the same boat, Seiberling said. A few years ago there were seven tire manufacturers and now there are 300. The speaker said that many in both branches would be eliminated before the business gets down to rock bottom and then would come a healthy period for all. The legitimate tire dealer was pronounced the sound point of contact for the manufacturer, and the argument was made that no business will survive that does not protect the dealer. He declared that tire manufacturers have the same troubles as the dealers, and he urged a spirit of tolerance be shown on both sides. The dealers were urged to build goodwill, for it is a most valuable asset both to them and to the manufacturer.

A. E. Berger of New York City asserted that the distribution of tires in New York was in chaos; that dealers had little confidence in prices and that the situation was further harmed by the action of the United Cigar Stores in selling tubes as a side line. He urged that before opening accounts manufacturers ask applicants for agencies to demonstrate that they had the qualification of good business men.

AERONAUTICAL BODY TO MEET

NEW YORK, July 5—The annual meeting of the Aeronautical Chamber of Commerce of America, Inc., has been called for July 11 in the executive offices, 501 Fifth Avenue, this city.

Indiana Pays Honor to Haynes on July 4

Dedicates Monument on Spot from Which His First Car Was Operated

INDIANAPOLIS, July 5 — Elwood Haynes received the national salute and heard prominent men eulogize him yesterday when Indiana commemorated before the nation his achievement in giving to the country a mechanically successful automobile and dedicated a monument on the spot from which the first Haynes was operated twenty-eight years ago. Hundreds of citizens of Kokomo and the state joined in the observance on Pumkinvine Pike and listened to the address of Dr. G. L. MacIntosh, president of Wabash College, and other speeches.

As the monument of granite with an inscription in stellite, another invention of Haynes, was unveiled by Mrs. John Edward Moore, past president of the Indiana Federation of Women's Clubs, the guns of Battery A 150th Field Artillery boomed the national salute in honor of Haynes and his first little machine, which the Smithsonian Institution had loaned for ceremonies.

On behalf of the Indiana Historical Commission, Frank B. Wynn paid tribute to Haynes' achievement, as did Frederick W. Fenn, representing the National Automobile Chamber of Commerce, who brought the greetings of the chamber. Mayor B. C. Moon of Kokomo made the address of welcome. Governor McCray of Indiana, represented by C. C. Shirley, who declared the celebration commemorated an epochal event in the development of the automobile and modern transportation.

Haynes Responds to Tribute

Haynes responded to the tribute and stated that at the original try-out there had been just four people. He narrated how the car had been hauled to the starting point, where a marker now stands, and had run a mile down the Pike turned around and ran back to the starting point. In his tribute to the citizens of Kokomo, he said I am surprised that that they stood for the annoyance that this machine caused them.

Wilbur D. Nesbit of Chicago was chairman of the occasion.

M. A. M. A. TO MEET AT BUFFALO

NEW YORK, July 5—The annual fall convention of the Motor and Accessory Manufacturers Association, at which credit and other conditions will be discussed, will be held at the Lafayette Hotel, Buffalo, Sept. 13, 14 and 15.

Factories in Toledo Add More Workers

Vehicle Plants Lead With Scarcity of Skilled Workers a Problem

TOLEDO, July 5—The automotive industries at Toledo contributed largely to the big increase in employment reported to the Department of Labor for the month ending June 30. C. G. Hale of the Merchants and Manufacturers Association reported for the twenty-one plants which normally employ 500 or more workers, that the gain for the month was 3913 employees, which is a greater increase than in any month for two years. The total in the twenty-one plants now at work is 24,706 employees.

The vehicle plants showed the greatest gain with 2672 men added. The Willys-Overland Co. now has 10,825 at work, which is an increase of 2200 as compared with the end of May.

The Milburn Wagon Co. put on 82 more men; the Toledo Chevrolet plant increased its force by 350 men, and the Toledo Machine & Tool Co., which is making automobile equipment for the most part, put on 120 more men.

The Electric Auto-Lite Co., which is classed in the miscellaneous group, showed a gain of 584 workers in the month. A night force has been added at that plant. The Champion Spark Plug Co. added 59 workers.

In some of the larger plants the labor turnover and the scarcity of skilled mechanics has now become a problem.

Willys-Overland officials report that sales are holding up to such a point that production is being increased right along. The daily turnout is nearing the 900 mark now. Most dealers report a heavy demand for closed cars.

Nash Reports Business Is Improving in West

KENOSHA, WIS., June 30—One hundred and fifty Nash sixes are being manufactured daily at the factory here and 60 fours a day at the Milwaukee plant. Orders received indicate that the present schedule will be continued during July and August. President Charles W. Nash does not look for as much business during July and August as last year, when several price reductions that were delayed until July 1 held up a great deal of buying which made July and August the largest production months of 1921. He expects a falling off of 10 to 15 per cent during these months, which would make them parallel the summer months of previous years, 1921 excepted.

Business is improving west of the Mississippi, C. B. Voorhis, vice-president in charge of distribution, reporting increased business from Kansas City and Salt Lake City, so that these two centers are now included among the ten centers that have in the last week shown the largest increase in retail sales.

This is the first time these cities have been included in the leading centers, as it is the first time that cities west of the Mississippi have qualified in such a list. It is a good indication of the business stimulation that is hoped to come because of the harvest and gives evidence that the farmer is going to re-enter the buying market. Montana has recently come back into the field, doubtless due to the very considerable improvement in conditions there.

Durant May Name Sarver to Operate Locomobile

NEW YORK, July 5—If the offer of Durant Motors, Inc., for the plant and assets of the Locomobile Co. is accepted when they are offered at receiver's sale, it is probable that the subsidiary corporation which will be organized to operate the property will be headed by A. H. Sarver, who headed the Scripps-Booth Corp. until it was dissolved by General Motors. It is not likely that Sarver will be actually in charge of production, but this work will be entrusted to some man already in the Durant organization.

Durant is understood to be willing to pay about $2,000,000 for the plant which includes four large buildings and eight or ten smaller ones. It is his purpose to effect manufacturing economies which will permit the sale of the Locomobile for less than half the present price and put it in the class with Cadillac and Lincoln. He proposes to use part of the factory space for the manufacture of the new Mason truck to supply the Eastern territory.

Mason Completes Test Run of New "Road King"

FLINT, MICH., July 5—The Mason Motor Truck Co. has completed a test run to New York and return with an experimental model of its one-ton "road king" truck which covered the distance of 1949 miles without a single mechanical repair. When the truck reached New York it was accepted by W. C. Durant without change.

Durant declared it was the first experimental job he ever saw which was accepted without change after its maiden trip.

The truck averaged 15.5 miles per gallon of gasoline for the entire distance.

Production of the one-ton model will begin at once. Experimental work has been started on a two-ton model which will be produced in about 90 days.

FARMERS BUY OVERLANDS

TOLEDO, July 5—Analysis of sales by the Willys-Overland Co. for May shows that farmers bought 81 per cent more Overland cars in that month than any other vocation. Laborers came next, with approximately 10 per cent of the total output. Merchants, salesmen, clerks, foremen and doctors followed in the order named. The vocational list of Willys-Knight owners show 104 classifications for May with the farmer fifth.

Most A. E. F. Trucks in Germany Are Sold

None of the 2,000 Machines Used During Occupancy Will Be Returned

WASHINGTON, July 1—All motor trucks used by the American Expeditionary Forces in Germany, with the exception of thirty, have been sold, the Department of State has been advised by General Henry E. Allen, Commander of the Rhine forces.

The information that none of the 2000 or more trucks used by the Government during the occupancy of German territory will be returned to this country, was received in response to a cable request by the Department to ascertain what number, if any, of the trucks might be affected by the Graham anti-dumping bill.

The trucks, it is understood, were sold with the understanding that none of them were to be re-imported to the United States. If the Graham anti-dumping bill is passed, a duty of 90 per cent re-import duty on the returned trucks would be collected.

The Department was not advised what price the trucks brought, but the cable advises that they were sold to all comers on open bids for whatever they would bring. The announcement of the truck sales has brought a protest against the Department of War by the Agricultural Department, which had previously been promised the equipment.

Cole Motor Operating 85 Per Cent Capacity

INDIANAPOLIS, July 5—Production of the Cole Motor Car Co. is running 100 per cent ahead of last year and at a rate which is equal to 85 per cent of capacity. J. J. Cole, president and general manager, reports that the smaller dealers in agricultural districts are ordering cars for delivery during the summer months and that with the harvesting of crops business with them will be better than in the last two years. Foreign business also has improved materially.

A balance sheet of the Cole company as of May 1 showed current assets of $3,561,629 as compared with current liabilities of only $327,671. Cash on hand amounted to $699,089. The Cole company paid a 10 per cent dividend early in May and present indications are that there will be a similar distribution of profits in October.

NEW STEAM CAR TO APPEAR

CHICAGO, July 3—The American Steam Truck Co., which is producing a steam passenger car, announces that it will show the car publicly for the first time at the Chicago Pageant of Progress which will open on the Municipal Pier Aug. 29. A carload of complete phaeton bodies has been received at the factory.

Dutch May Restrict Rubber Production

Association of Growers Acts Against Piling Up Surplus of Crude

NEW YORK, July 3—A cable dispatch from The Hague says:

"Action likely to have a far-reaching effect upon the world's rubber industry has been taken by the International Association of Dutch Rubber Growers at a conference held here. The urgent necessity for application of a remedy for the deplorable condition into which the industry has been forced by over production in years of financial and industrial depression, following the war, finally induced the growers in the Netherlands East Indies to seek government help to end it.

Seek to Meet Opposition

It then goes on to say:—

British producers, or a majority of them, have long urged the necessity for enforced regulation of the output of crude rubber through government agencies; since efforts to procure a voluntary restriction failed through lack of good faith on the part of many of the growers. It has been realized that without the cooperation of the Netherlands East Indies, any action taken by the British Colonial Government would be of little effect.

For many months efforts have been made to overcome the strong opposition of Dutch growers to government interference with rubber production, and the action now taken through their representative organization in seeking the assistance of the Netherlands Government for the rehabilitation of the industry will go a long way toward producing the desired result, if it does not remove all obstacles.

At the conference the association adopted by a vote of 383 against 129 a decision favoring government restriction of the output and a committee was appointed to take up the matter with the Netherlands Government. This does not mean that the proposals of the British States Commission have been fully accepted, but only that the Dutch Government will be asked to cooperate with other governments in order to obtain government regulation.

It was also agreed by the conference that there be taken under consideration the proposal made by the Dutch press, that an organization be formed for the purpose of withholding from the market 100,000 tons of the surplus rubber in the hands of merchants and producers.

Nine Companies Merged as Associated Motors

(*Continued from page 44*)

economical methods of operation. Present plans include automobile assembly plants at Boston, Indianapolis, Louisville, St. Louis and Oakland, Cal. The company has no plant at Oakland, but is understood to be negotiating for one.

Plans include a subsidiary dealers' financing organization capitalized at $35,000,000. This plan will permit the dealer to sell cars and trucks on a small cash payment from which he will take his discount or commission and to accept for the balance notes which he will turn over to the finance corporation. Between 600 and 700 banks have agreed to buy these notes from the finance company, Ohmer said.

As to the parts manufacturers, Ohmer said the new corporation will use nearly the entire output of the various plants, but that any surplus would be disposed of at inside cost to other manufacturers.

In addition to the officers, members of the board of directors are as follows:

James R. Dutlin, president, Inter-Southern Life Insurance Co., Louisville, Ky.; H. G. Stoddard, treasurer, Wyman-Gordon Co., Worcester, Mass.; H. V. Hale, general manager, Saginaw Sheet Metal Works; H. J. Linkert, treasurer, the Recording & Computing Machines Co.; C. L. Halladay, vice-president and general manager, Jackson Motors Corp.; W. W. Sterling, vice-president, Jackson Motors Corp.; C. L. V. Exselsen, vice-president and treasurer, Roland A. Crandall & Co., bankers, Chicago; Guy Wilson, president, Traffic Motor Truck Corp.; Buell Hollister, Pyne, Kendall & Hollister, bankers, New York City; H. F. Holbrook, president, H. F. Holbrook, Inc.; M. Douglas Flattery, chairman of board of Murray-Tregurtha Corp.

Industrial Motors Directorate

NEW YORK, July 6—Industrial Motors Corp., a consolidation of the Selden Truck Co. of Rochester and the Atlas Truck Co. of York, Pa., a subsidiary of the Martin Parry Corp., has announced the personnel of its board of directors for the present. The board is as follows:

John J. Watson, Jr., president, Lee Rubber & Tire Corp., chairman of the board, Martin-Parry Corp., and vice-president and treasurer of the International Agricultural Corp.; Frederick M. Small, president, Martin-Parry Corp.; Reeve Schley, vice-president, Chase National Bank; George C. Gordon, president, Selden Truck Corp.; Robert H. Salmons, vice-president, Selden Truck Corp.; William A. Phillips, New York; George P. Smith, member of the firm of Smith & Gallatin; Oscar L. Gubelman, member of the firm of Knauth, Nachod & Kuhne, and Henry Hopkins, Jr., a member of the law firm of Travis, Spence & Hopkins.

Moller Buys Crawford; Will Add Sport Model

HAGERSTOWN, MD., July 5—The stock of the Crawford Automobile Co. of this city has been purchased by M. P. Moller, a wealthy pipe organ manufacturer, and the plant has been placed under the supervision of Herbert N. Ross of New York. The factory was owned for several years by a corporation in which Moller and Henry Holzapfel, Jr., of this city were the principal stockholders. This corporation, it is said, will be dissolved.

Announcement is made by Moller and Ross that in addition to the Crawford car a sport model, to be called the Dagmar, will be manufactured at the local plant. One of its sport models has been built and is on exhibition in the company's salesrooms in New York.

Senate Seeks Data on Gasoline Prices

To Get Information on Intercorporate Relations and Stock Ownership

WASHINGTON, July 5—Investigation into the oil industry authorized by a Senate resolution will be made a sweeping inquiry into all conditions of the trade. The inquiry is under the direction of Senator LaFollette, chairman of the Committee on Manufactures, who, it was said to-day, hopes to develop a situation that will bring about legal action and a lowering of gasoline prices.

As a preliminary step to the investigation, Senator LaFollette to-day sent questionnaires asking the producers and the dealers many important questions bearing upon the conditions of the crude oil and gasoline markets during the years 1920, 1921 and the first six months of 1922, as well as the reason for the changes in prices of oil and gasoline. Other questions asked cover organization and business and financial conditions.

In this connection, Senator LaFollette said:

Latest Information Sought

These schedules are framed with the view of getting from the companies the latest and most complete information on the subject covered by the resolution. The purpose of the schedule on prices is to determine the prices paid by refineries for the crude oil or raw material and the prices revised by them for the finished products resulting therefrom after the refinery operations. Its purpose is also to bring out the tank wagon prices of gasoline and kerosene and the differences existing between said prices and the retail or service station prices.

The schedule on organization and business is intended to develop the intercorporate relations, if any, existing between the various companies engaged in the oil business; also to develop any common stock ownership that might exist together with any strong connection existing by virtue of any financial relationship.

The financial schedule is intended to develop the financial condition of the companies in the various branches of the oil business during the period mentioned, also to bring out the profits made in the industry during this period.

These questionnaires were sent to somewhat over 350 companies, covering all the large refineries and producing companies and the principal marketing companies. The questionnaires were accompanied by a copy of the resolution and a letter of explanation, so that the companies might be fully informed respecting the scope and purpose of the investigation.

CORRECTION

In the June 14 issue of AUTOMOTIVE INDUSTRIES it was stated that the Wilson Foundry & Machine Co. was preparing to produce 300,000 Willys-Knight engines next year. This obvious error was the result of attaching one too many ciphers to the figures. It should have read 30,000.

FINANCIAL NOTES

Torbensen Axle Co. on July 15 will redeem the scrip issued to holders of the old preferred stock at the time of the recent organization. When the company was reorganized there were two unpaid accrued dividends upon the preferred stock amounting to $3.50 a share. In the reorganization preferred stockholders were offered for each share of preferred stock four shares of the new no par common and scrip representing $3.50 in unpaid accrued dividends. This scrip was to be redeemed before any dividends could be paid upon the new common stock. The position of the old preferred shareholders after the scrip has been redeemed will be as follows: They will have received dividends accrued on their preferred stock and in place of each one share of preferred stock which, if purchased at the time of the original offering cost them $96 a share, they will be in possession of four shares of the new no par common, which at present quotation of from $26 to $27 a share, represents a total market value of from $104 to $108, or $8 to $12 more than the original cost of the preferred stock.

B. F. Goodrich Co. stockholders will meet on July 24 to authorize the redemption of $30,000,000 5-year 7 per cent gold notes on Oct. 1, 1922. In order to provide in part for funds to retire notes, stockholders will be asked to provide an authorized issue of $25,000,000 first mortgage 25-year 6½ per cent gold bonds, $20,000,000 of which are to be issued at once. The balance of the funds to retire the 7 per cent notes will be provided by the company in the regular course of business. The issue is being offered at 97 and interest by a syndicate composed of the Bankers Trust Co., Guaranty Co. of New York and Goldman, Sachs & Co.

Durant Motors of Canada for the two months ended April 30 shows total revenue from the sale of cars and parts with receipts from other operations of $652,944. The total receipts, including earnings and receipts from stock sales during the period, amounted to $2,104,778. Disbursements, including land and buildings, were $45,011; machinery and equipment, $149,762; expenses of organization, $261,597; materials and supplies, $596,543; labor, power, etc., $306,817. Cash on hand April 30 aggregated $741,783.

Republic Rubber Corp. reports that on a gross volume of business of $556,000 in May the earnings were $9,699. An authorized issue of $1,500,000 certificates of indebtedness has been sold. Proceeds are being employed to retire certificates previously issued, aggregating $1,000,000 and to aid in expanding its operations. June business is reported as running at the same average rate as in May.

Daniels Motor Co. has declared the regular quarterly dividend of 2 per cent on its preferred stock. President George E. Daniels states that sales were increasing and that with the new machinery recently obtained the company's output would be materially enlarged and operating costs reduced.

Webster Electric Co., Racine, Wis., maker of ignition devices, motor-driven tools, grinders, etc., has recently changed its authorized capitalization to consist of $125,000 of 7 per cent cumulative preferred stock at $100 per share, plus 10,000 shares of common stock having no par value.

Commonwealth Finance Corp. has declared a dividend of 10 per cent on the common stock, payable in stock, and the regular semi-annual dividend of $3.50 a share on the preferred stock both payable July 15 to stock of record June 30.

Mason Tire & Rubber Co. has resumed cash dividends on preferred stock, having declared a quarterly disbursement of 1¾ per cent, payable July 1 to stock of record June 25. The previous payment was made in scrip.

Master Tire & Rubber Co.'s assets will be disposed of at receiver's sale on July 26 at the plant in Dayton, Ohio. The appraised value of the fixed assets in September, 1921, was $225,000. Robert E. Cowden is receiver.

American Rubber & Tire Co. has declared a dividend at the rate of 8 per cent on outstanding preferred stock of the company for the quarter ending June 30, payable July 1.

Lee Rubber & Tire Corp. announces that its profits for the first four months of 1922, after setting aside special reserves, were $177,000, equal to $1.18 a share.

Jordan Motor Car Co. reports that June earnings will approximate twice the preferred dividend requirements for the year.

Reo Motor Car Co. has declared a stock dividend of 100 per cent, payable Aug. 10 to stock of record July 15.

Anti-Knock Liquid Production Planned

NEW YORK, July 5—Commercial production by the General Motors Research Corp. of tetra ethyl lead, the anti-knock liquid which has been developed in its laboratories, probably will not be started for several months. It first will be necessary to provide a plant, which probably will be located where there is an abundance of water power. The liquid is produced by a process of distillation and it is highly explosive, which will make it necessary to locate the plant with care.

When commercial production is begun, the liquid will be supplied first to the Government for use in aircraft. The second customer to be taken care of probably will be the Fifth Avenue Coach Co. and the third, a Chicago taxicab company.

Standard Is Producing New Light Speed Truck

DETROIT, July 3—A new model 75 light delivery speed truck is being manufactured by the Standard Motor Truck Co. to sell for $1,330. It has a capacity of 1¼ tons exclusive of the body allowance and has 35 x 5 pneumatic cord tires. Drive is by worm type Timken axle. Practically the same line of units is used in this truck as is used in the heavier models. These include a Continental 3¾ x 5 engine, Brown-Lipe disk clutch, Timken axle and Ross steering gear. The wheelbase is 134 in.

BETHLEHEM OPERATING

PHILADELPHIA, July 6—The newly reorganized Bethlehem Motors Corp. has begun operations at Pottstown and Allentown under Howard B. Hall of New York, who is acting for the stockholders' syndicate. The plant is running 10 hours daily. The officials are optimistic in their outlook of the motor truck business and soon will add to the working force at the plant.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Outside of preparations for the July 1 interest and dividend payments there were no important developments in the money market last week. Call money ruled firmer, covering a range of 4 per cent to 5½ per cent as compared with 2¾ per cent to 5 per cent in the previous week. There was a better demand for time money and a somewhat firmer tone developed. Sixty and ninety days' and four months' maturities were quoted at 4 per cent to 4¼ per cent, and five and six months' at 4¼ per cent as against a rate of 4 per cent for sixty days' maturities and a range of 4 per cent to 4¼ per cent for the longer maturities in the previous week. The prime commercial rate remained unchanged at 4 per cent.

The Federal Reserve statement as of June 30, 1922, showed an increase of $908,000 in gold reserves and $691,000 in total reserves. Total bills on hand increased $80,126,000 and total earning assets $81,199,000. Total deposits increased $84,877,000, while Federal Reserve notes in circulation showed a decline of $1,882,000. The reserve ratio declined from 79.1 per cent to 77.5 per cent.

Car loadings for the week ended June 17 were reported at 866,772, which is the year's peak and marks a 2.9 per cent increase over the number reported for the week ended June 10 and an increase of about 11.2 per cent over the week ended June 17, 1921, when car loadings were reported at 775,328.

Business failures for the week ended June 29 amounted to 382 as compared with 390 in the previous week; 303 for the week ended June 29, 1921; 122 for the corresponding week in 1920; 92 for 1919 and 108 for 1918.

The production of steel ingots during the half year just ended aggregated about 16,000,000 gross tons, as against 9,000,000 tons in the second half of last year and 10,000,000 in the first half of 1921. It is expected in some quarters that there will be a further increase in production during the next half year in order to maintain a balance in the market, inasmuch as the present rate of ingot production is about 40,000,000 tons a year.

MOON EXCEEDING MAY

ST. LOUIS, July 3—With orders on hand to keep the factory running at capacity for two months, the Moon Motor Car Co. reports its June business approximately 20 per cent better than that for May, which was the company's best month by 64 per cent up to that time.

The company expects good business this fall in the farming communities. One of its Nebraska dealers recently reported that many orders were given in Nebraska and Iowa conditioned upon rain before July 1. The rain came, breaking a threathened drought, and greatly improving crop prospects.

INDUSTRIAL NOTES

Fryac Manufacturing Co., Rockford, Ill., manufacturer of spark plugs, states that sales during the first six months of 1922 have surpassed the total year's business in 1921. This increase, President A. F. Hogland states, is due largely to the certificate plan the company has been employing. This certificate is good for $1 on the purchase of a set of Fryac plugs for any engine.

Simmons Handin Motor Co. of Chicago has been appointed distributor of Gray cars for northern Illinois. Simmons is one of Chicago's oldest dealers and Handin for some time handled retail sales for Ford Motor Co. in that city. He was later made branch manager of the Salt Lake City and Cincinnati plants of that company.

Milwaukee Concrete Mixer Co., Milwaukee, has brought out a new design of portable concrete mixer under the name of "Mixermobile." The mixer unit is mounted on a standard Ford 1-ton truck chassis and embodies all the features of the old style concrete mixer with added speed and mobility.

Fisher Body Corp., Detroit, enters the third quarter with a record volume of business booked up. The output during July and August will be at capacity. With the continuance of the growing demand for closed bodies the corporation probably will run at capacity throughout the year.

Ericsson Manufacturing Co.'s site and building at Buffalo are being advertised for disposal in accordance with a court order through a receiver's sale on July 25. The company manufactures Berling magnetos. The receivers are W. A. McDougal and R. E. Powers of Buffalo.

Stromberg Carburetor Co. increased its directorate from seven to eight members by the election of Harland B. Tibbetts. The retiring directors were re-elected. William L. O'Neill was chosen vice-president.

Packard Engineering Co. announces the removal of its offices to a permanent location at 1200 West 76th Street, Cleveland.

American Motor Body Co. reports that it has received an order from Durant Motors Inc., for 50,000 car bodies.

Stephens Will Produce 650 Cars During July

FREEPORT, ILL., July 3—Twenty-five cars a day are being produced by the Stephens Motor Car Co. The July output will approximate 650 cars, as compared with 425 for June and 430 for May. There are orders on hand to maintain this capacity during July and August.

The brush design of engine used in the Stephens has for the last two months been manufactured by the Stephens company at its plant in Moline, where a modern brick factory is utilized, the present daily production being 30 engines. At the two Freeport factories 520 men are employed, all of the open and closed bodies being done here, as well as the chassis assembly and all sheet metal work. These factories have a capacity for 75 complete vehicles a day.

The Stephens company is completing its final run of 1800 commercial bodies for Fords, the manufacture of which line has been carried on for several years. The intention, according to General Manager H. J. Leonard, will be to confine all manufacturing effort to Stephens cars.

The present Stephens output is 10 per cent closed types. The bodies are produced completely in these factories, the plant having very complete woodworking mill, forge shop, sheet metal, upholstery, top and painting departments.

A. A. A. to Investigate Local Club Sentiment

NEW YORK, July 5—The executive board of the American Automobile Association decided at a meeting here that the Ohio State Automobile Association was not functioning properly and admitted the Cincinnati Automobile Club to direct membership. A vote of appreciation was extended to the Youngstown club for its loyalty in refusing to join the state association in leaving the A. A. A. President Diehl announced that the Cincinnati and Youngstown clubs would be made the nucleus for a new state association.

The board announced that the Illinois association had been expelled from membership because of protesting checks and stopping payment on a recent check sent in payment of dues.

A committee consisting of David Jameson, Robert Hopper and Laurens Enos was appointed to investigate the sentiment of local clubs in all state associations which have withdrawn from the A. A. A. No action was taken in regard to the appointment of a permanent executive secretary.

Samson Tractor Output Stays at High Level

JANESVILLE, WIS., July 5—Despite the fact that the spring rush is over, the Samson Tractor Co. is keeping operations of its main works here at the same point as for the past 60 to 90 days, when a schedule of 25 to 35 tractors a day was necessary to meet orders. New business is being booked in a quantity sufficient to absorb output.

The Samson farm truck also is being produced in quantity on a schedule heavier than ever reached heretofore. One of the latest developments of the tractor department is mounting fire pumps on the chassis, the unit being designed for fire departments in the smaller communities.

FRANCE PLANS ROAD PROGRAM

PARIS, June 25 (*By Mail*)—A program of road building on a large scale in France is outlined in the new budget of the French Ministry of Public Works. The old system of French roads includes about 28,000 miles of highways and much repair work is needed. Increased strain on the French highways has been caused by a larger use of motor traction.

The number of automobile tractors and lorries in operation increased from 8000 in 1913 to 93,000 in 1921. The total number of motor vehicles increased from 100,000 to 208,000 in the above period.

METAL MARKETS

A PERFECTLY normal pause in the buying of steel products for August shipment by automotive consumers has set in. Nothing could be more natural amid the unsettled transportation conditions of the last few days and the general holiday atmosphere that was in evidence during the week. It is significant, however, that steel producers are more or less perturbed by this recession in the automotive buying wave. What fresh buying emanates from the automotive industries is nearly all for immediate shipment, and order books for mills for August shipment are not filling as rapidly as producers would wish. There are those among the producers who interpret the slowing up in buying for forward delivery as a temporary lull, while others have concluded with resignation that the pace of automotive steel demand during the third quarter will be less spirited than it was during the second quarter.

Taking the position of the steel industry as a whole, it remains an open question so far whether much or little of the 16,000,000 tons ingot production during the first half of the year must be attributed to apprehension on the part of buyers lest the coal strike result in a steel shortage.

In order to consider the steel production of the first half of the present year as having been actually consumed, it is necessary to assume an increase in the demand of 33⅓ per cent over that of the first half of 1921. There are many who doubt that so marked an improvement has actually taken place, and these incline to the view that considerable steel was shipped by mills during the last few months that awaits actual consumption. It is admitted, however, that the automotive industries form a notable exception from the general run of steel consumers, and that the tonnage of steel held in reserve by automotive consumers is of negligible proportions. Automotive consumers have bought from hand-to-mouth right along, and it is this factor which causes many producers that specialize in automotive steels to look upon the present let-up in buying for forward delivery as merely temporary.

Pig Iron.—Blast furnaces are bending every effort to hurry forward shipments of foundry and malleable iron ordered sent forward following the reduction in freight rates, which went into effect last Saturday. Fresh buying by foundries is temporarily in abeyance.

Steel.—Shortage of suitable labor is beginning to hamper more or less seriously operations of mills in all parts of the country. Merchant steel bars are in tight supply and in consequence cold-drawn steel bar producers are experiencing difficulty in fulfilling their obligations. New business is either turned down or an advance of $2 per ton over the previously prevailing 2c. base price asked. Sheet bars also continue scarce. One producer of full-finished sheets is asking $7 per ton more for No. 22 gage than the American Sheet & Tin Plate Co.'s official contract price. Hot-rolled strip producers are running short of fuel and refusing commitments.

Aluminum.—The market continues unchanged and apparently entirely unaffected by the Washington report of acceptance of the proposed metal tariff schedule in the Senate.

Copper.—Consumers are buying slowly and, while the market is fairly steady, it seems difficult to lift it to the 14c. level.

Calendar

SHOWS

Sept. 4-9—Indianapolis, Automobile and Accessory Show in conjunction with the Indiana State Fair, Auto Show Building, under the auspices of the Indianapolis Automobile Trade Association, J. B. Orman, manager.

Sept. 23-30—New York, Closed Car Show, Grand Central Palace.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

January—Chicago, Annual Automobile Salon.

FOREIGN SHOWS

March 10-July 31—Tokio, Japan, Peace Exhibition.

July 1-24—London (Olympia), Aircraft Exhibition.

Sept. 1922 — Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Associação Automobilista Brazileria.

Sept. 15-20—The Hague, Automobile Show.

Sept. 25-Oct. 3—Berlin, Automobile Show at the Kaiser-Damm Hall under the auspices of the German Automobile Manufacturers Association.

September — Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.

Oct. 4-15 — Paris, Automobile Show, Grand Palais.

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 10 - Dec. 19 — Brussels, Automobile Show, Palais de la Cinquantenaire.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

RACES

July 15 — Strasbourg, French Grand Prix.

CONVENTIONS

July 17 — Baltimore, meeting, representatives of highway departments of ten Eastern states.

June 26-July 1—Atlantic City, Twenty-fifth Annual Meeting of the American Society for Testing Materials, Chalfonte-Haddon Hall Hotel.

August 28-Sept. 2 — Detroit National Safety Congress.

Sept. 18-23, 1922 — Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

Sept. 13, 14, 15—Buffalo, Lafayette Hotel, Annual credit meeting, Motor and Accessory Manufacturers Ass'n.

Small Cars Gaining in Use in Antipodes

NEW YORK, July 5—Fiat is first and Citroen second in the sale of continental European cars in Australia and New Zealand, in the opinion of L. B. Clarkson of the firm of J. B. Clarkson & Co., Ltd., Sydney, Australia. British car makers are doing very little business in Australia or New Zealand. Small cars continue to gain in use in the antipodes, partly owing to the high cost of fuel and tires resulting from local manufacturing and the tariff in Australia. To these can be added the high body costs.

Australia has its stock of cars largely liquidated, but there are still stocks on hand in New Zealand. Exports from New Zealand have not developed as hoped for and this has hindered domestic business proportionately.

Motor Truck Business Good

Motor truck business is thriving in Sydney, and the prospects for a relatively large increase in motor bus business are good. The narrow streets of the city have brought about the building of a subway that should be completed in two years. The people are also demanding motor bus service, a service that is greatly restricted due to the refusal of the street railway companies to permit bus lines to parallel railway routes. The motor truck business has not opened up much in any other part of Australia.

American tire makers have little chance in Australia, according to Clarkson, as the import duty of approximately 50 cents a lb. on pneumatic tires protects the three home manufacturers, of which Dunlop is the largest. It is possible to buy Dunlop tires manufactured in Australia cheaper in New Zealand than in Melbourne as a high protective tariff is not in force in New Zealand.

The Australian body building industry is well handled, and a good four or five-passenger body can be had for $310 to $360 in quantities. The duty of $60 Sterling per body on a four or five-passenger car is somewhat of a barrier, except in the higher price class of cars, as the duty is a flat one, the same for a Ford as for a Lincoln.

Australia still has labor difficulties. New South Wales voted the labor party out of office some months ago, and Queensland is the only remaining province of the Commonwealth that has labor government, and this government is expected to be overthrown within the next six or seven months.

Readjustment of war wages is not yet underway.

LAUSON PRICES LOWERED

NEW HOLSTEIN, WIS., July 3—The John Lauson Manufacturing Co. has made the following reductions in the prices of its tractor models:

	Old Price	New Price
Model 5	$1,495	$1,295
Model 21	1,875	1,675
Road Model	2,100	2,000

HUDSON-ESSEX REDUCED

DETROIT, July 1—Reductions of $50 each were made to-day by the Hudson Motor Car Co. on four models of Hudson and Essex. Hudson four-passenger phaeton was reduced to $1,645, the touring to $1,695, and the coach to $1,745. The Essex coach was reduced to $1,295. The cabriolet has been reduced $100, to $1,195.

JEANNETTE TIRE LOWERED

JEANNETTE, PA., July 6—The Pennsylvania Rubber Co. of America, Inc., announces a price reduction on all sizes of its vacuum cup, cord and fabric tires and "ton tested" tubes, effective July 6. The new schedule shows the following reductions:

Vacuum Cup Tires

	Old Price	New Price
30 x 3½	$13.95	$11.95
30 x 4 (Cord)	32.50	29.25

Tubes

	Old Price	New Price
30 x 3½	$2.35	$1.95
32 x 4	3.25	3.05

Light Bus Continues Multiplying in Peru

LIMA, PERU, June 6 (*By Mail*)—The light passenger buses have continued multiplying in Lima. In fact the motor buses have grown more rapidly than the streets have been improved, and consequently are congested in a comparatively narrow area.

It is worthy of note that the light motor passenger buses of North American manufacture are still in service in Lima and increasing in number, yet the large European buses (De Dion Bouton) are out of commission.

For some time in Lima automobile dealers have been moving out of the central, crowded section of the city to the slowly developing wholesale district. This marks the second stage in the automotive evolution of Peru.

No Saturation Point

The population of Peru is variously estimated at about 5,000,000. Of these not 1,000,000 are to be considered economically. The importations per capita for Peru a few years ago were $13.78, but as only one-fifth of the entire population are economic consumers, this makes the importation per capita $68.90. There are countries with a per capita importation of $68.90 that have 10,000 automobiles. If road construction should be pushed in Peru, the estimate might be hazarded that the saturation point would not be reached before there were in the country 10,000 automobiles and trucks. This would mean that 1 per cent only of the economic consumers of Peru would have an automotive vehicle.

INJUNCTION FOR TORBENSON

NEW YORK, July 6—A permanent injunction was granted the Torbenson Axle Co. to-day by Justice Knox in the United States District Court restraining the United Gear Manufacturers Corp. from using the Torbenson name in the selling of parts for Torbenson axles where these parts are not made by the Torbenson company.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XLVIII NEW YORK—THURSDAY, JULY 13, 1922 NO. 2

$90,000,000 Business in High Priced Cars During 1922

Makers selling cars priced at $3,000 or more. Two per cent of total production since 1912 consists of cars in this price group. 1922 production likely to be about 40 to 50 per cent of capacity.

By Norman G. Shidle
Charts and Statistics by Raymond B. Prescott

TWO-THIRDS of a billion dollars have been spent during the last ten years for cars priced at more than $3,000. In 1922 something like $90,000,000 will probably be spent for cars in this price class.

These figures are particularly interesting in view of the prominent part played recently in the financial news of the industry by companies making high-priced cars. Ford's acquisition of the Lincoln properties, the contradicted rumor of a Lafayette - Pierce - Arrow merger, and other news stories centering around high-grade car firms, make timely a look into the production and sales facts about cars in the "$3,000 and over" group.

Last year 31,619 cars were manufactured and sold in this price group, while a few less will probably be made during 1922. Last year the cars produced in this price class constituted about 2.3 per cent of the total car production. This year they will constitute probably about 1.5 per cent of the total number of cars produced.

There are seventeen companies comprising 20 per cent of the N. A. C. C. membership producing cars which sell for $3,000 or over. According to the figures just quoted, these companies divide between them about 2 per cent of the total car production and about 7 per cent of the total money received from automobile sales.

Five of the companies in this group are doing 97 per cent of the price-group business on a production basis and about 83 per cent of the business on a value basis.

Production capacity is always a difficult figure to estimate, but it may be said that the seventeen manufacturers in this price class are capable of producing at present something

HERE is No. 5. In a few weeks the final price class article will be printed. This No. 6 story will give the facts and figures about the "Under $1,000" price group. The complete series is as follows:

No. 1—"*The Industry As a Whole*"—*Nov.* 17, 1921.
No. 2—"*94 per cent of Sales Will Be of Cars Selling Under* $2,000"—*Dec.* 22, 1921.
No. 3—"*Keen Sales Competition in Middle Priced* ($1,000-$2,000) *Field*"—*March* 23, 1922.
No. 4—"$2,000-$3,000 *Car Production Probably Less in* 1922"—*May* 11, 1922.
No. 5—"$90,000,000 *Business in High Priced Cars During* 1922"—*July* 13, 1922.
No. 6—"*Under* $1,000"—*to come.*

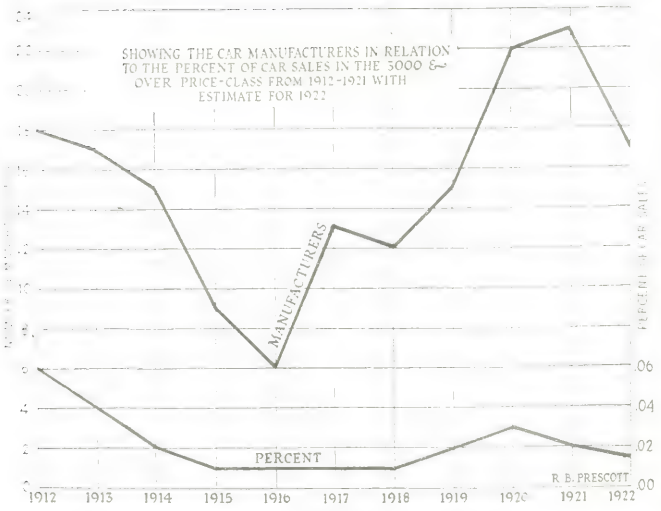


Fig. 1

like 75,000 cars a year, which is about 45,000 more than they are likely to reach in 1922.

These are the essential facts about the sales record and production probabilities of cars in the "$3,000 and over" price class. What do they mean?

Like most answers to industrial questions of this kind, the interpretation must be relative in character. General conclusions can be drawn for the price group as a whole, which do not apply in any respect to certain individual companies within the group. Individuality in design, personnel, sales methods, and production organization are more prominent in determining trends in this price group than in any other. In buying cars for over $3,000, price itself plays a less important part than in the lower price classes.

Production Below Capacity

This price group is capable of producing many more cars than there is any likelihood it can sell in the near future. Its probable production in 1922 is about 40 per cent of its potential producing capacity. This one general conclusion can be readily drawn for the group as a whole.

But this very conclusion gives an excellent example of a case in which the general result does not apply at all to specific cases. One maker in this group, for example, made and sold over 600 cars during the month of May. In certain other cases, a far smaller numerical production has yielded makers in this group excellent profits.

Capacity production is by no means a prerequisite of substantial profits. Yet, under present conditions, analysis does not indicate that there is immediate potential business to yield acceptable profits to all of the manufacturers now operating in this price class.

The chart shown in Fig. 1, for instance, shows the relation between the number of manufacturers making cars in this price class and the percentage of total car production accounted for by vehicles costing more than $3,000.

Here it appears that from 1914 to 1922 there has been little change in the percentage of "over $3,000" cars, despite the fact that the number of firms manufacturing cars in this class has fluctuated all the way from 6 to 23. The market for cars of this price is fairly stable as related to total car production. This percentage is not materially affected by the actual number of makers trying to sell cars of this price.

Production of cars selling for more than $3,000 has not varied in direct proportion to the industry as a whole. Its digressions from the average are greater than is the case with the $2,000-$3,000 group. Fig. 2 shows the actual production of cars selling for $3,000 and over as compared with the actual and normal production of the industry as a whole.

In 1915, when the industry was continuing its upward production climb, this price class took a decided dip, and the 1918 drop was relatively greater than that of the whole industry. The war acceleration gave a great impetus to sales in this price class, and for the first time it progressed more rapidly than the industry average, reaching a high point in 1920. Its subsequent drop, however, indicates a return to pre-war conditions, with the 1922 prediction indicating a recurrence of the 1915 situation, when the whole industry went forward but this high price class dropped slightly.

The individual manufacturer is chiefly concerned with the relation of his business to the total sales of the group in which he is operating. The chart shown in Fig. 3 shows the production progress of seven important companies in this price group from 1912 to 1921 inclusive. Similar curves can be applied by any maker for his own product.

Comparison with Lower Price Classes

A closer study of these relationships is not quite so interesting as in the case of the cars in lower price classes. The wide price range of "$3,000 and over" leaves considerable room for price fluctuation within the group serious enough to affect sales. Yet since the factor of price plays a comparatively small part in affect-

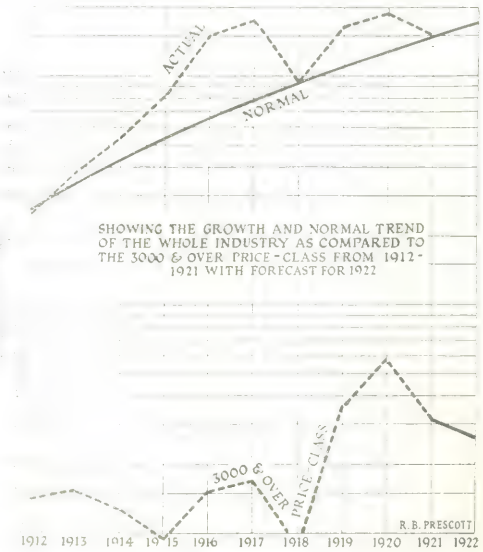


Fig. 2

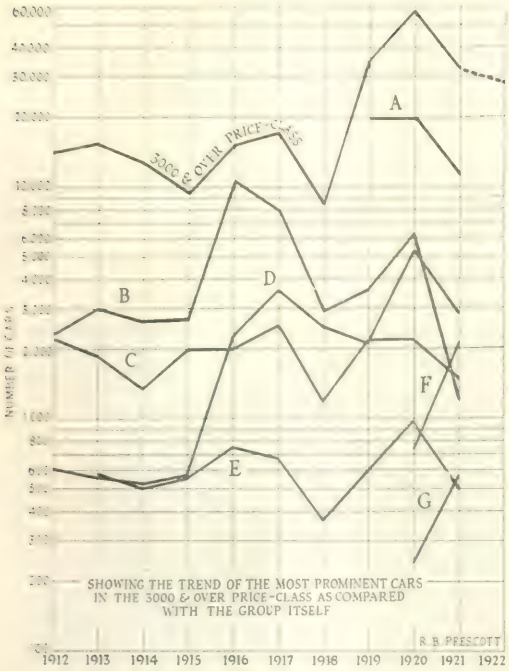


Fig. 3

ing buying desire in this price group, the relationships still hold to a large extent.

In some cases the period during which the car has been built or during which it has sold for more than $3,000 is so short as to make detailed analysis difficult. This is true of companies A, F, and G. The drop of "A" in 1921 was due chiefly to a material price increase which has since been changed.

How Various Companies Compare

It is interesting to make a more or less detailed study of the fluctuating production, not only of the price class as a whole, but of individual companies making cars within the price range in question. Fig. 3 presents particulars in this connection in graphical form. The total production of all makes of cars selling for $3,000 or over fluctuated from about 9,000 to about 16,000 for a period of six years from 1912 to 1918, the maximum production of any one company during that year being slightly over 10,000 cars, in 1916. After 1916 the war caused a falling off for two years and then came the boom of 1919 and 1920 when a total of nearly 60,000 high grade cars were sold. During these two years a newcomer in the high price field sold 40,000 cars or about three times as many as the nearest competitor in this field. During the same years, others less well prepared for the boom, or unable for some other reason to hold the pace failed to equal peak performances of earlier years. Except for 1919 and 1920, more cars sold for $3,000 or over in 1921 than in any earlier year, but this was due mainly to the large sales of newcomers.

"F" and "G" were new firms which made progress while others in their price class were falling, apparently because of novelty of design and appearance, bringing a fresh note into a generally dull selling season.

"B" has been in the field ever since 1912. Until 1915 it kept pace with the general movement of the price class, but in the following year went forward rapidly. From that time until 1920 it always did as well or better than the price group as a whole with the exception of 1919, when its gains were not quite so great in proportion. Analysis of this curve, however, indicates that this company had sound, satisfactory progress throughout the entire period, when viewed in relation to the price class as a whole.

The 1921 drop would seem unaccountable, except for the introduction of a new model in a lower price class upon which sales efforts were concentrated.

"C" has a production curve almost identical with that of the price group as a whole, excepting during the years 1912 and 1913. Thus its progress from a marketing standpoint can be considered sound up to 1921.

"D" started at a relatively low position, but assumed a more prominent place in 1915, which it has held ever since. This curve, also, indicates relatively satisfactory progress.

"E" has followed the movement of the price group rather consistently throughout its career.

For those desiring more detailed price group figures, Fig. 4 gives the production by years of cars selling between $3,000 and $4,000 and those selling for more than $4,000. The fact that these lines cross each other several times is not very significant, since the importance of price as a buying force is comparatively small, as has been pointed out previously.

It is characteristic of the companies which have been in this price group for many years that they have followed, in a general way, rather closely along the lines of the group progress.

Rapid Changes in Group Membership

There has been a higher percentage of comings and goings in and out of this group, however, than has been the case in any of the other price classes. Thirteen companies have gone out of business from this price class during the period 1913-1921 inclusive. During the

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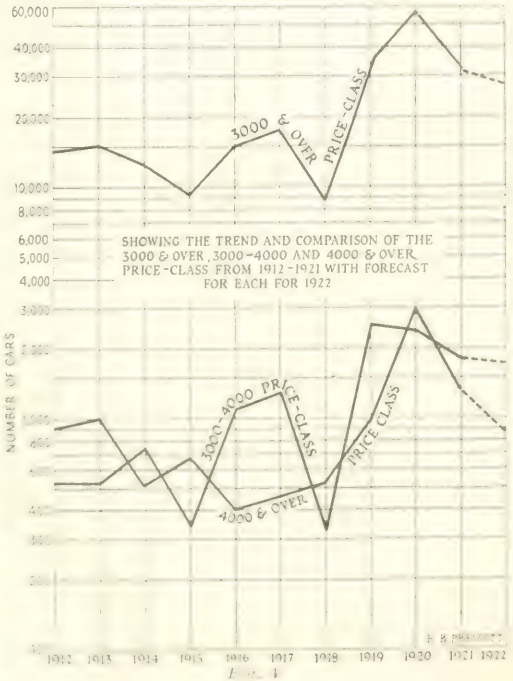


Fig. 4

Lighter Cars With Wheels of Smaller Diameter Predicted

More Aluminum to Be Employed—Smaller Wheels with Tires of Larger Section Give Better Riding Qualities

By J. Edward Schipper

JUDGING from the activity in practically all of the laboratories of the motor car manufacturers, it would not be surprising to find a marked increase in the use of aluminum in this year's cars. Aluminum timing gears which a great many of the manufacturers have been using successfully during the past year have shown that this material is durable in parts which are subject to continuous stress. The forged aluminum connecting-rods are already in the hands of many more users than is generally supposed. A number of concerns have put these rods out on test cars and kept an accurate record of their performance, in several cases, without the purchaser knowing that he had a car equipped with aluminum connecting-rods. The ability to rapidly machine this material is one of the factors which is helping to promote its greater use. It is said, for example, that forged aluminum can be manufactured almost on a wood-working schedule, as it is possible to increase the cutting speeds to such a great extent.

The cry for lightness has again become insistent, and if it is going to be possible by the use of forged and rolled aluminum to materially reduce car weight, this material is going to be heavily drawn upon in next year's design. As a matter of fact, one prominent consulting engineer at the present time is engaged on the design of a car which he states will not weigh over 1250 lb. without body. This is a six-cylinder unit designed to run at high speeds, 4000 r.p.m. being mentioned as probably the peak point.

It is a well-known fact that European car makers have been making rapid strides during the last two years toward lighter, high-speed engines. The tax on bore which is prevalent on the Continent is no doubt largely responsible for the acceleration in the design of small-bore, high-speed engines. While it is doubtful if this will ever be carried to the extreme in this country that it is in Europe, the lessons learned in the design of these high-speed engines are having some marked influences on American practice. The more rigid crankshafts and the crankcases, coupled with the increased use of high-pressure lubricating systems, indicates a tendency toward higher speed which is quite apparent in engineering circles.

A trend which fits in very well with the lighter and more economical vehicles is toward the use of smaller wheels. The 20-in. wheel with the new tire sizes which give a small exterior diameter but a very wide cross sectional diameter permit of carrying lower inflation pressures, thereby greatly promoting easy riding. A car designed in this way with the oversize tire inflated to perhaps 45 lb., will give a remarkably easy-riding vehicle. With the cord tire construction and improved practice in tire manufacture generally, the life of the tire is not seriously affected. In fact, it has been generally claimed that with a vehicle designed for lightness, these low inflation pressures would be fully up to the requirements of the tire manufacturer. Furthermore, the shock-absorbing capability of a pneumatic tire which is not too highly inflated are such as to greatly reduce the wear and tear on the vehicle and correspondingly increase its life.

Engineers regard the possibility of this type of construction as highly interesting and thoroughly sound from an engineering point of view. From the ultimate purchaser's standpoint, by which all cars must in the long run be judged, it would be difficult to find a vehicle which more nearly answers public demand. The higher speed engine in combination with a lower final gear ratio will enable rapid acceleration, while the lighter weight and larger relative size tires would give increased tire life, higher gasoline economy and materially improved riding characteristics.

$90,000,000 Business in High Priced Cars During 1922

(*Continued from page 53*)

same period eight companies went out of business in the $2,000-$3,000 price class, while the total number of companies in each case is about equal.

The record of incomings and outgoings in the "$3,000 and over" group is as follows:

	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
Total in group	18	17	15	9	6	13	12	15	22	23	17
New cars	..	22	0	0	1	1	1	0	6	0	1
From lower price group	..	2	3	0	0	6	0	3	5	3	0
Out of business	..	2	3	2	1	0	2	0	3	0	0
To lower price group	..	3	2	4	3	0	0	0	1	2	7

The proportion of cars selling for high prices bears a rather steady relation to the total production and this percentage is somewhere in the neighborhood of 2 to 3 per cent. The number of makers trying to market high grade cars has not materially affected this percentage in the past. The 1922 prediction for proportion of production in this price class seems to be pretty well borne out by the production figures available up to the time this article was prepared.

Blended Fuel Meets with Limited Success in France

Government price-control of "national" blended fuel makes operating cost studies difficult. General Omnibus Co. finds cost per mile cheaper than with gasoline, but maintenance costs rise 25 per cent. Carbureter and heating changed for new fuel.

By W. F. Bradley

ALCOHOL as fuel for internal combustion engines is finding its biggest commercial application on the fleet of one thousand motor buses owned by the Paris General Omnibus Company. This concern, which has a monopoly of surface lines in the city of Paris, has been using a 50-50 alcohol-benzol mixture exclusively since Aug. 1, 1921, and during these eleven months the Paris buses have consumed 6,000,000 American gallons of the alcohol-benzol mixture somewhat misleadingly termed "national fuel."

This change from straight gasoline to a fuel having an alcohol basis has not been made without a certain amount of opposition and criticism from vested interests. The gasoline ring, notably, was annoyed at the loss of its biggest individual client in France using 7,000,000 gallons of fuel a year with a certainty of an increase. Truck owners and the various taxicab companies also felt that they were placed at a disadvantage by the Government arrangement which practically gave the Omnibus Company a monopoly of benzol supplies. Because of this feeling it was not always easy to discover exactly what results were being obtained from the use of the alcohol-benzol mixture; even among the engineers of the Omnibus Company both favorable and unfavorable comment could be heard.

It now has to be admitted that the Paris motor bus service is being run with the same degree of regularity on an alcohol-benzol mixture as with gasoline or benzol, or mixtures of these two fuels. The cost per mile, too, is cheaper than with straight gasoline. This result, however, is obtained only by means of a special arrangement with the French Government which is interested in encouraging the use of a home-produced fuel, and has arranged with the Omnibus Company to take up the whole of the alcohol-benzol supplies at very advantageous rates. The same mixture has been put on the market, but supplies are not always available, and even when the mixture can be secured it is more costly than straight gasoline. The policy of the French authorities appears to be to take advantage of the present favorable circumstances—cheap German benzol and war stocks of alcohol—to carry out a big, practical experiment in the use of what may later become a really national fuel.

THE use of blended fuels, especially those containing alcohol and benzol, is increasing in this country as well as in Europe and in South and Central America.

Consequently the experience of large users of these products, such as is given in this article, should be of considerable interest to American manufacturers whose product sooner or later will be used with similar blended fuels.

Fuels containing alcohol and gasoline withstand higher compression pressures than most gasolines, and the higher economy available with such fuels can be realized only when the compression is increased.

The corrosive action of commercial alcohol and benzol is largely due to acid content which can be removed by proper refining methods or largely neutralized by substances such as pyridine bases.

By the terms of the Versailles Treaty, Germany is under an obligation to deliver to France large quantities of benzol as compensation for the benzol-producing plants destroyed by her during the war. This benzol is turned over to the French Government. During the war alcohol had been produced at the rate of nearly 200,000 gallons a day for the purpose of manufacturing explosives. The Armistice found immense stocks on hand, and the most suitable way of disposing of these seemed to be to mix them with the German benzol and cause them to be used in internal combustion engines. Some attempt was made to induce the individual owner to use this alcohol-benzol mixture denominated "national fuel," but the effort was not followed up and there was not the organization necessary to compete with imported gasoline.

The price paid by the Paris Omnibus Company for its Government fuel is not known, but it is admitted by officials of the company that they get very special treatment from the Government and that if they had to go into the competitive market for their fuel they would not use alcohol-benzol. This is proved by the refusal of the taxicab companies and automobile truckers to use the Government mixture.

In the neighborhood of Paris the price paid for high grade gasoline is 1 fr. 70c. per litre, and since a litre contains 7700 calories, the cost per 1000 calories becomes 22 centimes. The alcohol-benzol mixture, containing 6700 calories per litre, is 1 fr. 65c. per litre, or 24.5 cen-

times per 1000 calories. On this basis straight gasoline is more advantageous than the alcohol-benzol mixture. Theoretically the consumption ratios are in the ratio 10 for straight gasoline, compared to 11.5 for alcohol-benzol. The engineers of the Omnibus Company declare that the fuel consumption of their fleet has increased 35 per cent in bulk since the present mixture was adopted. This figure is the average obtained during the experimental period when there were sudden fluctuations the reasons for which could not always be found. During the last two or three months the figures show a greater degree of regularity, which is proof that the initial difficulties are being overcome.

Fuel consumption now works out at the rate of 7 miles to the American gallon, this being the average for the 1000 omnibuses operating in all parts of the city and in a few of the suburbs. There is one general type of chassis and two types of engines, the older model being a four-cylinder of 125 by 140 mm. bore and stroke running at 900 revolutions, and the newer model being 105 by 150 mm. running at 1000 revolutions. The single deck bodies carry 38 passengers; the weight empty is 5 tons, and with full load with passengers averages 8 tons.

THESE engines were designed to run on gasoline and have a compression of 101 lb. for the old type and 100 lb. for the newer model. When it was decided, last August, to make an exclusive use of the alcohol-benzol mixture the advisability of increasing the compression was taken up. The present Government monopoly of alcohol is of a temporary nature and it is not certain that the alcohol-benzol mixture will be available for more than a couple of years. In view of the fact, therefore, that it may be necessary to go back to straight gasoline or some other fuel at a not very distant time, it was decided to leave the compression unchanged, although an increase would have given better economy.

All the changes that have been made for the use of the alcohol-benzol are in the carbureter and the method of heating. Both Zenith and Solex carbureters are used by the omnibus company, with their own type of intake manifold and heating by both hot gases from the exhaust and hot water. Much more heat than is required for gasoline is essential for success with the alcohol mixture.

Maintenance costs are declared to have increased 25 per cent since the alcohol-mixture was put into use. This is accounted for by labor charges, for the spare parts service shows than there has been no appreciably increased expenditure for spares during the last eleven months. With the present mixture of 95 deg. alcohol and benzol having a density of 0.880 there is no deterioration of pistons, valves, or valve seats. Cast iron and aluminum pistons are equally unaffected by this mixture.

IN its liquid condition this mixture is not free from corrosive action. In fact, the 25 per cent increase in maintenance charges appears to have arisen from the corrosive action of the fuel on tanks, piping, carbureter and accessories. Nickel is said to be the only metal which will stand up for the needle valve of the carbureter; aluminum has to be avoided, and extreme precautions have to be taken to prevent the rusting of such parts as the exhaust manifold, valve caps, push rods, carbureter and ignition control rods, in fact, every part under the hood not completely protected by paint.

Flexibility is the same with alcohol-benzol as with gasoline; there is no loss of power. In winter starting is a more difficult matter, but nothing has been done to overcome this other than greater physical effort. As the consumption records show, a sudden drop in the temperature is liable to cause an increase in the amount of fuel consumed, if immediate precautions are not made to overcome this by adequate heating arrangements. Precautions have to be taken to keep the alcohol free from water, but this is not a matter of great difficulty for a concern handling its fuel in large quantities in underground tanks.

The experience of the Paris Omnibus Company is that the technical difficulties in connection with the use of mixtures of alcohol and benzol in existing engines can easily be overcome. The real problem to be solved is the production of adequate supplies and the marketing of them at a price capable of competing with gasoline.

A Promising Cracking Process

BECAUSE of certain unauthorized and rather extravagant statements that have recently appeared in the press concerning the so-called Bowie-Gavin "cracking" process, the Bureau of Mines makes the following statement regarding the experimental work that has been done up to the present time.

The process is designed primarily for the cracking of tars, heavy crudes, residuals, etc. It is possible that it also may be applicable to the recovery of oils from oil-soaked sands, oil-shales, etc., but no attempt has been made to perfect it along these lines, as it is not felt that extractions of this nature could be made profitably under present commercial conditions.

The process consists briefly of cracking hydrocarbon materials that contain no gasoline or kerosene products, in a still of novel design, and producing a cracked oil yielding relatively large proportions of gasoline, kerosene, etc. It is designed to be continuous, and the recovery of cracked oil is often as much as 85 per cent by volume of the original oil used. The oil produced by the process contains a relatively high percentage of unsaturated products. Results to date have indicated that many of the carbon difficulties, always a bugbear in cracking heavy oils, have been overcome. An attempt is being made to convert the carbon into producer gas, which, together with the fixed gas yielded in every cracking process, will furnish a considerable portion of the fuel necessary for operating the plant.

Laboratory experiments have been carried on by the Bureau of Mines for a number of years, and within the past year an 8-foot commercial apparatus has been constructed and operated intermittently at San Francisco. No claims have ever been made that the process has reached a commercial success; on the contrary, it is still decidedly in the experimental stage. However, tests recently made indicate that, so far as the still is concerned, the remaining mechanical difficulties could possibly be overcome by continuous operation of the plant. As this will probably require a larger amount of money than the Bureau of Mines will be able to expend, it is doubtful whether the bureau will be able to carry the experiments to a satisfactory conclusion.

A bulletin covering the process and apparatus is being prepared.

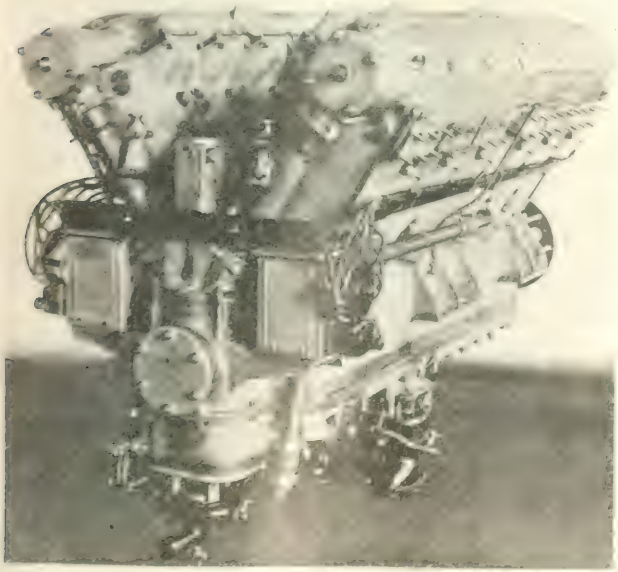
Wright-Navy Twelve Reflects Progress in Aircraft Engine Design

Dependability over long periods of operation is combined with low fuel consumption and unusual degree of accessibility. Engine develop 525 hp. but has same overall length as Liberty twelve. Open end sleeve used and babbitt bearings eliminated.

By Herbert Chase

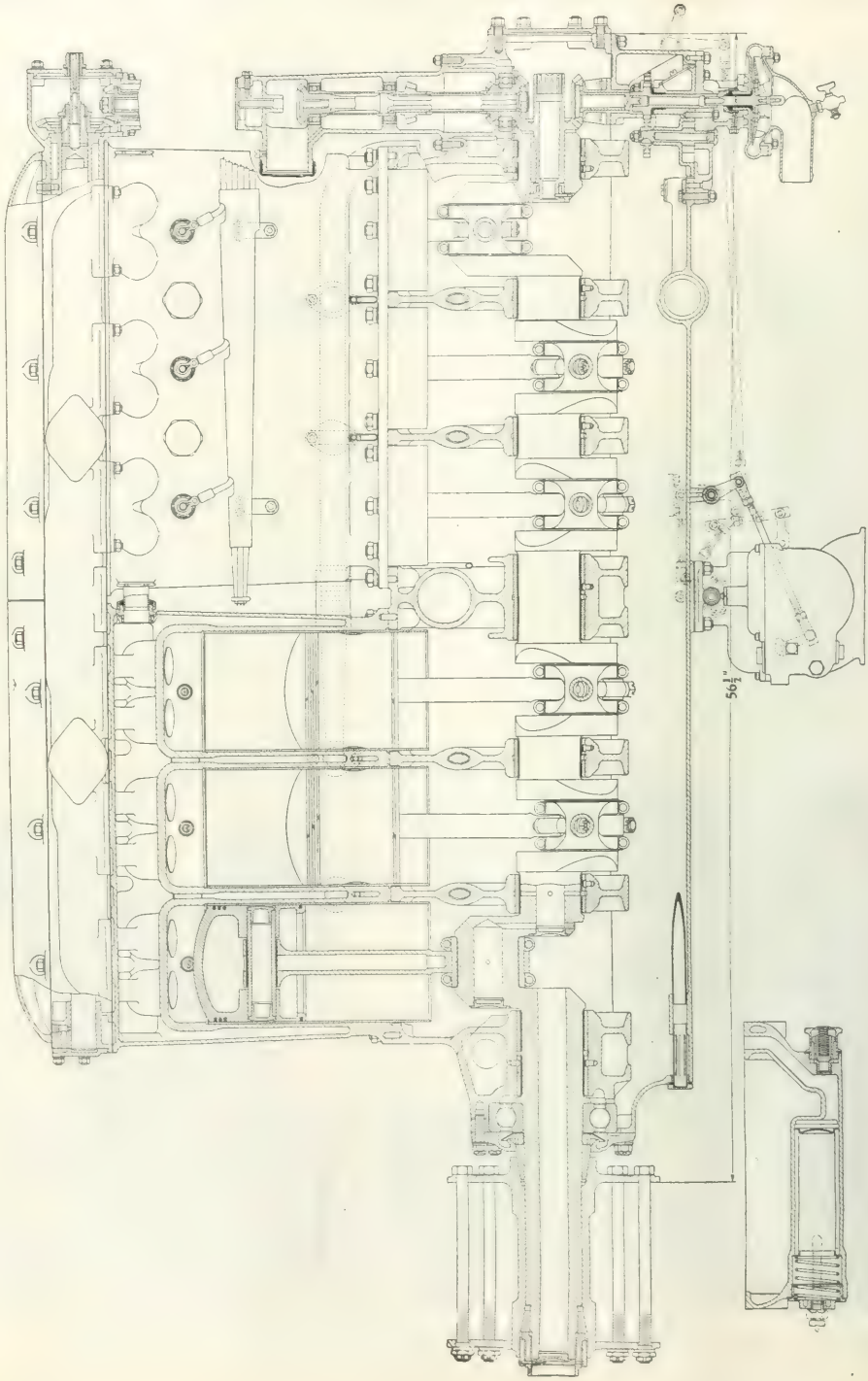
RAPID advances in engine design are being made in the aeronautic field which should not escape the notice of all automotive engineers who are interested in following progress in the development of modern automotive engines. Although aeronautic practice cannot be followed in many respects in other automotive lines, there are many structural details of common interest which are deserving of close study. For this and other reasons considerable space is here given to drawings and description of the new Wright twelve-cylinder engine designed by the Wright Aeronautical Corp., primarily for use in Navy Department seaplanes. This engine, though intended especially for rather heavy duty service in seaplanes which must be capable of sustained flight of many hours duration, is not by any means limited to this class of service, and the type developed seems likely to see a wide field of application. It is owing to the Navy's forward looking policy of encouraging work of this character that it has been possible for the Wright engineers to produce an engine of such advanced design.

It will interest those who have not followed aeronautic engine development closely to note that there is a marked tendency toward the use of engines which are capable of carrying their rated load without distress over long periods, and that to assist in accomplishing this and also maintaining high fuel economy, compression ratios are being raised and the inlet passages then slightly throttled to restrict maximum output and hold it somewhat below the peak performance which can be maintained for shorter periods. Other points of interest relate to the successful

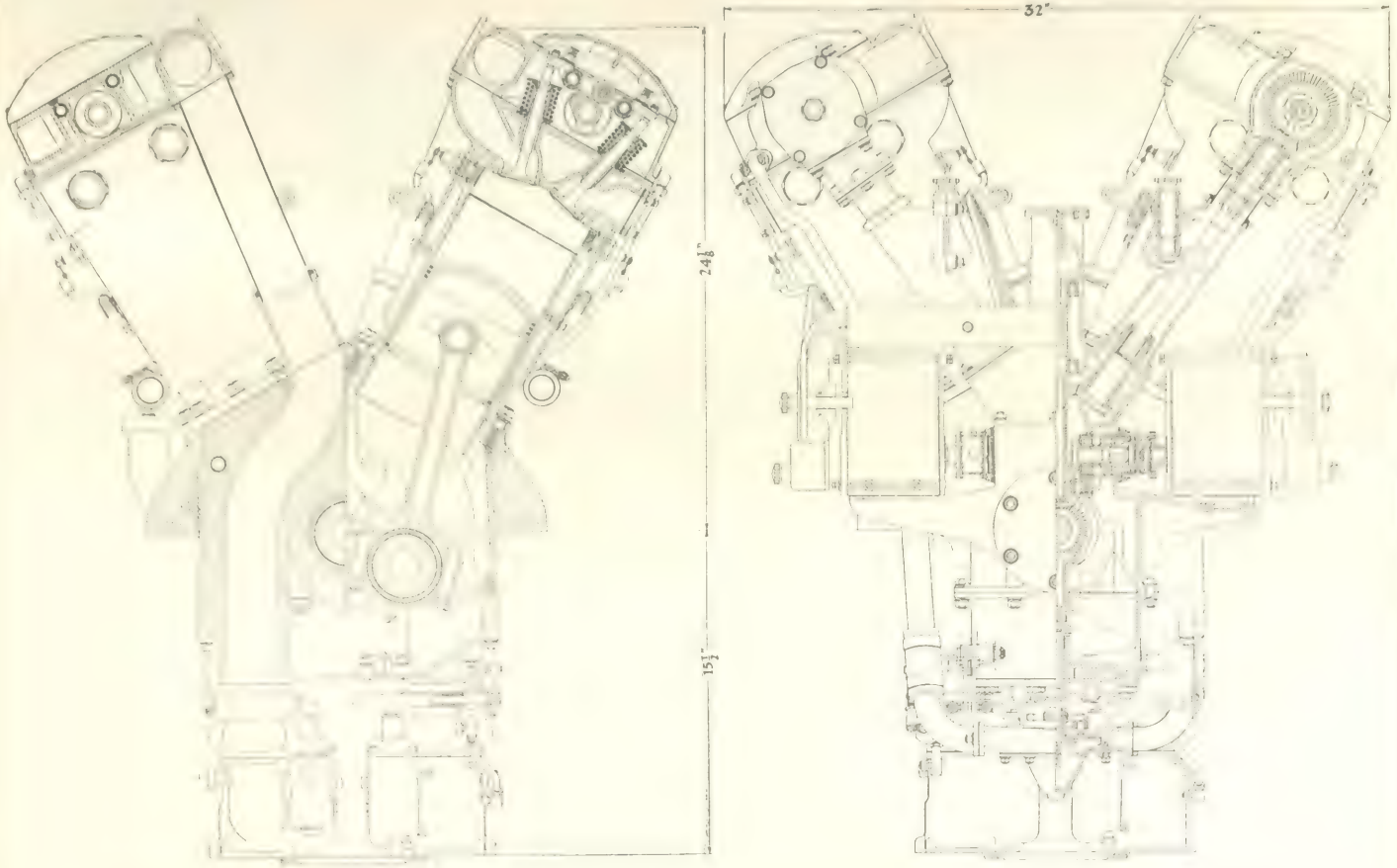




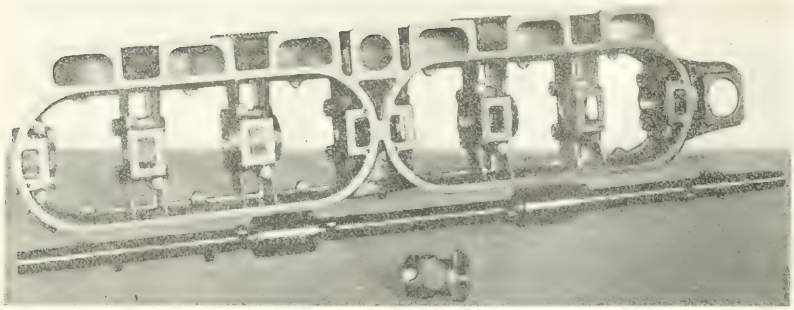
(Left) Three-quarter rear view of the new Wright model T-2, twelve-cylinder aircraft engine which develops over 500 hp. but is slightly shorter than the Liberty twelve and fits into the same bed timbers. (Right) Propeller end of the Wright engine, showing clean appearance and relatively small frontal area. The carbureters are below the crankcase, leaving the Vee clear



Lateral section of the new Wright engine. Note method of attaching bevel gear at rear end of crankshaft. The insert is a sectional view of the combined oil strainer and pressure relief valve unit carried in the lower half of crankcase



Transverse sectional views of the Wright model T-2 engine. Note cored passage to carburetors located below crankcase, and convenient layout of shafts for driving overhead camshaft and accessories, also aluminum cylinder with inserted steel sleeve and valve seats of nickel-steel bronze



Cam box and camshaft, showing also the integrally cast inlet manifold

use of aluminum cylinders with inserted valve seats and spark plug bushings of aluminum bronze; to the elimination of babbitt lined bearings, and the use of main bearing caps of forged aluminum; to the compact and convenient layout of the overhead camshaft and accessory drive; and to several features which make for greater accessibility, thorough lubrication and long life of wearing parts.

Some of the features which this engine embodies are quite new, at least in the combination employed, while some of them have been used in other Wright engines heretofore described in these columns. Among them may be mentioned integrally cast manifolds so arranged that the carbureters can be located either in the Vee or below the crankcase, elimination of all welded jacket joints, and the use of a construction which not only provides unusual accessibility, but which can be taken down without removing the engine from the plane and by breaking an unusually small number of joints. All this has been accomplished in an engine which develops about 100 hp. more than the Liberty twelve, but which is slightly shorter than the Liberty and fits into the same bed timbers. Furthermore, the engine was designed, built and successfully completed a 50-hour endurance test in less than a year's time—an exceptional if not a record performance.

Durability Increased by Throttling

The engine has 5¾ in. bore, and the stroke is 6¼ in., giving a total piston displacement of 1947 cu. in. The rated power is 525 at 1800 r.p.m., this corresponding to 118.5 lb. brake m.e.p. The engine is purposely somewhat throttled in order to increase its durability and dependability. The compression ratio is 5½ to 1 and the weight 1100 lb. The Vee angle is 60 degrees. The cylinders are cast in aluminum in four blocks of three, with integral jacket walls and heads.

The open end steel sleeve employed acts only as a bearing surface for the piston and is not required to take strain in tension as in some of the eight-cylinder engines built by the Wright company. This makes it possible to seat the valves directly in bushings which are inserted after the cylinder has been raised to a high temperature in an oven. The valve seats are made of aluminum bronze which has practically the same coefficient of heat expansion as the aluminum head. The spark plug bushings are also of aluminum bronze and are screwed in place while the cylinder is hot, thus giving good mechanical and thermal contact with the cylinder wall.

By the use of this construction it is possible to keep both the valves and the spark plugs relatively cool, since they are in close proximity to jacket water which circulates completely around them. The cylinder sleeve, which is also inserted while the cylinder is hot, projects about two inches into the crankcase, and is provided with a narrow flange which is clamped between the cylinder and crankcase.

Each cam box is a single casting extending the entire length of two cylinder blocks. The inlet manifold, cast integral with this box, helps to stiffen it and thereby stiffen the entire engine. It will be noted that the inlet passages connecting the manifold with the combustion chamber are cast integral with the cylinder head. The valves are inclined and are formed with hollow stems which bear in long inserted guides. There are two inlet and two exhaust valves per cylinder, each being fitted with two concentric springs. All valves are made of stainless steel. The rocker arms are short and are pivoted on light steel tubes running parallel to and on each side of the camshaft. These tubes extend half the length of the cam box to facilitate their ready removal, but are connected in such a way that oil can be fed through them under pressure. Holes are provided for lubrication of the rocker arms and leads carry oil also from the tubes to the camshaft bearings. The oil is led through one of the hollow pivot tubes from end to end of the cam box and returns through the second tube to the end from which it started. The rocker arms are drilled to provide oil passages to the cam followers and cams. Oil which escapes from the pressure system into the cam box flows to either end of the latter and is drained through external pipes to the crankcase. Tappet adjustment is provided by a screw in the end of each rocker arm. The camshafts are hollow and are provided with four plain bearings of 12 per cent copper-aluminum alloy which metal is used in several places instead of the bronze ordinarily employed for this purpose, thus saving considerable weight. It will be noted from the accompanying cut of the cam box and camshaft that the latter is provided with two large central bearings of a diameter slightly larger than the outer diameter of the cams. These bearing surfaces are formed by shrinking over the camshaft two pieces of steel tube. The tube is supported on light flanges turned integral with the camshaft, thus saving considerable weight which would be added if the camshaft were made solid at the bearings. By following this construction, it is possible to use one piece camshafts of relatively light weight and at the same time give large bearing surfaces and facilitate accurate machining and alignment of the bearing surfaces.

Oil Leakage Avoided

Each cam box is provided with two light aluminum covers which enclose the entire valve actuating mechanism and effectively prevent oil leakage to exterior of engine.

The aluminum pistons are quite conventional in design, having a heavy dome shaped head with skirt of tapered section. There are three rings above the piston pin and one scraper ring at the lower end of the skirt. The piston pins float in both rod and piston bosses. They are retained by bronze plugs pressed into the end of the hollow pin. Connecting rods are of tubular section finished all over and provided with bronze bushings fixed in the upper end. The hole in the connecting rod is drilled from the upper end.

A simple and very satisfactory type of bearing is employed at the lower end of the rod which is of the serrated

type. The bearing is a split sleeve about $\frac{3}{8}$ in. thick and is cast from a new copper-lead-tin alloy. The surface of this metal forms the bearing, no babbitt being required. The inner surface, of course, turns on the crank pin while the outer surface is formed in two diameters, which can be accurately ground to size. The two steps of large diameter are clamped between the halves of the forked rod while the smaller diameter fits closely the rod which turns on the outside of the box. This construction is unusually rigid and can be readily finished to the desired size by grinding, thus assuring unusual accuracy in fit. The metal is said to be of such quality that it cannot score the parts which bear upon it.

The crankshaft is quite conventional in design except for the fact that it has an unusually large diameter, 3 in. at the main and crankshaft bearings. It is made hollow for lightness and to enable pressure lubrication. The plugs used to close the hollow ends of the crank throws are readily removable to facilitate cleaning. There are seven main bearings, the center bearing being unusually long. The propeller end of the crankshaft is provided with seventeen splines, the space in which the eighteenth groove would normally be cut being left blank in order to make it necessary to put the hub on always in the same position. The splines are made straight and are intended to take torque only, the axial position and centering of the hub being determined by two sharp cones, one at each end of the spline.

How Stiffness Is Attained

Since stiffness is a prime requisite in an engine of this class, the aluminum crankcase is made with a rather heavy section and is well ribbed. The block cylinder construction and one-piece cam boxes also aid in giving stiffness. All bearings are carried in the upper half of the crankcase, the lower half forming only dry sump from which the oil is pumped as rapidly as it is thrown off from the bearings. The lower caps of the main bearings are aluminum forgings. By the use of this construction the bearings are made relatively accessible after removing the lower case. It will be noted from the transverse section of the engine that the carbureters are secured to the lower case and that this, as well as the upper crankcase, is cored to form a passage through which the mixture from the carbureter is drawn to the inlet manifold. To the upper end of this cored passage is attached a short length of light tubing connecting the passage to the inlet manifold. If, however, it is desired to use a carbureter located in the Vee, side openings into the manifold can be employed, although this renders the inner spark plugs less accessible than they would otherwise be. At the front end of the crankshaft there is provided a deep row radial thrust bearing which positively locates the crankshaft endwise.

Among the most interesting features of the engine is the layout of gearing for driving the camshafts and accessories. Practically all the bevel gearing is mounted in readily detachable housing units. As will be noted from the photographs and drawings, a vertical shaft with a bevel gear at its lower end is driven off the crankshaft and from this shaft are driven in turn the two magnetos and two inclined shafts which drive the camshafts. The inclined shafts are provided with serrated couplings which facilitate accurate timing of the valves. From the inclined shafts are driven the two gun synchronizers required on engines for the Navy Department. The vertical shaft terminates in a bevel gear from which either a generator or fuel pump located in the Vee of the engine can be driven if desired. From the lower end of this vertical shaft, and driven by the same crankshaft bevel gear, is another shaft which drives the three oil pumps and the horizontal centrifugal water pump. A blank cover opposite the end of the crankshaft is provided, and at this point either a hand or electric starter can be attached if desired. The compact location of the distribution gearing and accessories accounts in large part for the relatively short length of the engine.

The water pump is provided with two outlets to which are connected two short manifolds which deliver water to the center of the base of each of the four cylinder blocks. Water outlets are located at the propeller end near the top of the jacket.

There are three oil pumps in a single assembly. One of these draws oil from the front and one from the rear end of the lower case and delivers it to the external tank or radiator while the third draws oil from the tank and delivers it to the bearings under pressure. After the oil leaves the pressure pump it passes through a tubular strainer arranged transversely in the lower half of the crankcase and thence to the oil manifold cast in the upper half of the crankcase from which it is distributed to all crankshaft bearings. Piston pins and pistons are lubricated by splash. Outside piping is used to convey oil to the cam boxes. The oil returns to the sump by gravity after lubricating the inclined shafts, gears and bearings in its downward path. The pressure employed in the



Vertical and inclined shafts with bevel gears for driving camshafts and accessories. Note convenient unit housings which provide ready accessibility

lubricating system is 50 lb. per sq. in. and is controlled by a by-pass valve located at one end of the oil strainer.

Ignition is provided by two Splitdorf, model SS, twelve-cylinder magnetos. One of these fires all of the plugs located in the Vee, while the other fires all of the outside plugs. The two separate Stromberg carbureters, bolted to the bottom of the crankcase, are provided with the necessary control rods and bell cranks to bring the controls to the rear of the engine. These fittings are carried in bosses cast especially for this purpose on the bottom of the crankcase. Mixture issuing from the carbureters is heated by contact with the walls of the cored passage in the crankcase and the oil heated cambox passages as well as by passage through the water jacketed head of the cylinders. The engine is, of course, designed for operation on aviation gasoline without the use of anti-knock or other non-detonating fuel.

It will be noted that the water and oil pumps, magnetos and other parts, such as spark plugs, crankcase bolts and oil strainer, are readily accessible to facilitate their removal when this is required.

This engine, which is known as Model T2, is reported to have run for a total of 50 hours, averaging 500 hp. at 1800 r.p.m. During this run the average fuel consumption was 0.48 lb. and the oil consumption 0.02 lb. per b.hp. hr.

British Racing Cars Show Unusual Design Features

Vauxhall engine has flywheel located in the center of crankshaft. Sunbeam uses two overhead camshafts offset with respect to center line to permit use of larger inlet than exhaust valves. The steering wheel has laminated steel spokes intended to absorb shocks.

By M. W. Bourdon

TO participate in a British race for 3-litre cars, three Vauxhall cars were prepared; H. R. Ricardo collaborating with the manufacturer's engineers. The engine is a four-cylinder, $3\frac{3}{8}$ x $5\frac{1}{4}$ in. unit, and is said to develop a maximum horsepower of over 110, while its speed range runs beyond 4500 r.p.m. An aluminum cylinder block with steel liners is used, with detachable head for each pair. Ball bearings are used for the crankshaft journals and roller bearings for the big ends.

Rather unusual is the position of the flywheel, which is in the center of the crankshaft, the crankcase, therefore, being of unusually large dimensions. Overhead camshafts are used with four valves per cylinder; there are two Zenith carbureters, one for the end cylinders and the other for the central pair; ignition is by Delco coil and battery, the contact breaker and distributor unit being in triplicate, with three spark-plugs per cylinder. As a safeguard two entirely separate fuel feed pipes are installed, the piping being that flexible gut material known as Petro-Flex. The oil pump delivering oil to the bearings is duplicated, and a separate gage for each pump faces the mechanic's seat.

DESIGNERS and engineers who are accustomed to follow the performance of racing cars may take particular interest in watching that of the Vauxhall cars in coming European races.

H. R. Ricardo, the British engineer who has done so much to advance engine design, has collaborated with Vauxhall engineers in producing the latest racing cars bearing that name, and much may be expected from them.

It is to be noted that both the Sunbeam and Vauxhall cars are fitted with four-wheel brakes, but their construction and method of control is different. This brake system appeared on only three of the recent Indianapolis contestants and is still more of a European than American practice.

A plate clutch is used with an unit construction of engine and four-speed gearset. There is nothing unusual in the transmission, which is by means of an open propeller shaft, with a fabric disc joint at the front and a sliding pot joint at the rear. Driving torque is taken by a special torque member, though the rear braking torque is taken by the semi-elliptic springs.

It need hardly be said that four-wheel braking has been adopted, though there is something unusual in the controls of the brakes. The side lever operates the rear wheel brakes only; the pedal brings into use the front brakes, while in place of the usual throttle control over the steering wheel is a lever which brings all four brakes into use by air pressure.

For a French 2-litre race an entirely new Sunbeam chassis has been made, with four cast iron cylinders having a fixed head and a bore and stroke of 2 11/16 x $5\frac{3}{8}$ in. In this case also there are four overhead valves per cylinder and two overhead camshafts, but the positioning of the latter is unusual in that to enable the inlet valves to be larger than the exhaust, the camshafts are not placed symmetrically with respect to the center line. Plain bearings are used for the big-ends, but the crankshaft runs on three sets of ball bearings and is a built-up construction. Two magnetos are used, with two spark-plugs per cylinder and two Claudel racing carbureters for the mixture supply. Lubrication is on the dry sump system.

On this chassis the brakes on all four wheels are applied simultaneously, by the pedal, which operates through a friction relay or Servo system. There is no separate control of the front brakes but the rear ones can be applied independently by a hand lever. To resist the torsional stresses arising from the front brakes a special type of front axle is used. This consists of an H section central member terminating inside the spring pads in circular flanges. A second forging is bolted to each of these flanges and forms the spring pad and also the extension for the swivel pin. These axle ends are machined to a tubular section. Another divergence from ordinary practice is found in the steering wheel, which has laminated steel spokes to allow a certain degree of flexibility and relieve the driver's arms of shocks.

The foregoing description of the Vauxhall engine should be of particular interest to those who have followed the fuel research work done by Ricardo, since it is presumed that it embodies a construction such as to be affected to a minimum degree by detonation difficulties. The use of three spark plugs in so small a cylinder is significant in this connection. Friction has also been reduced to a minimum, it would seem, by the use of ball and roller bearings on the cranks and main bearings.



Plan view of Stock motor-driven plow built in Germany

German Motor Plow Design Provides for Variety of Work

Combines plow with two-wheel tractor. Construction makes weight of plow and plow carrier available for traction purposes. Low speed engine used. Can be used for belt work or for hauling.

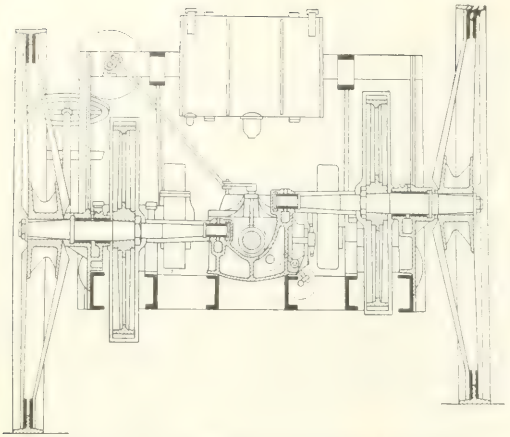
By P. M. Heldt

A TYPE of agricultural power machine entirely different from the conventional farm tractor has been developed in Germany and is there known as a motor plow. The first machine of this type was brought out by Robert Stock of Berlin in 1909, and the Stock Motor Plow Co. is still one of the leading concerns in this branch of the tractor industry.

These motor plows generally comprise two large driving wheels, 86 in. in diameter in the larger sizes, with a frame hung from the wheel axle or axles. Forward of the axle the frame is rectangular, and a considerable distance ahead of the axle it carries the motor. Back of the axle the frame is in the form of a triangle with one angle larger than 90 deg. The frame member opposite this large angle, which constitutes the long side of the triangle, carries the moldboards, while at the rear corner of the frame is mounted the third or steering wheel. The moldboards are rigidly secured to the frame, and are lowered or lifted out of the ground by raising or lowering the frame relative to the steering wheel.

Owing to the fact that the plows are rigidly connected to the wheeled frame, the latter must be kept parallel with the ground in order that all of the bottoms may cut furrows of equal depth. In practically all of these motor plows one of the driving wheels travels in the furrow, and therefore has to be set lower than the other wheel relative to the frame. This necessitates the use of a separate axle for each wheel. In most of the motor plows the difference in level between the two wheel axles is set once for all, to correspond to the average depth of plowing, while in others it is adjustable so as to keep the plow frame parallel with the ground when the depth of plowing is changed.

The chief objects in developing the two-wheeled motor plow seem to have been to make practically all of the weight of the plow carrier and plow available for traction purposes and to take advantage of the greater maneuverability of a self-contained machine as compared with a tractor and plow. In the original Stock plow only 1200 lb. out of a total of 13,200 lb. came on the steering wheel when the plow was at rest. The 86-in. wheels of this tractor had rims $6\frac{1}{4}$ in. wide, which were provided with angle iron lugs overhanging the rims 4 in. on both sides. The engine was a four cylinder type of 42-hp. with separately cast cylinders. This first Stock plow had only one forward speed and no reverse, but these deficiencies soon made themselves felt, and in later models a variable speed and reverse gear was provided. The first reduction was through a pair of bevel gears and the second through a pinion and internal gear. It has already been stated that the two driving wheels were not in line, one being placed lower than the other. In order to obviate the need for universal joints in the differential shafts, the two rear wheels were displaced also in a horizontal plane, so that the pitch circles of the two internal gears cut each other in the axis of the differential shaft. The rear steering wheel was provided with a skid ring so as to give fairly positive steering in spite of the small weight on this wheel. An implement type of seat was supported from the frame, extending sideward from the plow supporting beam, so that the driver rode over the plowed ground. Adjacent to him he had the clutch lever and the plow lifting lever.



Vertical section through axle of the Stock motor plow

The frame of a machine of this kind has a tendency to turn over backward in plowing and forward when backing. It is immediately apparent that there is no possibility of the plow overturning backward, but the tendency to tip over forward when backing gave considerable trouble at first. It is this proclivity of the motor plow which explains the heavy trussing under the frame, the need of which may not be directly apparent.

As pointed out, the Stock was the prototype of the whole class of motor plows now made in Germany. Later designs, of course, showed a number of variations in the general layout and many improvements in details. Thus, some of the plows are now made with a separate plow frame independent of the driving gear frame or main frame. This separate plow frame was introduced by Wendeler & Dohrn. In their tractor it is linked to the main frame and can be adjusted vertically by means of a nut on a horizontal screw spindle. Other manufacturers use a pinion and rack for the plow lift.

The engines of these motor plows are low speed machines, which is almost necessary on account of the very large driving wheels used. Most of them run at about 700 r.p.m. On the earlier machines the radiator was placed in front, but several of the more recent models have the radiator to the rear of the engine in a more protected position.

The majority of the motor plows are quite large machines. Stock, for instance, at present furnishes two sizes, with ratings of 50-55 and 70-80 hp. respectively. Lifting a six-bottom plow by hand is not an easy task and it soon became evident that hand lifting was not very practical. Since 1914 most of the manufacturers, therefore, furnish power lift, except in the case of the smaller machines. This power lift device consists essentially of a reversible gear with clutch, connected to the mechanism—often in the form of a screw and nut—which displaces the steering wheel relative to the plow frame. The clutches of the reversing gear are controlled from the driver's seat. Before power lift was definitely adopted, many users of these plows used two men for operating the plows, one attending to the driving and the other to raising and lowering the plows. One Austrian manufacturer, Rudolf Bacher, brought out a plow designed for operation by two men, the plow operator's seat being so arranged that he looked backward over the plowed ground, so that he could always observe the kind of work that was being done. What increased the difficulty in operating the plow by hand was that just at the moment when the plow has to be lifted out of the ground the operator is busy with his steering gear. An expedient to reduce the effort required to lift the plow, resorted to before the introduction of the power lift, consisted in the provision of a spring which neutralizes most of the weight of the plow.

Komnick of Elbing originally built a two-man plow, but in 1915 introduced a one-man plow with power lift. The first Komnick power lift model had a rating of 80-100 hp., its engine running at 900 r.p.m. The steering wheel was raised and lowered relative to the frame by means of a screw and nut, worm and wheel mechanism. This motor plow had the radiator back of the engine.

Scheffeldt of Coburg manufactures a small motor plow of 25-40 hp. rating. The engine is located at the forward end of the frame and the driver sits directly over the steering wheel. The steering wheel column is connected through a short chain to the shaft of the steering handwheel. Adjacent to the driver's seat is located the screw spindle for lifting the plow by hand. The simplifications in the steering and plow lift mechanisms reduce both the weight and the manufacturing cost.

In the fall of 1919 an agricultural machinery and implement show was held in Magdeburg, and at this show motor plows were represented in about the same number as the more familiar type of farm tractor. Most of the machines which have originated in Germany since the war have been of the tractor type, however, either wheeled or crawler. There are altogether about half a dozen manufacturers of motor plows in Germany and these machines are well known, not only in Germany but also in the large agricultural states which import most of their machinery. There are also two motor plows manufactured in Czechoslovakia, the Excelsior and the Praga. Practically all of the makers put out two sizes, a 5-6 bottom plow with a rating of about 80 hp. and 3-4 bottom plow rated at from 30 to 45 hp. in the different makes. Some of the recent improvements in these motor plows are as follows:

Plows Mounted on Separate Frame

Komnick has discontinued the plan of lifting the plow by changing the height of the frame relative to the steering wheel. He now mounts the plows on a separate frame or beam provided with two vertical posts which extend up through hollow columns on the main frame and can be raised and lowered relative thereto by means of screw spindles and nuts. The plow lift columns are made very massive so as to be able to withstand the strains imposed by the plow draft without distortion of the frame. The air is filtered through a cloth type air cleaner. Neither holes nor slots are required in the wheel rims for the attachment of the driving lugs. These lugs are placed against the wheel rims from the outside, yokes are placed against the rims from the inside, and the two are clamped together by bolts beyond the rim. Of course, the lugs are held on only by friction, but this seems to have proven satisfactory.

On the Akra plow, manufactured by the Kyffhäuserhütte, which has a 25-hp. rating and is the smallest motor plow made, the plow frame, instead of being hung on three racks, as in the past, is now swung in forks at the front and supported on a rack only at the rear, this rack being raised to lift the plow out of the ground. A spring compensates for the weight of the frame and makes it easy to lift the plow by hand. The drive wheels are vertically adjustable, so that the plow frame may be horizontal no matter what the depth of plowing. The plow frame can slide horizontally on its supports and is placed in driving connection with the main frame through a spring so as to relieve shocks in starting and when striking obstacles. This machine weighs 5500 lb. and is the lightest motor plow made.

The Scheffeldt G. m. b. H., which came out with a 3-bottom motor plow in 1914, changed to a 4-bottom plow in 1919, the machine weighing 4 tons and having a rating of 60 hp. In this case the depth of furrow is changed by raising and lowering the drive wheels and the steering wheel simultaneously, the machine remaining level under all conditions. The driving wheels swing around the jackshaft axis and are braced by radius rods which also serve for adjustment. A rather unique feature of this machine is the arrangement of the steering wheel, which runs in the furrow of the third (next to the last) bottom. This serves to guide the machine effectively, and at the same time it keeps the last furrow in shape for the right front wheel to run in the next time around. It is claimed that if this last furrow were disturbed by the steering wheel it would not guide so well.

There is a disadvantage, however, in running the steering wheel in the furrow, as it results in uneven depth of plowing if the ground is at all uneven.

In their latest models, adjustment of depth of plowing is effected by changing the setting of the wheels by Stock and Scheffeldt, and by means of a separate plow frame by Wendeler-Dohrn, Komnick and Akra.

Objections to the construction in which there is a separate plow frame below the main frame are that it necessitates a high main frame and that it is heavy. This is claimed to have been overcome by the Bussard Motorplow Co. in Hanover by means of a construction in which the plow frame is linked to the main frame at the rear. At the rear of the plow frame there is the usual steering wheel, and the front end of the plow frame can be lowered relative to the main frame, and the rear end of the plow frame relative to the steering wheel by equal amounts. The plow bottoms of the Bussard are elastically connected to the plow frame so that they will not be injured when striking an obstruction. When striking a rock, for instance, the resulting pressure lifts the plow over the obstruction.

The Komnick motor plow has recently been offered in South Africa at what is a very low price for that market, namely, £530. This is a 3-bottom machine and weighs 4 tons. The large Komnick plow, a 6-bottom machine weighing 8 tons, sells at £850 there. Both operate on kerosene. One objection to the machines is their huge size, which is apparent from the photograph reproduced herewith. A correspondent of AUTOMOTIVE INDUSTRIES reports that in a test in grass land the larger of the two machines easily pulled its 6 bottoms at a depth of 11 to 12 in. and plowed 2 acres per hour. Although the weight is great, it is claimed that there is no soil packing, owing to the large diameter of the wheels. The machines turn in their own length.

Our correspondent writes that these machines have made a very favorable impression in the South African market, the prices of other machines of similar capacity running much higher, but he concludes that once the mark begins to appreciate it may be impossible to sell at the present low price.

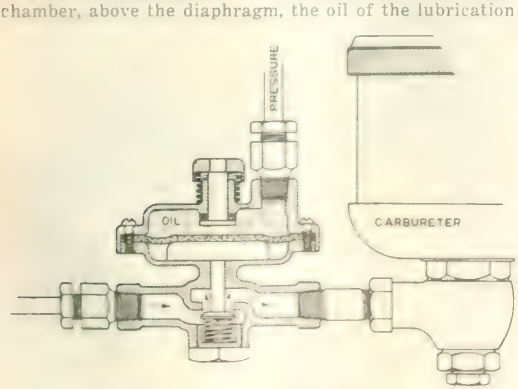
These motor plows are not limited to a single line of work. They can do belt work as well as tractor. A harrow or disk roller can be attached every third time around in plowing, and the machine can also be used for hauling wagons or trailers, although the plows must first be removed when such other work is to be done.

Safety Device for Pressure Lubricated Engines

A DEVICE known as the Lubritector, designed to shut the engine down automatically as soon as the lubrication fails, has been placed on the market by the Pierce Governor Co.

The apparatus consists of a poppet valve in the fuel line close to the carbureter which is normally held to its seat by the pressure of a light coiled spring. The stem of the valve enters a diaphragm chamber in which there is a leather diaphragm. To the upper portion of this chamber, above the diaphragm, the oil of the lubrication system has access, and the pressure of this oil (in a pressure lubricating system) will open the valve and allow the fuel to flow to the carbureter. But if the oil supply runs low or the circulation fails for any reason the spring will immediately shut the valve and thus cut off the fuel supply.

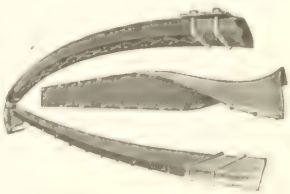
An extension of the valve stem extends through the cover of the device, and if the engine should stop and the driver not know the reason, he can easily make a test by depressing the knob on top of the stem. If the engine starts and then stops again as soon as the amount of fuel admitted to the carbureter has been used up, it is a sign that there is something wrong with the lubrication.



Pierce Lubritector for shutting off fuel when oil pressure fails

Improvement in Spring Covers

THE spring covers of the Woodworth Specialties Co. are now being made with an oil cup for replenishing the oil, so that the felt pad can be kept saturated with oil and the spring thoroughly lubricated. These covers completely cover the springs from the clamped thick part to the spring eye. They have a felt lining by which the oil is absorbed, and they are made in two grades.



Woodworth spring cover

Seam Lock Is Feature of New Radiator Construction

Sections held together by lock. Solder acts merely as a seal. Brass or copper used in making up core is not stretched during construction. Novel machinery utilized in manufacture. Core specially adapted to motor truck use. Not injured by freezing.

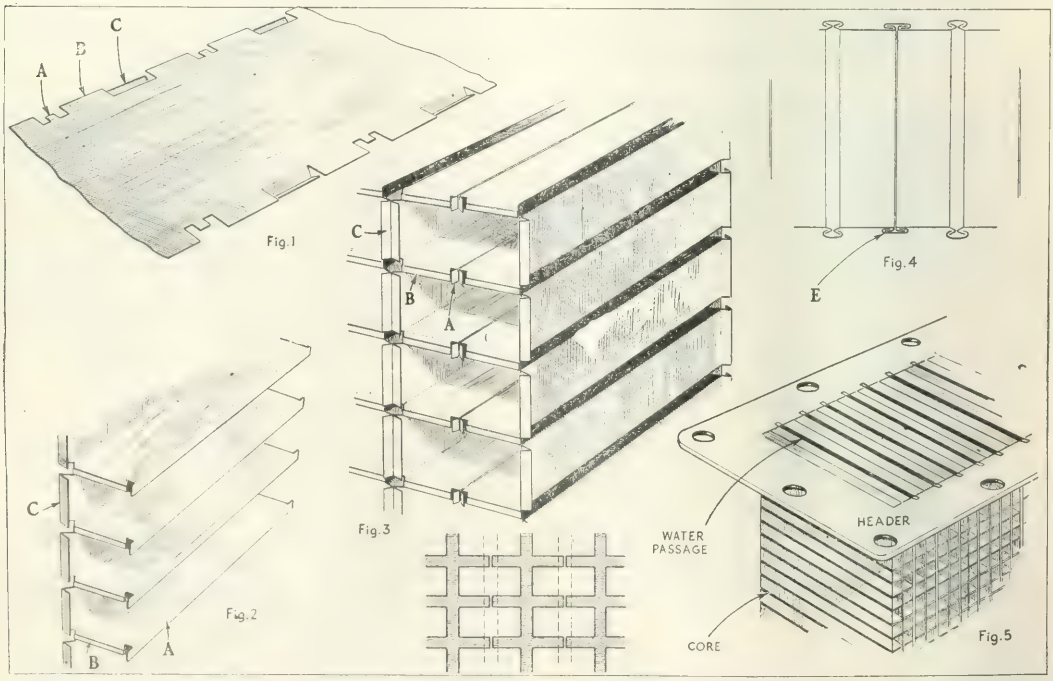
By B. M. Ikert

THE Rochells radiator, made by the Rochells Mfg. Co., incorporates a unique method of construction, and four advantages are claimed for it, namely, maximum strength, maximum radiation, minimum weight and minimum cost. Probably the most interesting feature of the construction, and which contributes chiefly to its strength, is the patented channeled seam lock. This holds each seam securely, and solder is not depended upon to hold the sections together. The solder acts as a seal only, to take care of minute openings in the core.

It is interesting to note that in making up the core the metal is not offset or stretched in any way, which might tend to destroy its ductility. Only right angled bends are used. As a result, it is claimed, the core will withstand certain kinds of abuse (indentations) without leaking, because the metal readily gives, not having been previously deprived of its ductility.

Either brass or copper, 0.005 in. thick, is used, and the construction is such that the core will not burst if the water in the passages should become frozen, because the layer of ice would be only 1/16 in. thick.

From the cross sectional views it will be noted that both horizontal and vertical cells are live. This design is said to afford much greater cooling surface per cubic inch than conventional types of core.



Detail views showing form and construction of the new Rochells radiator

The machinery for making the core is novel in itself. The first operation consists of running the brass or copper through a combination punching and forming die. Fig. 1 shows the metal as it looks after the punching operation, while Fig. 2 shows the strip after passing through the forming die. The reference letters indicate how the metal is shaped from the flat strip. For a 3-in. core the strip is 3 in. wide, for a 4-in. core it is 4 in. wide, etc.

After the strips have been formed, as shown in Fig. 2, they are locked. Two strips which have previously been cut off to a length which corresponds to the height of the core, are laid back to back in a machine, so that the tangs A are directly opposite each other. The seam locking device then feeds a ribbon of brass around the tangs A, and after a roller has flattened the seam it has the general appearance shown at the point E in Fig. 4. Both sides of the strips are seamed or joined at the same time.

The other seams, those at the water passages, are locked by a similar machine, but in this case it is necessary to insert a strip of steel 1 16 in. thick (corresponding to the water passage) between the section, which is withdrawn after the joint has been made. The steel piece offers a suitable surface for the roller E to crush against and thus flatten the joint.

When the core has been completely assembled it is placed in a jig over a bath of molten solder. The core is lowered horizontally and slightly dipped into the solder, thus sealing it against any small leaks. The strength of the core will be appreciated when it is considered that no box is necessary to retain its shape while the dipping process goes on.

The core is particularly suited to the requirements of motor trucks, and tests have shown that after long periods of use no disintegration of the sections was in evidence. For trucks and tractors the company flanges each section through the plates in addition to soldering. This construction virtually makes the plates integral with the core, thus adding to the strength.

$190,000,000 Authorization Aids Road Construction

FEDERAL aid for road construction will be continued as a result of the authorization of additional appropriations for this work amounting to $190,000,000 carried by the Post Office appropriation bill signed by the President June 19. Fifty million dollars is authorized for the fiscal year beginning July 1, this year, and $65,000,000 and $75,000,000, respectively, are authorized for each of the two succeeding fiscal years. In addition, $6,500,000 is authorized for forest roads for each of the two fiscal years beginning July 1, 1923, and July 1, 1924. The funds will be administered by the Secretary of Agriculture through the Bureau of Public Roads.

The apportionment to be made to the various States is approximately as follows:

	Fiscal Year Ending 1923
Alabama	$1,035,614
Arizona	702,188
Arkansas	836,095
California	1,641,399
Colorado	894,117
Connecticut	320,599
Delaware	243,750
Florida	591,217
Georgia	1,331,972
Idaho	625,691
Illinois	2,164,187
Indiana	1,305,904
Iowa	1,401,915
Kansas	1,401,521
Kentucky	944,786
Louisiana	664,660
Maine	463,440
Maryland	427,086
Massachusetts	730,784
Michigan	1,499,688
Minnesota	1,415,731
Mississippi	863,271
Missouri	1,632,086
Montana	1,031,257
Nebraska	1,054,126
Nevada	635,624
New Hampshire	243,750
New Jersey	628,581
New Mexico	793,216
New York	2,464,299
North Carolina	1,139,556
North Dakota	776,476
Ohio	1,882,003
Oklahoma	1,168,226
Oregon	788,443
Pennsylvania	2,265,969
Rhode Island	243,750
South Carolina	707,492
South Dakota	802,707
Tennessee	1,098,461
Texas	2,950,115
Utah	566,278
Vermont	243,750
Virginia	971,219
Washington	735,806
West Virginia	534,906
Wisconsin	1,263,211
Wyoming	623,078
Total	$48,750,000

These funds must be matched by the States and will be administered subject to the general provisions already in force.

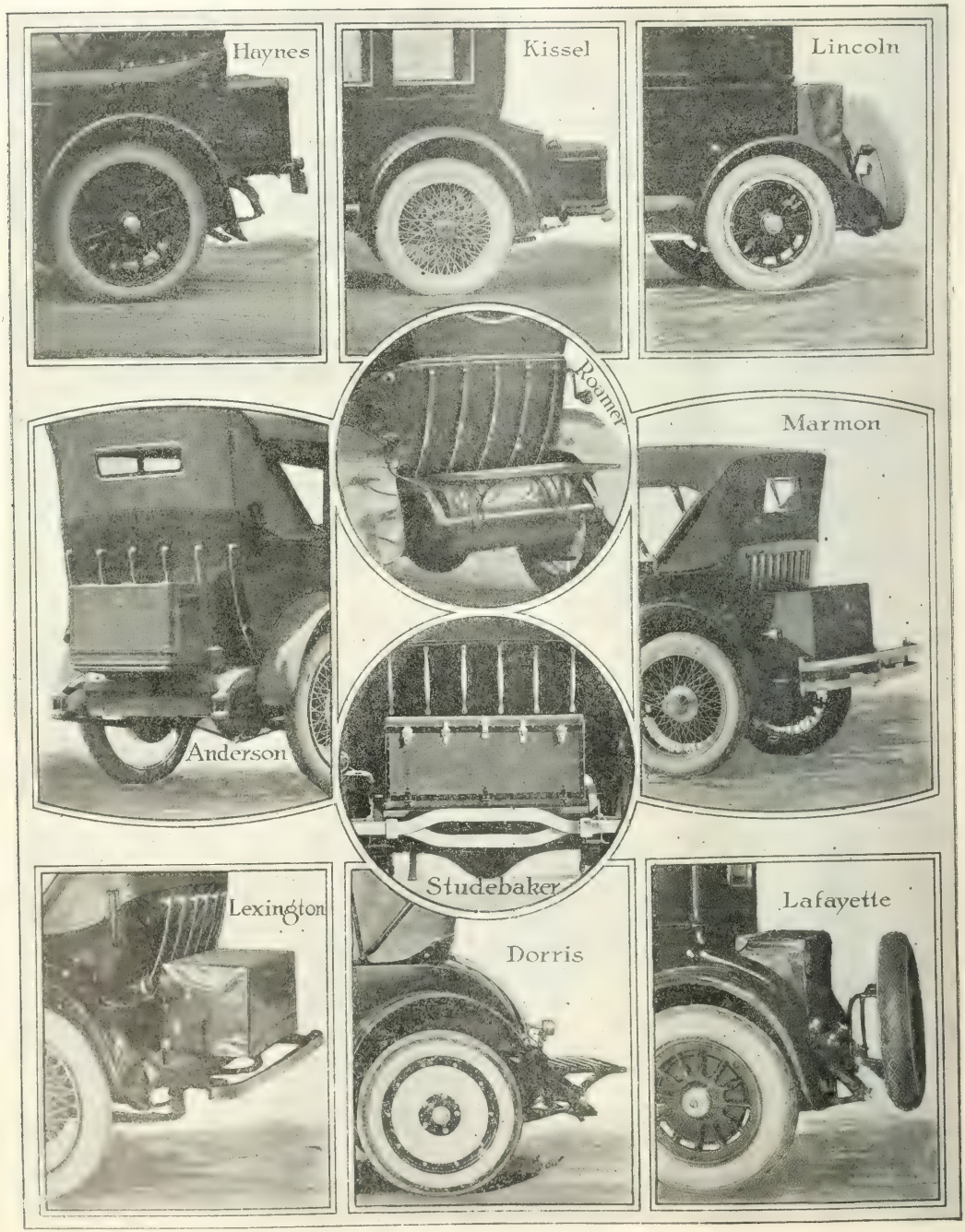
Plans Received from All but Eight States

Plans for the proposed system have been received by the Bureau of Public Roads from all but eight States, and the State systems are being coordinated so that when joined together they will serve the best interests of the whole country. In the meantime only projects certain to be on the proposed system are being approved.

The new appropriation comes at a time when several States are nearing the limit of funds available. The authorization of funds for three years in advance will be of great benefit to all States in that it will permit them to lay their plans for some time ahead. Uncertainty as to future Federal aid is removed and provision can be made at once for raising State funds to match it.

It is estimated that the $190,000,000 lately authorized will result in the construction of more than 25,000 miles, which added to the 46,000 miles that is expected to result from previous appropriations makes a total of 71,000 miles, or nearly 40 per cent of the estimated 180,000 miles of road in the system of Federal-aid roads now being outlined.

The Latest Styles in Trunk Racks



Increased Life for Tire Molds

Rough handling and constant temperature changes frequently result in breakage of tire molds, the average life of which is short. Effective repairs can be made by arc welding. Total repair cost on badly damaged $800 tire mold estimated at about $70.

By A. M. Candy *

THE average life of a good tire mold is estimated at approximately 60 to 70 heat cycles. The alternating heating and cooling which these molds undergo gradually cause the cast iron to crack and fail. The rapidity with which the molds are handled, moreover, subjects them constantly to rough usage, so that a large amount of breakage results.

Economical methods of repairing broken molds are of great practical interest, since these units cost as high as $700 or $800 each, owing to the large amount of hand work required to produce the intricate design desired for the tread of the tire. Such economical repairs can often be made by means of welding.

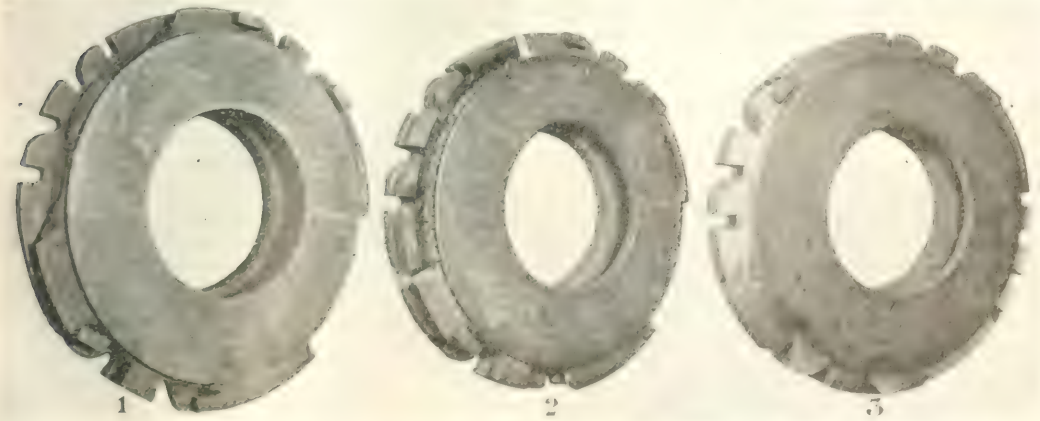
The mold is constructed in two halves provided with lugs around the outer edge so that the two halves of the mold can be held together by bolts, each having a T head. One face of these molds is a plain surface, as indicated by the front side of the mold, whereas the reverse face of the other half of the mold contains grooves so that a circulation of steam can be obtained when the molds are placed in the vulcanizers.

A mold which has been damaged severely in service and which would ordinarily be ready for the scrap pile is indicated by Fig. 1. It will be observed that the greater portion of the lifting lugs have been broken from the half of the mold on the side toward the observer. To properly repair this mold the surface at the broken portion of the casting was thoroughly cleaned off and a series of holes located on approximately 2-in. centers were drilled and tapped for inserting ½-in. diameter bolts. Ordinary machine bolts were then turned into these holes and cut off approximately ¼ in. above the surface of the cast iron. The next step in the operation was to prepare pieces of steel which could be substituted for the missing lugs, said pieces of steel being formed in the shape required for the finished lugs.

This piece of steel was beveled off along the inner edge, so that when it was placed in position formerly occupied by the original lug, the welding operation could be carried on along the beveled edge of the piece of steel and the surface of the cast iron containing the studs. One of these pieces of steel in position for the welding operation is illustrated by Fig. 2. This mold after being completely welded ready for service is shown by Fig. 3.

The operations involved and the resulting expense for repairing the mold illustrated is indicated by the following data. It must be borne in mind when going over this cost data that this mold was much more severely damaged than is usually the case. The preparation of the surface of the casting, including the drilling, tapping and

*Arc welding engineer, Westinghouse Electric & Manufacturing Co



1—Tire mold rendered useless by severe damage received in service. 2—Broken mold prepared for welding. 3—Broken mold after welding is completed

setting of the 150 ½-in. studs was approximately 24 hours. Approximately 8 hours were required to form the pieces of steel necessary to replace the missing lugs. Approximately 40 lb. of welding wire were required to do the welding work, the time required for the entire welding operation being approximately 45 hours.

The welding time for such work as this is unusually long, because it is necessary for the operator to weld very slowly so as to reduce the heat accumulation at any given point to a minimum value, so as to have the cooling strains as small as possible to avoid fracture of the welding work when it is finished. The welding in this case was carried on, using approximately 150 amperes, the total power consumption being approximately 100 kw.-hr. The actual itemized cost of doing the complete job is indicated by the following table:

Preparation of casting, including drilling, tapping and setting bolts, 24 hours time at 60 cents per hour	$14.40
150—½" bolts at $2.00 per 100	3.00
Steel prepared for replacing lugs, labor 8 hours at 75 cents per hour	6.00
Cost of steel used in lugs, approximately	1.75
Welder's time, 45 hours at 80 cents per hour	36.00
40 pounds of welding wire at 8 cents per pound	3.20
100 kw. hours of power required from supply circuit at 5 cents per kw. hour	5.00
Grand total	$69.35

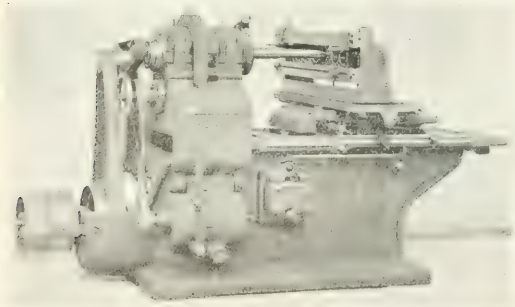
New Cylinder Grinding Machine Employs Hydraulic Drive for Main Table

A NEW cylinder grinding machine for automobile cylinders, which is both a manufacturing and regrinding tool, has been brought out by the Heald Machine Co. The machine is known as Style 50 and it is the company's present plan to discontinue the manufacture of its other styles, except possibly the Style 55, which is to be used for railroad work.

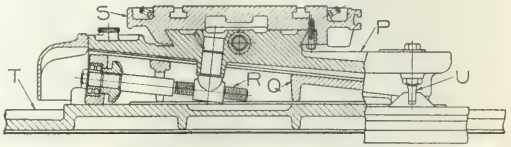
The new style 50 is a solid base machine, exceptionally massive and wide, so that it will take care of any size block that may be brought in to be reground. The rear shaft is mounted on ball bearings and driven directly from the main line. The head spindle has been made a little heavier, but the general design is the same as that previously used.

A most important feature, and said to be original in the cylinder grinder field, is the hydraulic drive for the main table. In trials given it this is said to have proven a very satisfactory drive. It makes it possible to get any speed desired from nothing up to the maximum, and, therefore, to get a very fine finish regardless of the material worked upon. This applies to steel cylinders as well as to cast iron. It is simple and silent in operation, and the operator can reverse the table at any desired point without shock or noise, it is claimed.

In addition to the vertical adjustment obtained by means of a universal locating jig, the cross slide table can be raised and lowered sufficiently to take care of any vertical adjustment that may be desired by the operator after the block is strapped to the jig. This is obtained by two inclined slides, P and Q, located between the cross slide table S and the main table T. By turning a small pilot wheel, which is connected by gear with the screw R, it moves the upper inclined slide P in a direction parallel to the main table. This upper inclined plate moves up and down on the inclined surface of Q, raising and lowering the cross slide table and work.



Front view of Heald style 50 cylinder grinder



Section through cross slide, intermediate and main table

Rubber as a Road Surfacing Material

EXPERIMENTS are being carried out by the Colombo municipality in the use of rubber as a road surface dressing, says Consul Vance, Colombo, in a recent report to the Department of Commerce. The dressing, which is the invention of a Ceylon rubber planter, is now being used on a portion of Darley road, which is one of the most used thoroughfares in Colombo. This solution was first tried on a road of the Deviturai rubber estate, where it has been in use for the past thirteen months. A short stretch was later laid in the municipality of Galle. The present test, however, is the hardest to which the new solution has been put.

The solution is made from pure bark and scrap rubber. The experiments so far show that this solution is easier to handle than tar. It is a secret formula and the inventor is still working toward its perfection.

The idea of using rubber for roads has been almost exclusively confined in the past to rubber blocks, the cost being very high. The cost of the liquid rubber road dressing is 50 to 75 per cent more than that of tar, but it is found that a tar dressing in Ceylon must be renewed every three or four months, while rubber dressing is expected to last from eight to nine months or longer. It is anticipated that a slight difference in the cost of material, in favor of the rubber dressing, will be found that labor cost will be reduced 50 per cent at least, and that a better road surface will be procured.

How Pressed Steel Wheels are Made

Recent machine tool developments add to manufacturing efficiency. Varied nature of press work shows wide possibilities in pressed steel production. Designers at work on machine to install, start, and finish rivets. Disk of tapered section is employed.

By J. Edward Schipper

NO phase in the fabrication of steel calls for more ingenuity than the manufacture of pressed steel parts. Some of the shapes which are now being made from pressed steel would have been considered impossible three or four years ago. These intricate shapes call for great accuracy and for very fine press and die work, and some which appear to be of the simplest form offer very complicated manufacturing problems.

A very interesting case in point is the Disteel wheel, which is manufactured by the Detroit Pressed Steel Co. The new dished wheel which this concern is manufacturing appears to be a very simple pressed steel shape, but because the disk is tapered to give a uniform fiber stress from the hub of the wheel out to the periphery, the manufacture is not simple. The work is very largely a press proposition and the machining operations, with the exception of that of putting the taper on the disk, are not of a very striking nature. The material used is .18 to .25 carbon, hot-rolled steel, typical side rail stock. From these sheets the blanks for the wheels are cut on a Toledo press, as illustrated in Fig. 1. The blank is merely a circular disk with a square hole in the center. This hole is punched, not only to determine the center of the disk, but also to act as a driving means for future operations.

The operation after blanking is turning the taper, which is done on an ordinary boring mill. This operation now seems to be very simple, but is the final result of an evolution of methods involving a tremendous amount of experimental work. All sorts of means were tried to get a proper method of giving an accurate and uniform taper on the disk before this simple method now used was finally discovered. As shown in Fig. 2, the boring mill itself has a straight transverse feed. The table of the machine is concave and in the center a fixture is applied and screwed down so as to spring the blanks or disks down to meet the concave table. The square hole in the center of the disk acts as the driving means and the cut is taken by two tools, one of which starts about half-way out toward the periphery of the disk and gives a roughing cut. The reason for this is that owing to the taper, if a single tool were employed, the cut would be too heavy toward the outside diameter where the blank is thinned down to the greatest extent. The two tools are mounted in the same post and the finishing cutter takes a light cut near the hub and follows along behind the roughing cutter, taking the finish cut all the way out to the outside of the disk.

After the taper has been cut, the disks are given a sort of preliminary forming operation. This consists of rolling them against a form, as shown in Fig. 3. The result of this rolling is a smoother surface on the disk. Moreover, the metal is stretched so that it can be accurately formed in the next operation.

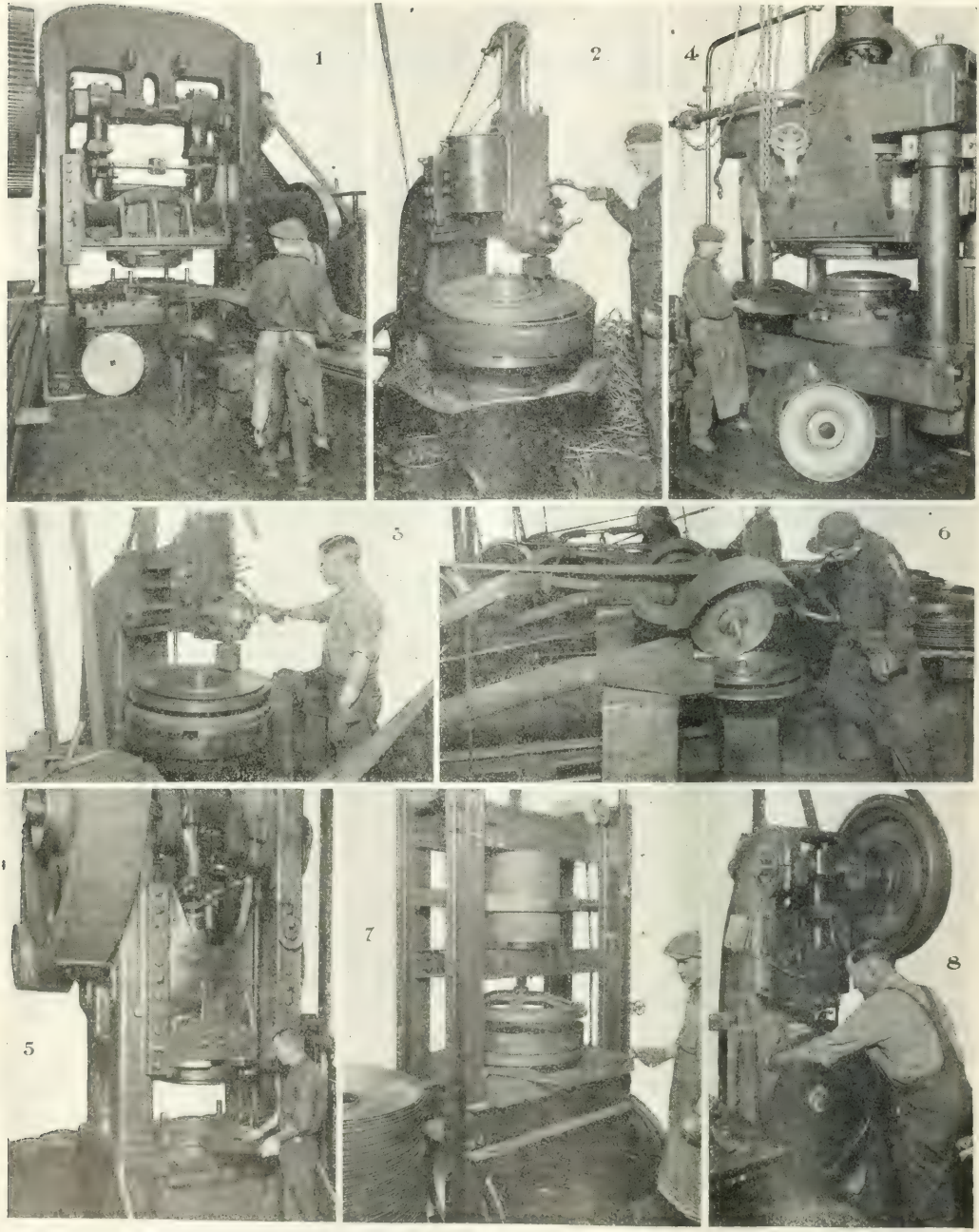
The actual forming is done on a 1500-ton hydraulic press. The work is illustrated in Fig. 4. This press has a sort of compound action first giving a relatively light pressure to give a preliminary form in the disk and then full pressure is thrown on to set the form permanently. The blank disk, after it has left the preliminary forming operation and the disk after it has been through this final forming, are both shown in the illustration. The forming operation leaves a flash on the disk which is trimmed off as shown in Fig. 5. This is simply a shearing operation which leaves the disk in finished form.

An improvement on the press shown in Fig. 5 is shortly to be installed to provide for the automatic removal of the flash ring from the cutting die. This will be accomplished by having the flash ring cut at two points so that it will fall from the die when the die is lifted.

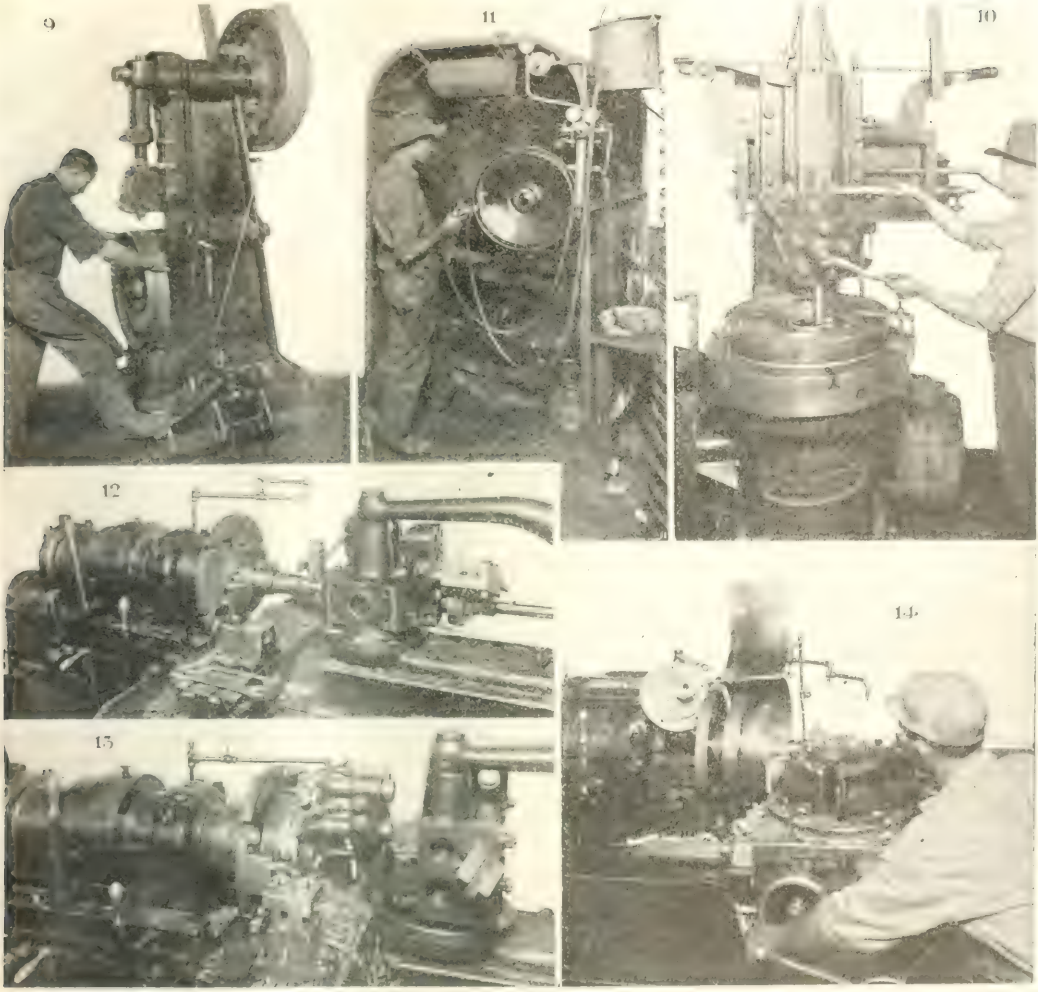
All of the disks are polished on the turned side to provide smooth surface for painting or enameling. These polishing wheels as shown in Fig. 6, are simply glue and emery wheels made up in the Detroit Pressed Steel plant. The disk is rotated at high speed and the grinding dust thrown off by polishing is ejected directly into exhaust pipes provided for the purpose. This arrangement, which is shown in Fig. 6, gives a clean room which is free from the grit particles usually found in a department of this kind. The disks are rotated horizontally against a table of proper form during the polishing operation. Following the cleaning, a complete inspection for concentricity and trueness is given. The finish on the surface is also checked up and the trueness of the holes, which were punched at the time of the trimming, is verified.

When the disk has reached the state of completion denoted in the foregoing, it is ready to be assembled to the rim. These are prepared for assembly in a separate department. The disks are pressed into the rim on the small press shown in Fig. 7. In spite of the care in manufacture of the rims up to this point, they are never quite round. Forcing the disk into the rim, however, makes the latter round and gives firm assembly. The toggle punch shown in Fig. 8 pierces and countersinks with a compound punch the holes for the rivets which fasten the rim to the disk. At present the rivets are slipped into these holes and started by hand and the assembly is then passed along to the riveting machine shown in Fig. 9 where the riveting work is completed. The tool designers, however, are at present engaged in a study of this operation for the purpose of determining whether it would be possible to design a machine which would install, start and finish the rivets. The difficulty is, of course, the putting of the rivets into the holes and upsetting them slightly so as to hold them in place before the heavy hammer finishes the operation. With the rivets temporarily in place, the rest of the operation is very rapid on the machine shown herewith. This is a No. 84 Consolidated riveting machine.

The facing operations shown in Fig. 10 are twofold



1—*Blanking out the disks for Disteel wheels. The square hole in the center of the blank is for driving the disks on the preliminary operations.* 2—*Turning the taper on the disk. The disk is sprung down against a concave table, permitting of a straight cross feed on the boring mill bar. Note the two tools for rough and finish cuts toward the periphery of the disk.* 3—*Rolling the disk in a preliminary forming operation.* 4—*Forming the disk on a hydraulic press. This press first forms and then sets the disk.* 5—*Trimming the disk after it has been brought to form.* 6—*Polishing the disks on emery wheels. Note how the dust is thrown directly into exhaust cleaners.* 7—*Pressing the disk into the wheel rim.* 8—*Piercing rim and disk for rivet holes*



9—Riveting the rim to the disk. 10—Facing the flange engaging surface so as to insure wheel running true with hub. 11—The wheels, before shipping, are given a coat of Arco primer. 12—Boring and reaming the hub for the Yellow Cab Mfg. Co. on Potter & Johnston machine. 13—Drilling and rough facing the Moon rear hub. This machine also finish turns the outside diameter and the brake drum flange. 14—The Dort rear hub requires a special forming operation because of the curved nature of its surface

in nature. First, the lip which is thrown up at the center hole of the disk is faced off to the proper depth and then the flange engaging surface is faced on a Colburn boring mill. This is one of the important features of Disteel wheel manufacture. The ability to hold the wheel true to the surface of the hub is one of the factors in making the wheels run true. The method used is claimed to produce 100 per cent true running wheels.

After reaching this stage of manufacture, all of the wheels are put through a Blakeslee washer with an alkaline solution which cleans them and puts them in condition to be sprayed, as shown in Fig. 11. All of the stock wheels are given a coat of Arco primer. This is a rust preventive and keeps the wheels in good condition for any color of paint job. After this final operation, the wheels are ready to be shipped.

One of the most important features in the steel wheel business is the manufacture of the hubs necessary for these wheels. These are straight machine operations on either forgings or malleable castings. Some of the hub designs are such that a forging is impossible, but they can readily be made from malleable. It is not purposed here to go to any length on a description of the manufacturing methods on these hubs, as with the exception of a very few operations, they are ordinary machine work without complications. A very good example of work on a forged hub is shown in Fig. 12. This is the boring and reaming operation on a hub for the Yellow Cab. Mfg. Co. of Chicago. The operation shown here bores and reams for the back bearing, turns the outside diameter on the flange and faces the bosses on one side and the flange on the other side. This is a Potter & Johnston automatic.

The operation shown in Fig. 13 is on a rear hub for the Moon car. The barrel is center spot drilled, the flange outside diameter turned, the flange rough faced and finish turned, rough reamed, and the ends of the hub rough faced. The brake drum diameter is turned to size, after which the machine finish faces both sides of the flange and finish reams. This is a turret lathe operation on a Potter & Johnston automatic. In taking care of the location of this work, the hub is chucked on the hub cap diameter.

Following the operations described, the hubs go to a lathe where they are located on a taper arbor and the brake drum diameter is turned concentric with the bore. The flange is also straddle faced for width and uniformity.

The final operation of locating in a fixture on the brake drum diameter is to rough turn the flange disk and the hub cap diameter, finish turn at both these points and cut a clearance groove back of the thread for the hub cap. The hubs are next broached for a keyway and then drilled for the bolt circle. The threads for the hub cap are cut on a Lees Bradner thread mill. The thread mill in this case handles about 25 hubs per hr.

The operation on the Dort rear hub is especially interesting from a machine standpoint, although it may be open to criticism from the standpoint of simplicity. The hub has to be formed to a curve as shown by the peak which has been placed on top of the machine shown in Fig. 14. The hub is located in a fixture and is driven from the bolt holes in the flange. An Acme turret lathe with a special set-up roughs and finish forms the hub at the rate of 10 pieces per hr. As will be noted from the chips, this is quite a heavy cut requiring a very rigid tool support.

While the majority of operations on the hub are what would usually be encountered in straight machine work, these few examples will disclose some of the exceptions which are encountered. The manufacture of the wheel itself affords some interesting lessons in pressed steel handling, particularly in view of the fact that the forming is accomplished without putting internal stresses into the metal and at the same time keeping the product up to rigid standard of accuracy. The wheels are held to very close limits of roundness and concentricity. To accomplish this and at the same time to use the tapered construction described has been the object of a process of evolution in the machining of these disks until the methods described herewith have been reached. A few minor improvements are under way in connection with the new wheel which has been added to the line and which has been described in these pages. In the main, however, the manufacturing operations will continue along the lines shown here.

Melting Gray Iron in Electric Furnaces

SINCE 1917 the electric furnace has been used to a slight extent in the melting of cast iron, instead of the usual cupola. At first it was used for melting the iron from cold, but it was soon found that this was uneconomical, a given amount of electrically produced heat costing more than the same amount of heat from coke. It is in the secondary stages of the melting process, the refining and superheating, that the electric process is at its greatest advantage. Handling cast iron, the electric furnace is capable of delivering metal superheated to any desired degree, reduced in sulphur as required, deoxidized, and with carbon, silicon and manganese adjusted to the desired standards.

One of the first concerns in this country to install and use an electric furnace for this purpose was the Lunkenheimer Co., and G. K. Elliott, chief metallurgist of the company, read a paper on the subject of "Cast Iron from the Electric Furnace" before the American Electrochemical Society at Baltimore in April, last. The Lunkenheimer Co. at first used its Heroult furnace for melting the iron from the pig, but soon gave this up and since then has been using what is described as the tandem process, in which the iron is melted in the cupola and is then transferred to the electric furnace. According to Mr. Elliott, the electric furnace is at its best when coupled with a chemical laboratory, so that by sampling the molten iron as soon as it is transferred from the cupola, the laboratory can determine as many elements as desired and the proper additions can be made before the metal is poured. The combination of the electric furnace and laboratory can also be made to yield the best possible machining qualities consistent with the physical properties required by the purpose for which the iron is intended.

The most valuable feature of the electric furnace for melting cast iron is that it permits of quickly reducing the amount of the sulphur content. According to Mr. Elliott, in the electric furnace, cast iron with 0.18 per cent of sulphur can be reduced to 0.07 per cent in about 30 min., which is the difference between a relatively bad and a good grade. The percentage of sulphur in the world's scrap pile has a tendency to increase, and this characteristic of the electric furnace therefore should be of great interest to firms located at a distance from sources of good pig iron and which must therefore depend largely on scrap. Just what the sulphur limit in cast iron should be depends undoubtedly on the purpose of the castings, but in one particular instance where large castings are used, they invariably become "dirty" at an important machined point whenever the sulphur exceeds 0.10 per cent.

If iron contains an excess of sulphur, it generally also carries other objectionable impurities which the desulphurizing process tends to remove. These include oxygen in certain combinations, nitrogen in the form of nitrites, and others. The desulphurizing process is one of the most drastic cleansing processes known to metallurgy and an iron that has been subjected to it is generally regarded as a highly refined product.

In the case of iron, superheating is synonymous with increasing the fluidity. The electric furnace gives increased fluidity, which is especially needed where thin section castings are to be poured. Fluidity is a strong assurance of solid castings through freedom from blow holes, shrink holes, slag inclusions, and the like. Superheated metal increases the effectiveness of risers by lengthening the period of fluidity which is their only period of activity as feeders, and thereby obviates to a large degree that internal shrinkage that comes from fluid contraction of the metal. Abetted by super-hot metal the efficiency of the ordinary riser is surprising.

THE North-Eastern Railway Co. of England is at present conducting experiments with motor omnibuses as a means of improving the services on certain branch lines on which circumstances do not permit an extension of traveling facilities of the usual kind. The omnibuses are of the ordinary road type, and are fitted with flanged wheels. As a trial, the first omnibus is being run on the line between York and Strensall.

Buenos Aires Can Buy More Low Priced Cars

Analysis shows that greater sales effort in behalf of low and medium priced cars is needed. Such effort will bring big returns. American motor vehicles now constitute 57 per cent of total.

By George E. Quisenberry*

AN analysis of the automotive registrations in Buenos Aires, the capital city of Argentina, indicates that the manufacturers of the United States have neglected this expanding market. A few have visioned the existing opportunities and have developed this sales outlet with care and ability, but this is not true in many cases. That there has been little merchandising effort in this greatest city of South America is so readily apparent that it scarcely needs comment; that a field exists for constructive automotive development is likewise apparent.

BUENOS AIRES has not been sold on the American idea of the low priced essential automotive vehicle used for transportation pure and simple. The registrations reveal that most sales have been made on the basis that the motor car is a luxury vehicle for the rich alone.

* * *

American manufacturers have pioneered the rural use of automotive vehicles in Argentina. European manufacturers have scarcely scratched—and probably not even conceived—this other great market. This rural market has been developed under the American belief that an automobile is a general purpose vehicle for use in any and every kind of territory.

Buenos Aires is a city of 1,500,000 to 2,000,000 population, the count depending upon which statistical expert makes the calculation. It is the chief city of a country that ranks sixth in the automobile world, being exceeded in total registrations only by the United States, England, Canada, France and Germany. It outranks, according to the world statistics published in AUTOMOTIVE INDUSTRIES several months ago, all countries that do not manufacture automobiles within their own borders, although the contest is close with Australia for this honor.

One-fifth or one-sixth of the automobiles in Argentina are owned in Buenos Aires. A registration list of these city-owned cars and trucks, made up in December of last year, shows a total of 13,755 vehicles divided into 5,871 private cars, 6,230 taxicabs, 1,379 commercial cars (presumably trucks), 173 for which trial licenses have been issued and 102 for which no licenses are required (including official cars). This total is made up of 306 different makes, representing the automotive industries of the United States, England, France, Spain, Italy, Germany and apparently every other country where motor cars are built. It is doubtful if any other city of the world possesses a greater array of different makes (with consequent service problems), but a majority of these, of course, have only one, two, three, four or five cars, imported perhaps direct by the owners or by short-lived dealer establishments. However, comparatively few lines, both American and European, control the market and take, at least in the last few years, all but a small part.

Hundreds and even thousands of European cars bought prior to the war are still being used in Buenos Aires. A very few of the European makers have been able to attempt such merchandising effort there in the last three years and, consequently, the present sales are being controlled by a handful of American and European companies.

The total number of American cars and trucks in Buenos Aires is 7896, or approximately 57 per cent of the total. Of these, 113 are obviously trucks and need not be considered. Ford trucks cannot be taken out of the registrations and, consequently, they are counted as cars in this analysis. The results show:

	Number	Per Cent	No. of Makes
Low priced cars (American)	5594	71	8
Med. priced cars (American)	1688	22	47
High priced cars (American)	501	7	21

This percentage, surprisingly enough, follows closely the percentages established in the United States and, if this were considered alone, it would seem that the Argentine development is proceeding along the same course as here. But such an assumption loses sight of the fact that there are nearly as many more European cars in Buenos Aires, and when they are considered the percentage development appears to be far from normal. An overly high ratio of medium and high priced cars is shown and this in turn means that Buenos Aires has not been sold on the American idea of the low priced essential automotive vehicle used for transportation purely and simply. The registrations in Buenos Aires reveal the obvious statement that most sales have been made on the basis that the motor car is a luxury vehicle for the rich alone.

SIXTY-ONE makes of European cars and trucks have a total registration in Buenos Aires of 6351, each of which, with one possible exception, falls immediately into the high or medium priced field. Europe does not make the low priced passenger car similar to that having a

*Managing Editor, El Automovil Americano.

factory list in the United States of $1,000 or under and scarcely any in the class below even $1,500. Most of the European cars are closer to comparable list prices of $2,000 or over.

Unfortunately, it is not possible to ascertain the exact classification for many of the European makes. Some of them have several models in the two classes and it is impossible to distinguish which is which in registration figures. Renault, which has more cars in Buenos Aires than any other make except Ford, formerly built a small taxicab that probably predominates in the 1583 cars of that make. But there can be no doubt of the class of such cars as the Benz, Berliet, Delage, Delahaye, Daimler, Hotchkiss, Hispano, Isotta, Itala, Lancia, Minerva, Napier, Opel, Rochet, Rolls Royce, Vauxhall, Delauney, each in the high priced field and represented by from 24 to 130 cars each. The Bianchi, Clement, Citroen, Chenard, Gregoire, Humber, Martini, Rolland and others are in the medium class. De Dion, Fiat, Durkopp, Renault and Peugeot have models in each class and they cannot readily be determined for comparison purposes. But each of these sixty-one makes is represented by ten or more cars, many of them being in excess of 100.

13,755 Vehicles in Buenos Aires

ALL of the European cars may safely be counted in the upper price classes, except the Renault, concerning which there is some doubt. By deducting all of this make, there are an additional 4768 cars in the medium and high priced fields. A compilation shows:

American medium priced cars	1688
American high priced cars	501
European medium and high priced cars	4768
Total	6957

The total Buenos Aires registration shows 13,755 vehicles and the total of American and European models in these two higher classifications is within a slight fraction of exactly 50 per cent. In the United States, which must serve as an example of the most completely motorized nation and in which the automobile has reached its highest use as a vehicle of transportation, these two price classes represent just 30 per cent of the whole, or less than a third here as compared to more than half in Argentina.

(This computation for the United States is based on the statistical fact that 70 per cent of all cars fall below the $1,000 factory list price, 24 per cent below $2,000, 4 per cent below $3,000 and 2 per cent above $3,000. The difference in the Argentine capital is readily apparent.)

The price class spread would be further enhanced and made more apparent if all other European makes in Buenos Aires were taken into account. These figures were computed on the basis of the sixty-odd Continental makes, each of which is represented by ten or more vehicles. In addition, there are 139 European makes represented by less than ten each, probably totaling some 500 to 750, largely vehicles selling above $1,500 or $2,000, as is customary with automobiles of this type. So many of these cannot be recognized for classification that their inclusion in the statistical picture is difficult.

The number of Fords shown in the registration figures is 4751, or slightly less than one-third of the total vehicles in the city. There is probably no place in the United States where this make is not at least 50 per cent of all cars and trucks and in some places the figure is even higher. The Ford percentage of all American automobiles in Buenos Aires is just under 70 per cent, and it is doubtful if any city of the United States has quite such a large proportion, although this figure might hold true in some country districts.

The preceding paragraph has a double indication. The first is that Ford—and consequently all other of the low priced cars—has not reached its proper percentage in Buenos Aires. The second is that other American car manufacturers have not kept up to the Ford level or, stated differently, other American makers must push sales much farther if they are to keep pace with Ford and with the possibilities indicated by the Ford percentages in the Argentine capital.

Of course it will be granted readily that the city of Buenos Aires is not representative of the Argentine as a whole. Ford has attained a much higher percentage in the smaller cities and rural districts than in the capital, and the gains made by the Ford company in Buenos Aires since the registration figures were compiled last December have been impressive. Furthermore, such American makers as Studebaker, Buick, Hupmobile, Hudson, Essex, Nash, Chevrolet, Overland, etc., show up to better advantage outside of the city. These American makers have pioneered the rural use of automobiles in Argentina as in other sections of the world. The European makers have scarcely scratched—and probably not even conceived—this other great market, four or five times as large as that in Buenos Aires.

Yet it is shown that a small number of American makers have attempted any worthy effort in Argentina. Many American makes, it is true, are owned in this growing country, and in Buenos Aires the registrations show 65 passenger car (many now out of business) and an additional 20 truck lines, or 85 out of a total in excess of 300. But only 33 passenger car and four truck lines have been able to sell more than ten vehicles each. This is a surprising indictment, considering the great wealth of American automobile factories, but the indictment is made more telling by a further study showing the small number of lines now being pushed or which have made any appreciable place for themselves in Buenos Aires. Ten lines represent 1337 out of the 1668 medium priced American cars. Two lines in the higher priced class total 390 out of 501 and four lines represent 5484 out of 5594 in the low priced field. Some of these are not now being pushed and are practically without representation there.

This will be made somewhat clearer by stating the inverse comparison, showing that 37 American medium priced lines have totaled only 331 sales and 19 in the higher priced field are represented by only 111 cars. This indicates the measure of sales efforts made by some makers, who at home pride themselves upon the quality and the intrinsic value of their lines.

To sum up, this analysis shows that Buenos Aires has an unusually large number of fine cars, indicating that further sales effort in behalf of the lower and medium priced lines is needed. Further, it indicates that only a comparatively small number of cars are being actively pushed and that most makers, content with sporadic sales, have made little or no effort to foster trade. From the statistics relating to the higher priced cars, it is readily apparent that much yet remains to be done in promoting the automobile as a transportation vehicle.

Europe Competes

THE very large numbers of European cars were principally brought into Argentina before the war and the shipments from Europe since the armistice have been very small. Knowing what we do about the average life of a car, the industry may well assume that the replacement of these old vehicles should be large. This indicates sales if the attempt will be made to obtain, if only for replacement business and if no new business should develop.

Light Weight Cultivator Designed to Supplement Tractor

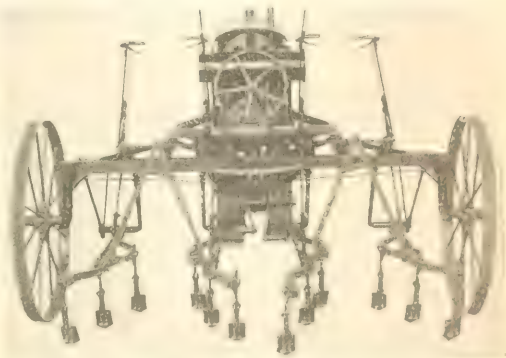
Built to cultivate row crops and do other farm work. Weighs 1200 lb. and has simple design and construction. Transmission consists of bevel gear connection with engine shaft, a vertical shaft and worm gear to axle. To be sold at a low price.

WITH the tractor industry turning its attention to the development of an automotive unit which will cultivate row crops and do other farm work, the cultivator recently brought out by the Boring Tractor Corp. merits attention for the simplicity and uniqueness of its design and construction.

Here is a machine weighing only 1200 lb., and cast iron wheels are to be used instead of those shown in the illustration in order to bring the weight up to this amount. It was designed primarily as a cultivating unit, with the idea of getting a machine which would do the work and still could be manufactured and sold at an attractive price from the farmer's standpoint. It will retail for $395.

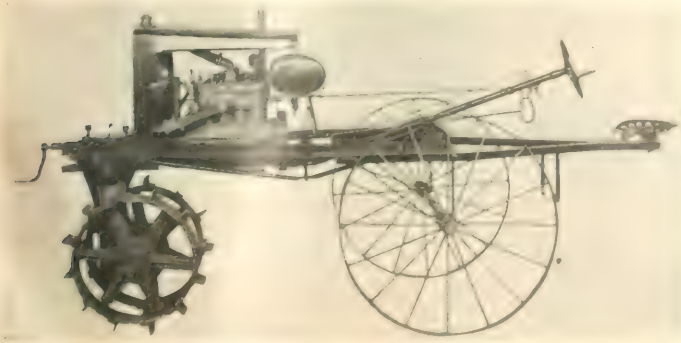
The frame is angle iron, the transmission housing and the wheels are cast iron. Power is generated by a four-cylinder LeRoi engine, 3⅛ x 4½ in., which, complete with carbureter and ignition equipment, weighs 350 lb. Perfex radiator, Borg & Beck dry disk clutch, Zenith carbureter, United air cleaner and high tension magneto are used as standard equipment. The wheels are 30 in in diameter, with 8 in. face.

This power unit was designed to be used with the implements now on the farm. In some cases, such as the cultivator shown in the illustration, the attachment can be made direct to the angle iron frame. In other cases a truck is attached to the rear of the tractor and implement connections are made by means of a draw bar. It is claimed that this tractor furnishes sufficient power to operate a two-row cultivator, mower, binder—in fact, any load which can be pulled by three horses. It has not been tried ahead of the plow, but it is claimed that it has sufficient power and weight to pull one 14-inch bottom. It is intended to supplement the four-wheeled tractor on the larger farms, and there is hope that it will find a place on the smaller farms.

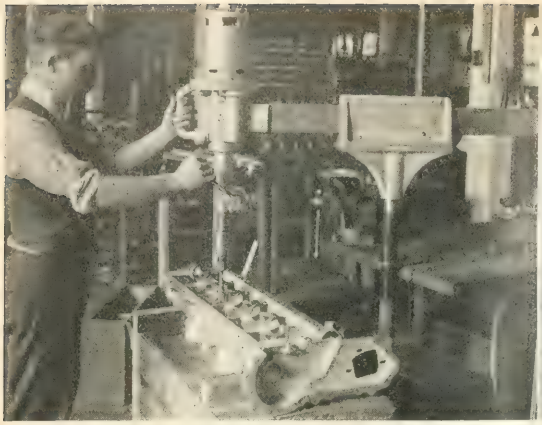


Rear view of Boring cultivator

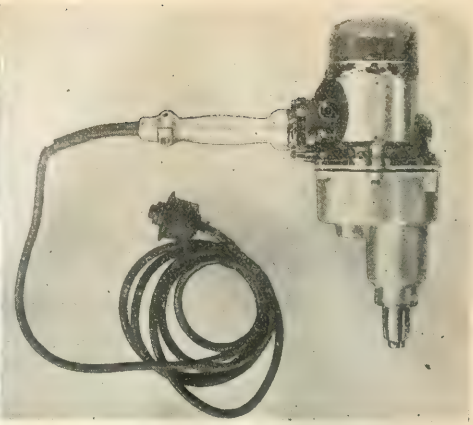
Aside from the general features of the design, which involves two wheels so placed that they will run between two rows of corn, the use of implements now on the farms, and the simplicity of the design, the most interesting feature is the transmission. This consists of a bevel gear connection with the engine shaft, a vertical shaft and a worm gear to the axle. The reduction ratio in the bevel gear is 2.95 to 1 and in the worm gear 20 to 1, giving a reduction from the engine to the axle of 59 to 1. The engine shaft extends across the top of the lower gear in the bevel set. On this engine shaft, but not connected to it, are two smaller bevel gears. A sliding jaw clutch attached to the engine shaft, in addition to the regular clutch, is used to connect the engine with the transmission. When connected with one of the smaller bevel gears the motion is forward, and when connected with the other the outfit backs up. Variation in the rate of travel is obtained by a manually operated throttle control on the engine. The rated speeds are from ¼ to 4 m.p.h. Provision is being made to attach a belt pulley to the engine crankshaft.



Side view of Boring front drive cultivator



Stationary type screw and nut driving machine at work



Portable screw and nut driver

An Electric-Driven Machine for Turning Up Screws and Nuts

Is provided with a multiple disk clutch, adjustable to give desired torque capacity

AN electric tool for setting nuts, cap screws, wood screws and studs has been developed by the Elecdrive Mfg. Co., Inc. The machine will operate in both directions and therefore can be used also for turning down left-handed nuts and for unscrewing right-handed ones. For the present the machine will be turned out in three sizes or types, of which two are portable and the other is stationary.

Patents covering the general principle on which the operation of the machine is based were granted nearly four years ago, and since that time working models have been in service in a well known automobile plant. Many changes have been made in the first crude model, and the manufacturers claim that they have now a machine that is out of the experimental stage.

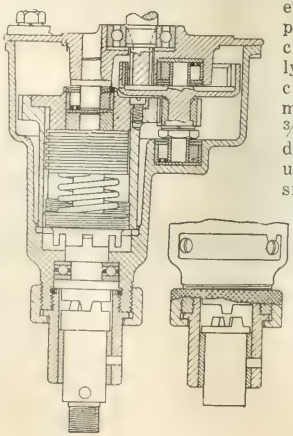
From the accompanying cuts it will be noted that the portable tool resembles an electric drill in its general outline, but that the stationary type is a radical departure from any machine heretofore made for this purpose. The portable tool operates from an electric light socket on either a direct or an alternating current circuit of 110 volts, with a frequency not exceeding 60 in the case of alternating currents. The stationary type should be connected to a power line, though where the wiring installation involves a large factor of safety it may be operated also from a light socket. This type also forms a universal motor.

The tools are provided with motors specially designed for the purpose, of the high speed type, and operate through a reduction gear with a 10 to 1 ratio. The driving mechanism, which forms the patented feature of the tool, consists of a multiple disk slip clutch, which can be adjusted for any torque within the capacity of the motor, driving through a splined shaft to a positive clutch. This positive clutch automatically "kicks out" when the disk clutch is fully released. While the positive clutch is disengaged the driving spindle is entirely free. This feature permits the removal of the wrench, chuck or screw driver from the driven member and its engagement with a new member while the motor is running at full speed.

It is claimed that the slip clutch insures that all nuts or screws are driven to the same tension and that it prevents shocks to the motor. This clutch is so designed that it cannot be over-tightened, and thus cannot overload and burn out the motor.

A special feature of the Elecdrive machine is that it provides for slow setting up of the nuts or screws, obviating the possibility of stripping threads, straining bolts and injuring the tool. Both the portable and stationary tools are furnished with recessed and tapered wrenches, so that nuts can be picked from the bench while the tool is running at full speed. The nut or screw is held in the wrench so its axis is true with the driving spindle of the machine and can be started without danger of cross threading.

During the period the screw or nut is being driven down the driving spindle of the machine rotates at 1000 r.p.m., but during the actual setting of the nut or screw the spindle is slowed down to about 350 r.p.m. The stationary type of machine can be equipped with a hopper which will handle double chamfered nuts, cap screws, wood screws, etc. With the hopper the performance of the machine is said to be greatly increased, and it is claimed that in experimental work thirty-two ⅜-in. nuts were started, driven and set in one minute. Each tool is so designed that it will take a Jacobs drill chuck and can then be used as an electric drill.



Section of Elecdrive

The smaller portable tool weighs about 11 lb. and will drive and set nuts from ⅛ to 5/16 in. The larger one weighs approximately 13 lb. and will drive and set nuts from ⅛ to ½ in. Stationary type handles ½ to 1 in. nuts.

Get a Good Foreign Dealer—Then Take His Word as to Sales Prospects

American automotive business in foreign countries depends upon the quality of dealer connections established and maintained. Well established agents know their market rather well. Permanent business can best be developed by co-operating with them.

By M. H. Hoepli*

A CONTRACT or agreement in which a dealer takes upon himself the obligation of disposing of a certain number of a manufacturer's cars, is an instrument serving as a guide to both parties concerned: For the manufacturer it represents a basis for future production; for the dealer it serves as a norm by which he gages his sales efforts. By its very nature the agreement should thus result in benefit to both of the contracting parties; if it works to the detriment of one of them, the agreement is faulty.

Years of extreme commercial fluctuations, such as 1918-1919 on one hand and 1920-1921 on the other hand, are likely to witness a maximum of unsound contracts and their detrimental results. In 1918 and 1919 the dealers in American cars could sell all the cars they were able to obtain from the manufacturers and in order to obtain a certain number of cars they became used to asking for a multiple of this number. Consequently, sales estimates were exaggerated and sales agreements "inflated." In 1920 and 1921, the years of deflation and depression, the manufacturers, in order to deplete their inventories, held dealers to their contracts, with a result that most of the latter suffered considerable financial hardship and many of them went into bankruptcy.

In 1922 the consequences of the past four years' experience make themselves felt. The dealers who were chiefly responsible for the overestimates and unsound contracts, are placing conservative estimates. However, the results of the most rapid improvement in the home market already reflects itself in the attitude of the American manufacturer. The reasonable, in many instances, perhaps, overpessimistic estimates of the foreign representatives are severely criticized and frequently burdensome contracts are forced upon them—even at the risk of losing well-established dealers, or at least their good-will.

Several such instances have lately come to the attention of the Automotive Division. In one case, which may serve as an illustration, an American manufacturer, who was about to introduce his new medium-priced car in a market, went as far as requesting that a very successful dealer of highest standing, and with an excellent sales and service organization back of him, pledge himself to sell a number of cars over twice as big as the highest mark ever reached by a well-established competitive car of the same class. The situation is the more noteworthy as in the face of most favorable offers from European manufacturers, this dealer has remained singularly faithful to American motor cars and tires. While thus the undoubtedly most desirable dealer refused to be forced into a contract to which he could not whole-heartedly subscribe, the manufacturer prided himself with having had a number of solicitations for the agency of this car from parties which were willing to meet his conditions. A careful investigation on the part of the local representative of the United States Department of Commerce, who is highly regarded by the automotive industry, showed that these offers came from parties that had either no standing whatever, or no previous experience, or no capital to back them up, or no selling and servicing organization. What would the results have been had the agency of the American car been accorded to one of these promising prospective dealers?

The lesson is plain: The past record of a dealer is more important for future business than promising estimates. If a dealer has been successful in the past, his suggestions should be followed, although they may seem overconservative, as he knows his territory better than the manufacturers.

THE staff of the Automotive Division of the Bureau of Foreign and Domestic Commerce has a chance to observe closely the foreign merchandising method of American automotive manufacturers.

In this brief article, M. H. Hoepli, Assistant Chief of the Automotive Division, tells what he thinks about foreign dealer contracts. To illustrate his idea, he cites an interesting incident which occurred recently in connection with the foreign selling activities of a prominent car maker.

AS a result of motor car price reductions of about 25 per cent, the number of high-priced cars around Campbellton, New Brunswick, has increased. At present there are 12 makes of cars represented as compared to 4 a few years ago. Approximately 5000 passenger cars and 600 trucks have already been registered this year in comparison with 12,585 cars and 875 trucks during 1921.

*Assistant chief, Automotive Division, Bureau of Foreign and Domestic Commerce.

Motor Buses and the Electric Railway

The bus can help the electric railway. Akron, Ft. Worth, Niagara Falls, and many other cities furnish examples of practical co-ordination. Interests of steam and electric roads as well as those of the consumer are best served by low motor vehicle taxation.

By Zenas W. Carter*

THE question of the economy of motor trucks and motor buses when used by electric railway companies has too many factors for anyone to offer much more than a statement of some of the operations already under way. For instance, six months ago an officer of one of the Ohio electric railway companies made the statement that they were not interested in motor buses. At the present time the same company has determined that it will be economical for them to purchase, and their order has been placed for five special motor buses. These are to be operated on a highway paralleling their present lines.

Their decision was made from two angles entirely uninfluenced by the question of direct profit. In the first place, if they had not initiated bus operation covering the territory, someone else would have started this service. Their franchise was in jeopardy because the public in the territory were not adequately served by the present electric service. Another factor was lack of capital to make the electric extensions, and their belief that the cost of additional track laying and equipment would be too great to prove a profitable investment at the established rate of fare.

Another company, the Northern Ohio Traction Co. of Akron, found by careful study and survey that there was an opportunity to keep competition from their electric lines and at the same time operate buses at a profit by initiating two bus lines, generally paralleling their trolley service at a distance of several blocks off track. On one of these lines there was already partial jitney competition, but this competition will soon be entirely eliminated by the action of the trolley company in purchasing high class motor bus equipment and by their granting transfers from bus lines to the trolley cars.

An important factor in both these cases is also the opportunity offered by motor bus use to test the volume of traffic which may be secured in advance of making an expensive installation. Furthermore, should it be necessary later to either abandon the lines or prove more profitable to install electric trolley operation, the motor buses will have a large salvage value or may be at once transferred to other service.

THESE two cases are cited, particularly, to illustrate that the question of economics in electric railway operation is not necessarily a question of making a specific profit on a definite installation of motor equipment.

On the other hand, there are hundreds of motor bus lines in operation in the United States in territory which was not being served by either the electric or steam companies. These hundreds of bus lines are delivering a profit to their operators. In some cases, as in California and a few of the Middle West cities, the patronage has already proven so profitable that passenger and transfer stations have been supplied by the bus operators.

It is reasonable to assume that this business belonged to the transportation companies, either the steam or electric operators. As it is in outside hands, it is evident this transportation business was lost to the regular transportation companies largely through lack of interest in their making surveys for motor bus operation.

Several of the larger electric and steam railway companies have, however, checked over their prospective fields and are now actively in the business of catering to the public idea that they desire to "ride on rubber."

At Milwaukee, the Milwaukee Electric Street Railway Co. made surveys which have justified their purchasing and operating twenty or more buses in co-ordination with their electric service.

AMONG the many street railway companies in the United States who have initiated bus service in co-ordination with their electric property operations are the United Electric Railways Co. of Providence, R. I.; the Pennsylvania and Ohio Electric Railway Co. of Youngstown, Ohio; the Rockford and Interurban Street Railway Co., Rockford, Ill.; the Connecticut Co., at various places in Conford, Ill.; the Public Service Corporation of Newark, N. J.; the street railway companies of Baltimore, Washington, D. C., and Tulsa, Okla.

Several of the New England companies have already initiated bus service, and in California the electric lines are both operating buses as individual companies and in co-operation and in co-ordination with independent bus companies in order to issue through tickets for long trips. At Niagara Falls, the Gorge Railroad Co. supplement their service by a bus operation; the Escanaba (Michigan) Power and Traction Co., and the Northern Texas Traction Co. of Ft. Worth are also now on the list of users of both electric and gas motor bus transportation. At San Francisco and Seattle the municipal companies are co-ordinating both types of service in carrying passengers. As an evidence of the very rapid increase in the use of motor buses throughout the United States and in support of the statement that the public are enthused over the flexibility, convenience, economy and utility of the motor bus, it is most interesting to cite the fact that one manufacturer of buses has received orders for over 350 of a new model which was first announced to the electric railway and motor bus operators on Jan. 1, 1922.

As transportation men, the electric railway operators will undoubtedly be much interested and possibly quite surprised to know that an independent bus operator,

*The White Co. Excerpts from paper read before Central Electric Railway Association.

Frank Martz of Plymouth, Pa., carried more passengers per bus in 23 buses which he operated in Wilkes-Barre, Pa., in 1921 than were carried by the same number (23) of the buses operating on the Fifth Avenue Line in New York City. The figures are: For Wilkes-Barre, 183,891 passengers per bus; for New York City, 174,192 passengers per bus. In fact, the total passengers carried by Mr. Martz in the buses which he operates in Wilkes-Barre, Pa., territory was well in excess of 4,000,000 passengers carried during 1921. Mr. Martz began hauling passengers in and about Plymouth, Pa., in 1910, and he reports that several of his buses have passed the 300,000 mile travel mark, that 8 have run more than 200,000 miles and that 20 of them have run more than 100,000 miles each.

Throughout the United States there are dozens of these independent bus operating companies, which have had a period of existence amply justifying the statement that motor bus operation is an economic transportation.

Mention should also be made of the rapidly increasing use of motor buses of special type to transport vacationists, tourists and business men into scenic and resort territory previously inaccessible on account of the expense of establishing either electric or steam transportation on account of physical contours of the country and the seasonal feature of the traffic.

With almost 11,000,000 motor vehicles already on our highways, it will be just a short time until all individual highway transport will be by motor.

This is the logical step for this generation. It is the absolutely necessary step in the evolution of mankind. The steam railways and the electric railways will reap a return ultimately from this motorization, as it will tend to knit still more closely the country into a corporate economic unit, promoting and facilitating quick exchange and rapid interchange.

While at the present moment, in some isolated instances, the advent of the motor truck and the motor bus may seem to initiate a new competitive unit and ultimately there may be numbers of lines of steam, electric and motor buses serving in the same community—the motorized vehicle will always be used for a type of economic transportation which, in general, is not competitive with either steam or electric operation.

IT is an important fact that the motor on the highway offers the opportunity to supply the public with both local and express service operating over the same route, while this is impossible on single line rail.

It is very probable that a great many electric railway companies could profitably operate bus lines paralleling their rails, especially in congested centers, operating the bus lines for express service and using the electric service almost entirely for local stops. In many cities it would be possible to secure 10-cent fare rates for such improvement in service, and thus turn into a very profitable operation a franchise which carried so much long haul traffic as to be otherwise unprofitable at the usual 5-cent fare rate.

In other cases such a service might solve a rush hour congestion problem profitably where the addition of extra cars would only tend to slow up movement and increase congestion.

ANOTHER field for the use of buses in conjunction with electric line operation is in territory where development has spread the area served until a large percentage of possible short haul passenger business is lost on account of the distance the passenger must initially walk to reach the trolley.

The use of buses covering such a section over what might be called a curved or bow route paralleling the trolley service at some distance but not operating on exact trolley schedule would often prove distinctly profitable and preserve the existing company from possible competition.

The picking up and delivery at curb, whether in urban or in congested city territory is a psychological element to consider in the opportunity to increase short haul traffic.

While the motor vehicle automatically demands good roads and the use of motor vehicles increases in proportion to the improvement in the mileage of good roads, the all-important point is that the mass citizenship is bettered by the improvement of roads, as it is an old adage that civilization and development follow improvement of transportation facilities.

Even the interests of the steam and electric roads may ultimately be served better by low taxation of motor vehicles than by high taxation. The steel rail carriers, both steam and electric, are the transportation industry. Sooner or later they will own and operate their own motor truck and motor bus lines, probably using trucks very extensively in store door delivery, which is beginning to be demanded by merchants and wholesalers; and motor buses for the economic handling of their short haul and local passenger business and to supplement and probably in many congested districts to support or supplant already established lines.

In fact, as there are now dozens of electric railway and steam railway companies who own and operate both motor trucks and buses, they are just as much interested and will be more interested in the future in keeping down the taxation on motor vehicles as will the makers of motor equipment.

For this reason, it seems fitting that all transportation interests—the electric railway and steam interests as well as the motor interests—can well refrain from agitating for taxation which may ultimately tend to become a boomerang tax, and thus prove burdensome to their own operations. Especially is highway tax agitation futile when it merely tends to widen the transportation cost breach existing between consumer and producer, and as well to reduce the volume of goods which may be transported by motor for short haul, and thus increases the unprofitable short haul tonnage to be handled by the railways.

THE interests of the steam and electric roads may ultimately be served better by low taxation of motor vehicles than by high taxation. The steel rail carriers, Mr. Carter states, will sooner or later own and operate their own motor truck and motor bus lines.

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Highway tax agitation is futile when it merely tends to widen the transportation cost breach existing between producer and consumer, as well as to reduce the volume of goods which may be transported by motor for short haul and thus increase unprofitable short haul tonnage for the railways.

Turn the Spotlight on Your Mass Selling Methods

Mass selling is to modern merchandising what machine tools are to modern production. Present marketing is speculation in future buying habits. Advertising should be subjected to the same critical analysis by factory sales manager as individual selling.

By Harry Tipper

THE automotive manufacturer must use all the methods of sales promotion, sales development and maintenance which are available to modern marketing without any waste and without any lack of co-ordination in the objects and the development. There are a number of differences in the methods employed by different concerns. This is highly desirable. But the differences are in the details of the operations, rather than in the broad classification of methods. These remain practically constant through all the operations of marketing in all lines of business.

Practically all of these usages can be arranged under two headings:

(1) Those which are devoted to the individual work of marketing.

(2) Those which are given over to the mass work of marketing.

HARRY TIPPER tells in this article:

* * *

1. What advertising should be expected to do.

* * *

2. Why it doesn't always do it.

* * *

3. How to make it do what you want it to.

The progress in production methods has been from the exclusive use of hand methods and implements to the increasing use of mass methods, or machine operations wherever these methods have proved their advantage for the particular operations and objects. Gradually the machinery was increased so that there are few purely hand jobs in a modern factory. This has not lessened the value of the man but has multiplied his capacity to produce.

Something of the kind has been happening in the commercial side of business, particularly in connection with marketing. At one time the entire transaction of marketing was a personal one and the whole development of the sale an arrangement between persons. Even the correspondence was individual and hand written and used only between known traders on specific transactions. Gradually the necessity for building up markets against a future sale demanded the mass attack on the market as a whole, with no specific transaction or individual in view. More and more the future market alone could meet the necessities of the plant and its investment. The speculative character of business, the storing up of wealth in production facilities, which were valuable only as they remained employed in turning out useful product, demanded that a market be built up which would endure beyond the range of the founders and the active time of the capitalists. Plants were erected and started on capital borrowed from contemporaries. These plants could not pay back the amount of the borrowings unless uninterrupted business for many years should make the regular amortization possible. Bonds have been issued which required ninety years to mature, leases have been taken for ninety years, other transactions frequent in the world of business show that the modern business man is obliged to speculate on the buying habits of future buyers, with unknown ideas and with unknown desires.

This development more than anything is responsible for the increasing use of mass methods in promoting and maintaining the market for the products of the manufacturer. The individual or hand method of selling and marketing was too uncertain in its development and its future to fully insure the promoter and capitalist who desired to build up a business with the mass machinery of manufacture and keep that business on a thoroughly stable foundation.

It did not provide for any building up of a future market which would be ready to receive the products years after the first transaction had been consummated.

It was, like the hand method of manufacture, clumsy, cumbersome and slow, capable of wonderful work, but lacking the speed and volume necessary to insure the covering necessary as a corrollary to the mass manufacture.

After the Civil War these mass methods of promoting the market began to assume a regular place in the life of American business, and they were adopted with greater rapidity after the pressure of competition became more severe as the manufacturing capacity began to approach the market desire to consume. They grew up from two different possibilities—the advent of the typewriter, which permitted the extension of correspondence and the growth of printing and publications which offered opportunities to the manufacturer for securing public attention to his products and organization.

These mass operations were undertaken usually without any great definition of policy and they have remained without thorough definition in most business institutions.

This is most clearly shown in the way in which the

methods and objects of these mass selling methods are decided. The average concern adopts a selling policy only after some careful consideration of the responsible heads and the development of the selling force—that is, the force of salesmen, branch offices and executive system for sales is the subject of very definite consideration and consultation. The erection of a branch house, the development of a sales territory and the extension of a sales force are matters to be given a careful analysis, and the collection of thorough information in all directions. The executive who is responsible for the sales force and its work is rightly considered as an important executive and his responsibility and authority are in accordance therewith.

MASS methods of selling, on the other hand, loosely classified under the head of advertising, are decided with comparatively little analysis in comparison. It is not unusual for a manufacturing concern to take the plans of an outside organization and empower such an organization to run the matter without any special check or analytical comparison. The executives who are in charge of the operations of mass selling do not receive either the responsibility or the authority which should be accorded to the men superintending such important operations.

This is largely because the work of mass selling, having been classified as advertising, has not been put entirely and thoroughly under the marketing work of the organization, the general principles governing the use of these methods have not been understood by the business man, and the whole development has been left too largely to the men who were specialized in the work of advertising as a separate and different character of business medicine which had little relation to the other operations, except the rather curious way in which its intangible impressions resulted in business improvements and extension.

This has been the cause of most of the misuse of the mass selling methods and the large amount of waste connected with the general development of this branch of the marketing work. It should be thoroughly understood that advertising is mass selling; that it is a part of the sales work which is subject to the same developments as the individual selling, the principles governing the proper growth of the individual sales force are the same as those which should govern the advertising or mass selling operations. To accomplish this thoroughly and to coordinate all the methods of marketing the executives in charge of the marketing work should be versed in all methods of promoting and maintaining the market. All methods and special development should grow out of the full general plan of marketing, each method being associated with the same object. The first and most essential object of marketing is to secure and maintain customers sufficient to take the output of the factory at proper terms and to increase these customers as rapidly as the possibilities of manufacturing extension will permit. For this purpose it is necessary to know the location and industrial grouping of the present and prospective customers, or their relation in connection with social groupings and the general population.

In the automotive field it is comparatively easy to get this knowledge because of the public information contained in the statistics of registration and the previous records of the individual concern. When this knowledge is secured, the sales organization and the branch offices must be placed so that all these customers can be covered from the proper centers of activity, which will permit of this work being done at the least cost. The number of prospective customers and the required frequency of calls will regulate the size of the sales organization required for a given problem, while the economic relation of the territories to the cost of movement over them and their productivity will determine the number and location of the branch establishments necessary.

The first job of the advertising, or mass selling, is to parallel this work of the sales organization, doing in the mass much of the work of promotion which would have to be done otherwise by the slower and more expensive means of individual salesmen alone.

In addition to paralleling the work of the sales force the mass selling, or advertising, should also be used for the promotion of the business among prospective customers in territories not covered by the sales force, so that many of the areas to be covered in the future will be more readily worked by the salesmen as the business extends itself and with less original investment in securing the market therefrom.

In many lines of business, and in this the automotive field is no exception, customers and prospective customers vary greatly in their purchasing capacity through a given period. The sales pressure, both from the sales force and the mass selling, should be graduated as much as possible to the purchasing possibilities, so that few sales are made at a cost exceeding the economic limit desirable for profitable operations. In this respect the mass selling can be used to supplement the work of the sales force among the customers very effectively because of its ability to reach the attention of the prospective customer with little cost many times, where the salesman is restricted to a very few because of the limitations imposed by the necessities.

MASS selling through advertising seldom receives the same careful analysis or check up that is used in preparing and following up the individual sales campaign. This has naturally resulted in much waste which is avoidable to the same extent that other wasted sales effort is avoidable. Similar methods and care can and should be applied in both individual and mass selling, and the two should be fully coordinated.

It is not good business policy to put the same pressure of individual and mass selling on a customer who can buy a few hundred dollars worth of goods in a year as it is to put it on the concern which will buy many thousand. Both are desirable, but the competition and the economic limits of cost both demand that the latter shall receive more attention and more careful effort in the endeavor to secure his business.

IN addition to paralleling the work of the sales force, the work of mass selling may be extended profitably beyond the area of the present and prospective customers, so that it may work upon other market influences. It is in this extended work that much of the controversy has arisen and many of the values have been diminished, so that large expenditures have been wasted. As this work is the subject of much argument and is governed by such intangible laws, it will be necessary to give the discussion of it a larger place than the present article would allow, so that a further article will be devoted thereto in an early issue.

It is advisable to determine the work of mass selling from the basis that all advertising work is an attempt to sell in the mass, and it is subject to the same fundamental and practical considerations as the development of individual selling.

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Truth in Advertising

THE Vigilance Committee of the Associated Advertising Clubs of the World has just issued a pamphlet detailing its activities in the automotive field during the past year. The cases given attention range all the way from the so-called "unqualified" guarantee used by a few battery manufacturers to false claims in the promotion of new automobile concerns.

The Vigilance Committee is a constructive, hard-working organization whose activities are for the best interests of the industry as a whole. By helping to eliminate false claims and untrue statements in advertising, it aids the constructive efforts of the legitimate manufacturer and advertiser.

All sound and permanently useful advertising is based upon truth. No executive in the industry would dispute that fact. Yet many statements are made in car and truck advertising which, while perhaps based on truth, are not readily traced to their source. Exaggerated terms such as "finest," "best," "most beautiful," etc., are not subject probably to any active criticism by the "Truth-in-Advertising" campaigners, yet they are certainly steps in the same general direction as statements which make false claims for a product.

The vast majority of publicity material sent out by automotive concerns is still bombastic, prejudiced and exaggerated. Its effectiveness is thereby materially decreased. The public becomes more "motor-wise" each year. And the selling value of superlatives decreases accordingly. Sound thinking in advertising and publicity will help greatly to reduce marketing costs.

Crane's Spring Suspension

MOST of the improvements in connection with chassis springs which have been announced within the past several years have had for their object either to vary the flexibility of the springs with change in load, making them stiffer as the load increases, or else to eliminate the spring shackles with their bolts and the wear and tendency to become rattly, which are associated with these parts. The new spring suspension system described by H. M. Crane in his S. A. E. paper presented at the White Sulphur Springs meeting aims at somewhat different objects, namely, to combine the good points of the Hotchkiss drive and of the system embodying the use of a torque tube or torque arm.

The advantage of the Hotchkiss drive is that it cushions the drive and protects the transmission members and engine from shock. This is generally appreciated. There is one questionable feature connected with the Hotchkiss drive, however, which has been the reason why a good many engineers have refused to consider its adoption, and that is the effect of extreme torques on the springs, whether these torques be due to driving or braking. To enable the springs to withstand extreme torque couples, modifications are usually made in its design which adversely affect its ability to absorb road shocks. A moderate cushioning effect of the springs under a sudden variation in torque is certainly very desirable, but to keep this cushioning action within reasonable limits the spring must be made comparatively stiff, which interferes with its principal object, that of cushioning road shocks.

Mr. Crane therefore has produced what amounts virtually to a combination of the Hotchkiss and torque arm drive. With this suspension the rear axle housing has a certain angular flexibility, but the range of its angular motion is limited by the radius rods between short arms extending downward from the axle housing and the side members of the frame. Shocks in the drive are therefore relieved and at the same time the springs are protected against excessive strains due to torque reaction. Consequently it is not necessary to specially stiffen the springs, and their ability to absorb road shocks is not impaired.

One advantage of the Hotchkiss drive, that of simplicity and low cost of construction, is not realized in the new design, at least not to the same degree, but as the latter is probably intended for high class cars only, this is a matter of no great moment.

What Next?

COMMENTING upon the miners' strike recently, the *New York Times* said that the miners were not interested in having their leaders become powerful and prominent but only in the final result of "obtaining steady work at a living wage."

The remark is worth attention, because it is somewhat typical of the mistaken attitude frequently assumed by employers as regards the needs of employees. "Steady work at a living wage" is certainly a desirable thing in life—one of the necessities. Yet the employer who deludes himself with the idea that workers will be satisfied when this end has been achieved is neglecting to recognize many important aspects of human reaction.

"Steady work at a living wage" provides only the basis for a happy life. The individual spirit or ego or Whateveryouwanttocallit is constantly striving for greater development; for more opportunity for achievement; for more worlds to conquer. Complete industrial stability rests upon a recognition of this fundamental human characteristic. When means have been found to so organize industry that those who work can have complete opportunity for personal development, friction between employer and employee will be materially reduced.

Progress has already been made. Many employers, recognizing this desire for development in themselves, have rightly assumed it to be common to most men—to all men likely to be of constructive value to an organization. These employers have been seeking the means of industrial readjustment. They have made some progress but are still studying and experimenting. The automotive industry has a big part to play in carrying forward such investigations and analyses.

How To Sell Buses

WE had lunch the other day with one of the men who has done most for the promotion of bus transportation in its commercial aspect and who has been prominent in advocating that the automotive industry build the buses. We asked him how he would go about selling buses to-morrow if the job were put up to him.

He said something like this:

"I would organize a factory selling organization, separate from my regular truck dealer organization. This factory selling force I would operate much as the big truck companies do their men selling to big national truck users.

"The dealer organization could be worked in to give tips and leads, but the central sales force would be equipped, capable and expected to sell the buses.

"I would try to sell to the electric railway lines now in existence. They are the groups which have already at their command sufficient capital and sufficient transportation experience to buy, equip and operate bus lines immediately. The bus will develop as an ally, not as an enemy of these interests. Existing transportation agencies are the largest immediately available bus market.

"It would be more difficult to sell to individual bus operators in various parts of the country, although my central selling force would attempt this in the case of those bus lines known to be in existence. Dealers might help out in giving tips about local bus propositions before the equipment had actually been bought.

"Further experience in selling buses will develop better and more efficient methods than those I have outlined. But this is what I would do if asked to outline a plan for immediate use."

Here is one interesting answer to the question that is before most of the companies which have taken up bus development work. Bus marketing must grow along with better bus design.

Stiffer Frames Needed

THERE seems to be little doubt that the average passenger car is fitted with a frame which is much too flexible to resist torsional and other stresses to which it is frequently subjected without subjecting the body and other parts to strains which shorten their life and result in many unpleasant rattles which might otherwise be avoided.

The frames of modern cars seldom break unless grossly mistreated, but they do distort and in so doing often cause excessive distortion of the body as well as other members more or less rigidly attached to the frame. The resultant weaving, especially of closed bodies, opens up body joints, causes doors to bind and sometimes even become inoperative. It results also in other troubles which are, to say the least, extremely annoying to the user though he may not realize their cause.

Some concerns have redesigned car frames with a view to overcoming trouble of the kind mentioned and certain patented constructions have been employed in other instances. In one case the running boards are made integral with the frame, which is of very deep section, and in another a heavy gage tubular member, which serves also as a muffler, is riveted between two transverse members and it gives the frame an unusual degree of torsional strength about a fore and aft axis. Both of these constructions are steps in the right direction and one at least may be presumed to add but little to production costs, since it is to be used in a low priced chassis soon to be produced in very large quantities.

There are doubtless many other ways of building less flexible frames than are now used. In any case the matter is worthy of much further study and experiment and should handsomely repay those who give it the consideration it deserves.

Total June Output Reached 271,000

New Record Exceeds May Mark by 15,000

Production for Quarter, 746,000, and for Six Months Approximately 1,138,000

By JAMES DALTON

NEW YORK, July 12—Another new record for production of passenger cars and trucks was established by the automotive industry in June with a total of 271,000. This exceeds by 15,000 the May record of 256,000. This would make a total for the second quarter of 746,000 and for the first half year of approximately 1,138,000. The total for 1921 was 1,668,000. The gain over June, 1921, was 51 per cent.

While factory schedules for July have not been cut materially, there will be a considerable falling off in the month's production because of the universal July 4th holiday and inventory taking in several plants. The total will reach large proportions, however, and probably will approach 200,000. Ford expects to make as many vehicles as in June and the same is true of some of the other companies.

A seasonal falling off in sales has become apparent in some sections, notably in the larger centers of population. The farm demand has not really opened and the extent of the decline will depend in large measure upon the volume of sales in the agricultural districts.

Truck Makers on Alert

Truck makers are watching the rural districts even more closely than the passenger car makers. Most of them are bringing out new models of light trucks designed especially for farm use and will cultivate this field intensively. Unless there is a strong demand in this direction it is not expected that truck business will go much beyond the present level for the remainder of the year and it may fall off.

Passenger car manufacturers are confident that sales of closed cars after August will be unprecedentedly large and will make the volume of business for the closing months of the year entirely satisfactory. Many

(*Continued on page* 95)

Business in Brief

NEW YORK, July 10—Potential danger of serious interference with freight traffic is found in the strike of the railroad shop craft workers in its second week. Several of the roads are annulling trains, and considerable congestion is reported, although conditions cannot be described as serious up to this time.

Administration efforts to settle the coal strike give some promise of success. Unless work is resumed soon, conditions in certain sections of the country next winter, particularly in the Northwest, will be serious. When production of coal is resumed, its movement in large quantities by the railroads may interfere considerably with other traffic.

Labor troubles are the only clouds on the industrial horizon, but with nearly 1,500,000 workers in voluntary idleness, they cannot fail to have their effect sooner or later.

Manufacturing and industry generally have maintained their activity, and unemployment, except that which is voluntary, is negligible.

There has been a noticeable improvement in crops, especially corn and cotton, in spite of irregular weather conditions.

Retail trade slowed down somewhat after the pre-holiday rush, but jobbers and wholesalers are receiving more small lot orders for near and distant delivery.

The steel industry is most strongly situated, both as to output and prices, but the rising cost of fuel and labor is eating up the price additions. Operations are restrained by the necessity of hoarding coal and coke.

Building reports for June in large cities indicate that new records were established in that month.

Rising prices for raw materials and finished products have made for uncertainty in the textile markets.

No softening of prices is apparent in the wool markets.

Railroad stocks are buoyant, bonds active and higher, sterling up and other European exchanges weak.

Bank clearings for the week ending July 6 were $6,803,504,000, a loss of 1.5 per cent, as compared with the previous week, but a gain of 11.4 per cent over the same week in 1921.

Lincoln Car Changed and Price Increased

Town Model Now $7,200—Revisions in Any Other Types Will Be Upward

DETROIT, July 10—Forty-four aluminum parts for the Lincoln car are now being cast in the River Rouge foundries of the Ford Motor Co., in addition to the casting of the cylinder blocks and crankcases. Machining is continued at the Lincoln Motor Co. plant. Additional equipment is being added at the Rouge to permit handling castings for the entire Lincoln output.

Without formal announcement the town car of the Lincoln line has been remodeled and the price increased from $4,800 to $7,200. Previous to the sale of the plant to Ford in February the town car had been $6,000. The new town car is understood to represent an Edsel Ford idea in fine car construction, the body work being of an exceptionally fine type.

Formal Statement Expected

Since the severance of relations between the Fords and Lelands, there have been no formal statements by either side, but a statement by Edsel Ford on Lincoln manufacturing policies is expected soon to be made. This statement will show, it is reported, that the Fords are undertaking to manufacture America's finest car, that the production will be on a limited basis and that prices, if changed at all, will be increased to compensate for the extra fine character of the general construction.

Changes in prices made by Ford since taking over the Lincoln have been increases, the new prices being practically higher than formerly. In both revisions to date the construction of the car has undergone important changes, the improvement being principally in the bodies. Apparently the thought of competition has not been allowed to enter into the manufacturing plans, as the sole idea has been to make a very high type of car regardless of price.

Sales Running High

Sales of Lincoln cars are reported to be running high, and orders are said to be four months ahead of production. Output at the factory is ranging from 30 to 35 cars daily. A constant flow of orders is reported to be coming in despite the long wait for deliveries. Sales are being handled through the Ford sales office, of which R. C. Getzinger, who was formerly Lincoln sales manager, is now a member.

Makers Keeping to June Schedules

Dealers Hold Orders Down to Sales Basis

Demand Reported Steady with Decline from Rush of Early Spring

DETROIT, July 10—Reports received from factories in the Detroit district indicate that a compilation of figures on June production will show a slight increase over the record output of May. In most factories the variations were very slight due to the fact that capacity was reached in May, but better deliveries of materials and other causes enabled the June production to run just a trifle higher.

Production in July so far as the daily schedules are concerned will be practically identical with the schedules of May and June but holidays early in the month and close-downs for inventory and vacation periods, will bring the monthly total considerably lower. The demand for cars is reported to be steady but falling off from the early spring rush. Dealers are said to be holding orders strictly to a sales basis.

Program of Companies

Columbia Motors, with the assurance of deliveries of materials for its light six, has set a schedule of 1650 cars for July, which will exceed its June total by 100 per cent. Two-thirds of this will be the light six and the remainder the former larger models. Gray Motors has booked a total of 500 cars for July, which will be its first full production month. First deliveries of the Gray were made late in June and consisted mainly of demonstration cars for dealers.

Incomplete figures for Ford business in June show that the schedule of 130,000 cars and trucks and 10,000 tractors was approximated. The company has set a similar schedule for July production and announces that this schedule is lower than the orders received from its dealers. There will be considerable orders carried over into August, for the most part these being in the closed models.

Dodge production is continuing at the rate of 550 to 600 daily and Maxwell at the rate of 300 to 350. In the latter case the month's total will be lower owing to a week's closing for inventory in the first part of the month. Durant production is continuing at the rate of 100 daily, June being the largest month to date for the Lansing plant and increases are set for July and August. Production of the Star car will begin at the Lansing plant in August. Dort Motor production for June was lower than in May. The July schedule is fixed at from 50 to 70 cars daily.

Hudson Motor Car Co. reports an increase over its May total of about 5 per cent in June, and expects to approximate the June production in July. In both the Hudson and Essex models the daily production is continuing at 275 to 300. Hupp Motor Car Corp. is continuing its schedule of 140 daily. In the first six months the company reports business to have reached about 18,000 of its planned 30,000 output for the year.

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Truck Maker Should Proceed Cautiously in Stocking Up His Dealer

By WALTER E. PARKER
President of the Commerce Motor Car Co.

Detroit, July 11.

BUYING by farmers the remaining part of this year will be important to truck producers mainly in that it will clear the way for safe, steady buying next year. The clearing up of unsold trucks in the farm sections of the country will release capital to both dealers and manufacturers and will make business conditions easier. I do not look for a large demand upon truck factories this fall, due to farm buying.

There is a large field for dealer development by the truck companies in the farming states, and the time following the opening of the farm market should be productive of good results. Many dealers became discouraged in the past two years and dropped out of the truck business. The return of buying, with the promise of steady business in the future, should induce many to come back. Before going extensively into the development of new sales outlets in these territories, however, the manufacturer should be sure conditions are right for truck business. Otherwise there will be additions to the ranks of discouraged dealers and increases in the surpluses of vehicles.

Probabilities are small of the automotive industry being compelled to halt at any time, due to the settlement of the coal strike and the consequent congestion of railway shipping facilities. There will undoubtedly be a severe tie-up in traffic while coal is being rushed through, but the automotive industry can always resort to driveaways. There may be an inclination among some manufacturers to stock dealers up against a possible rail tie-up, but I regard such action as unnecessary. Manufacturers should be cautious in stocking dealers, no matter what the conditions are.

The truck business has been good in the industrial cities of the East and Middle West, and I look for most of the business this year to come from these sources. Heavy-duty truck demand is showing steady gains. Business in buses is advancing steadily, but the greatest development in the bus business will not come until the street railway and interurban companies adopt them and operate them as feeder lines. The weak financial position of most of the railway companies, however, makes this prospect poor at this time.

In my opinion, the operation of buses by individual owners will give way to the operation of charabancs, or other light passenger-carrying vehicles, for reasons of economy and comfort. In most cities the operation of the heavy vehicles, except in rush hours, is not on a paying basis, and their heavy construction makes riding conditions poor except under full load. Cities where the charabanc is in competition with buses show them to be much more popular with passengers and more paying to owners.

Parking congestion in cities is adding to the popularity of numerous passenger-carrying vehicles, car owners preferring to make trips to and from their business places in this way rather than encounter difficulties in getting parking space. In some states and cities the automotive competition with railway lines has been set back temporarily, but there will be steady progress in the development of the additional transportation service.

Anti-Bus Measure Defeat Is Sought in Georgia

ATLANTA, July 10—The recently organized Georgia Bus Line Association, at a meeting in Atlanta early this month, decided to make a determined effort before the present session of the Georgia State Legislature to defeat the passage of a bill being sought by the short line railroads of the state, which, if passed, would make the bus a common carrier subject to the same rules and regulations as the railroads.

The association expressed itself as willing to confer with the railroads relative to a bill less stringent than the one proposed.

Export Gain Shown by Wisconsin Parts

Truck Sales Reported Improved in Europe—English Company Has New Model

OSHKOSH, WIS., July 11 — Marked improvement in its export business is reported by the Wisconsin Parts Co. Nearly 25 per cent of its May shipments of truck axles went to the export trade which represented a decided increase over any previous month. Sales in June were equally as good and July promises to be even better.

European representatives of the company report such an improvement in truck sales that several manufacturers are planning for extensive production. One English company is arranging to bring out a new speed truck which will be placed in production before the end of the year.

The demand from foreign countries is fairly well divided between worm drive and double reduction models. The former is used on trucks up to two and three-ton capacity and the latter on heavy duty types. Four of the largest truck builders in England follow this practice exclusively, and although several other manufacturers have retained the chain drive, the tendency is toward the use of the worm on light short hauls with the double reduction in the heavier sizes for long distance trucking.

The special double reduction bus and trackless trolley types which the company is now producing have been well received by the trade. Two bus models are offered suitable for 18-25 and 30-50 passenger pay loads. These models provide special treads, low top clearance and a wide range of gear reduction as well as many optional features.

A special reverse gear rail car axle is being developed in collaboration with railway engineers in which standard railway practice is modified to meet new conditions. Exhaustive road tests will be made in the near future.

Beaudette Sells Plant to Fisher Body Corp.

PONTIAC, MICH., July 10—The plant and real estate of the O. J. Beaudette Co. here has been sold to the Fisher Body Corp. of Detroit, according to an announcement by O. J. Beaudette, for thirty-two years engaged in the automobile body manufacturing business in this city. The Fisher corporation will take possession as soon as the present Beaudette contract with the Ford Motor Co. is filled, which will be about Aug. 10.

The corporation will begin arrangements at once to put the plant at work to capacity. It has been running light, but can give work to about 2000 men. "We will have the plant running full within 90 days," said President Fred J. Fisher. The plant includes 10.4 acres of real estate fronting on three streets and on the Grand Trunk Railroad tracks and has about 300,000 sq. ft. of floor space.

It is understood that Fisher will use the plant for making open bodies on General Motors contracts. Beaudette during the past sixteen years has been employing the plant on Ford contracts and during that time has made in excess of 1,000,000 bodies. Originally the shop was a buggy body plant. Beaudette will retire from business.

Dividend on Preferred Passed by Seiberling

AKRON, July 10—The Seiberling Rubber Co. has informed its preferred stockholders that the dividend due July 1 has been passed as a measure to conserve capital and cash resources.

It was generally understood that the dividend would be paid because semi-official statements by officials of the company indicated that the dividend had been easily earned during the first half of the year.

Sales of the company, as given in the letter to the stockholders, indicates that business during the first year may approximate $5,000,000. During March sales amounted to $229,000, April $291,000, and May $435,000, the letter to the stockholders states. It is estimated that June sales will amount to $550,000, although this has not been officially confirmed since the issuance of the letter.

That expenses incident to the starting of a new business has decreased net earnings somewhat is also pointed out by Seiberling in his letter to stockholders. Announcements regarding increases in production are lacking, although the statement that sales are increasing has been made officially.

G. M. Report Will Show Bank Loans Liquidated

WILMINGTON, DEL., July 10—While the balance sheet for the General Motors Corp. has not been issued, it is learned on reliable authority that it will show operating profits of between $30,000,000 and $33,000,000 for the first six months of the current year, considerably exceeding the expectations of the officers.

The company has liquidated all of its bank loans, which at their peak totaled $80,000,000. Resumption of dividends on common stock depends on the volume of business for the remainder of the year. The inventory, it is said, will show under estimates of values, rather than over estimates. The company showed a final deficit of $65,000,000 at the close of 1921.

WINTON DROPS BRANCH

BOSTON, July 10—The Winton Co. has discontiued its branch in Boston and turned the New England territory over to George W. Canterbury, who will act as distributor. This was one of the first branches opened by the company and has been continuously handled as such for more than twenty years.

Moline Plow Expands Distributing System

Is Getting Away from Custom of Having Dealers at Every Crossroads

MOLINE, ILL., July 11—A new plan of merchandising farm implements has been adopted by the Moline Plow Co., and George N. Peek, president and exponent of the plan, hopes to start a movement that will very largely revolutionize the merchandising of farm machinery.

The plan is to get away from the great numbers of small implement dealers, many located at crossroads, and none of whom have made money or been capable of giving the necessary service or even making sales. In place of these dealers, Peek aims to develop distributors at distributing centers, these to serve a large territory and have a large volume of sales.

The company, which had twenty-four factory branches, has already reduced this number to nine, and the appointment of distributors has been under way for some months. This change is to get away from the old method of distributing implements, which Peek describes as wasteful, and to still further complete his plan, a basis of cash sales has been included. It is founded on the belief that the farmer should pay cash when he can.

In the past the old order of implement dealers has required too much factory sales effort. The implement manufacturer, not satisfied with putting dealers at every crossroad, had to send factory representatives to instruct these dealers, to assist them in making sales, to assist them in collecting for the machinery and also in servicing it.

The Moline plan is opposed to free service because it regards free service as meaning it is generally paid for in the original price. The new Moline distributor plan is aimed to reduce the selling cost. The distributors should buy in volume and receive volume shipments, securing the economies going with both of these.

The sale of agricultural machinery is from 40 to 50 per cent.

Delaware Court Names Receiver for Premier

INDIANAPOLIS, July 10—A second receivership suit has been filed in Wilmington, Del., against the Premier Motor Corp., incorporated under Delaware laws. Chancellor Wolcott has appointed Elmer E. Mitchell of Wilmington receiver.

Like the previous suit filed in Indianapolis, the action was brought by the American Foundry Co. for $2,970, the petition alleging insolvency of the Premier concern. The Delaware action and receivership appointment is ancillary to the Indiana action by which the Fletcher Savings & Trust Co. was made receiver here July 1.

Ford Canadian Plant Will Double Output

Land Acquired for New Buildings—1000 Cars Daily Is Contemplated

DETROIT, July 11—The Ford Motor Co. of Canada, Ltd., has paid $1,000,000 for the land adjoining its border city plant, on which it is proposed to erect structures which will enable it to double its present capacity of 250 cars daily. An ultimate 1000 cars a day production is contemplated, according to W. R. Campbell, vice-president in charge of operations at the Canadian plant.

Plans for the extension of the plant activities have been worked out with Henry Ford. Engineers are now preparing plans for the buildings which will include machine, forge and body shops, and foundries. Other buildings will be added later, which will provide for the manufacture of all parts and equipment used in the Canadian Ford car.

Old Plant for Bodies

With the completion of the new buildings, the former headquarters will become the body plant. The property provides a river frontage of 2000 ft. and is served by the Grand Trunk and Essex Terminal railroads. According to Ford, the establishing of a tractor plant is contemplated in conjunction with the extension of car manufacturing facilities.

Tractor building in Canada is contingent upon the location of a water power site. Vice-President Campbell, in explaining the car expansion plans said:

We have done little construction for several years and we have come through the depression nicely. Our company has enjoyed a healthy year. The Canadian demand for our car is growing. Export business is increasing. Canada is again in a healthy condition. The Canadian market can absorb all the cars we can make and we feel that we should set the example for greater activities in the Dominion.

All engineering activities connected with the Henry Ford enterprises will be housed in a special laboratory building at Dearborn adjoining the present buildings of the company, which will be razed when the new structure is completed. The new building will be of Grecian style of architecture, one story in height and will be 800 x 200 ft. in size. The cost will approximate $500,000.

Half of Men "Scientists"

In a statement on the new building, Henry Ford said about 200 men will be employed, half of whom will be mechanics and "we may as well call the other half scientists." None of the former buildings will be continued, Ford saying "it is better to start afresh and make the new buildings stand for something."

Referring to other activities of the Ford company, he said the glass factory at Flatrock, Mich., will soon be in full operation, as will a cement plant at River Rouge which will be operated solely for the needs of the company. This latter plant will be established to utilize slag left over from the pig iron operations at the blast furnaces. Ford also said that power for the Lincoln plant will soon be supplied from the River Rouge powerhouse by means of underground wires, nearly all of which are now in place.

Building 50 Per Cent of Bodies

DETROIT, July 11—Ford Motor Co. body plant at River Rouge reached a production of 68,128 bodies in May, 15,542 being sedan and the balance, 52,586, phaeton. With production of cars in that month reaching approximately 120,000 (excluding trucks and tractors), the company is now building more than 50 per cent of its own bodies. Of those made outside the larger part is the coupe body, which is one of the company's most popular models.

Daily production schedules set in the body plant for June were 2400 phaeton and 900 sedans.

The Ford foundries at the Rouge established a record output for cylinder blocks in a single day on May 24 when 7687 were cast. The average daily output of cylinder blocks at this time is 7100.

Erection of the electric furnaces at the Rouge is reported to be progressing rapidly, the 50-ton furnace, which will be the largest in the world of its type, will be ready in the fall. The first of two 10-ton furnaces will be completed about Sept. 1 and the second a month later. A conveyer system for carrying ingots from the pouring to the stripping operation will be an innovation in work of this kind. Three cranes with capacities of 10, 25 and 100 tons will be part of the equipment. A stripping crane will also be installed.

Ford Foreign Production

DETROIT, July 10—Another material increase in Ford foreign production is reported for May. The total was 7170 as compared with 5904 in April. The Copenhagen plant turned out 1288 cars and trucks compared with 824 in April; Sao Paulo, 228 compared with 154; Bordeaux, 1044 compared with 609; Cadiz, 410 compared with 305; Manchester, 3527 compared with 3013, and Buenos Aires, 673 compared with 350.

FRANKLIN REPORTS BEST MONTH

SYRACUSE, July 10—Franklin Automobile Co. reports that June surpassed all previous records for the month, and was the second biggest month in the history of the company. It states that practically the entire output of the factory up to Aug. 1 is now sold.

EDWARD R. CALDWELL DIES

SYRACUSE, July 10—The death is announced of Edward R. Caldwell, president of the Syracuse Rubber Co. and one of its founders. He was for many years head of the E. R. Caldwell & Son Brass Co.

Springfield Plants Report Many Orders

Truck Concerns Kept Busy Supplying Demand—Expect July to Equal June

SPRINGFIELD, OHIO, July 10—An order for ten motor trucks was booked during the past week by the Kelly-Springfield Motor Truck Co. from the company's Detroit distributor. These trucks have been sold by the distributor to persons in several of the Canadian sections which are being opened up by the company's representatives. The trucks ordered are of the 1½-ton type. Further orders were also received from the Edwards Motor Railway Co.

An order for fifteen light delivery trucks is being filled at the Springfield works of the International Harvester Co. for Sidney, Australia. Material is coming in better than heretofore and trucks are being turned out at the rate of 50 a day.

Order Aeronautical Engines

An order was booked during the past week by the Steel Products Engineering Co. from the United States Government for aeronautical engines. These are to be of the high power type air service and will be delivered in the next three months. The company has been making such engines for the Government for some time. It recently received an order to build two motor trucks with equipment for balloon operations. One will be a balloon tender chassis and the other will contain a compressure unit for the manufacture of gas in the field. The local plant is being operated with about 40 per cent of its normal force.

Karl Heinzen, advertising manager of the Westcott Motor Car Co., reports June business best since June, 1920, and that July should be equal to June.

Case Has New Model and Revises Prices

RACINE, WIS., July 13—The J. I. Case Threshing Machine Co. has brought out its new model W which replaces the previous model V. The new car is slightly longer, the wheelbase being 129 in. as against 126 on the older model. The engine bore is 3⅝ in. as against 3½ in. The stroke is the same, 5¼ in. The prices on the new model are:

5 pass. phaeton	$2,200
7 pass. phaeton	2,250
Coupe	2,850
Sedan	3,250

These prices are several hundred dollars higher than the previous model V. Prices on the model X, which is to be continued, have been reduced. Following are the old and new prices:

	Old	New
2 pass. roadster (new)		$1,750
5 pass. phaeton	$1,890	1,790
Coupe (new)		2,550
Sedan	2,790	2,690

Milk Shippers Seek Data from N.A.C.C.

Take Up Question of Shipment by Truck Pending I. C. C. Decision

WASHINGTON, July 11—Steps looking toward the employment of motor trucks in the transportation of milk on short line hauls from the "milk sheds" to large cities have been taken, according to Charles Holman, executive secretary of the National Milk Producers Association, composed of twenty-six allied associations and having more than 200,000 members.

Because of the excessive rates on milk and cream, which are now being transported by the railways and on which the recent reduction does not apply, the milk producers must turn to some other means of transportation, and the truck, the association believes, offers the solution.

Fenn Gathering Information

So convinced is the organization that it will be necessary to resort to truck transportation that it has asked the National Automobile Chamber of Commerce to submit proposals and data on the best method of solving the problem. The details will be worked out by the motor truck committee of the N. A. C. C., of which F. W. Fenn is secretary.

Pending the N. A. C. C. survey of the situation, the milk producers are bending their efforts toward having the Interstate Commerce Commission issue an order permitting them to lower rates on the transportation of their product. Because of the fact, however, that all milk and cream is transported by passenger and express trains, little hope is entertained for a reduction in rates.

Chief among the problems submitted to the N. A. C. C. by the Milk Federation is whether it would be more economical for the members of the association to operate truck fleets themselves or whether it would best serve their interest to organize a holding company, the stock to be sold to the milk producers, which would handle all short hauls of milk. The N. A. C. C. has also been asked to submit figures showing the relative cost of haulage by truck over dirt roads and improved highways.

Little Hope for Lower Rates

In discussing the situation, Holman said:

Figures secured by our organization indicate that we can transport our product on short hauls considerably cheaper than is being done by the railroads, because when shipping by truck we save a delivery charge to the railroads and also a delivery charge from the railroad to the distributing stations.

We have about given up hopes of securing a reduction on milk rates from the I. C. C. Our only recourse would seem to be the employment of individual trucks or the use of a comprehensive transportation system serving our members in each of the important and large cities.

General adoption of automotive transportation by our association would be a decided factor in the motor truck business of the nation, because of the number of trucks that would be required, and the fact that ours would be the first large association to adopt on a national scale, we believe, the use of motor transports in fleets for the transportation of our product.

A survey of the relative cost of truck transportation vs. railroad transportation has been made in a limited way by the milk producers themselves in Minneapolis, Philadelphia, Cincinnati and several other important milk consuming points, with the result that a big saving is shown by the motor transportation method.

This saving, however, it develops, diminishes when the haul is above 40 miles and totally disappears when the haul is in excess of 60 miles. With the milk producers the question of transportation of their product has been a succession of rate increases.

Automobile Freight Cars Number 93,433

NEW YORK, July 10——Statistics compiled by the National Automobile Chamber of Commerce show that there are now in service 93,433 automobile freight cars. An additional 7498 box cars can be used for the shipment of smaller machines. The railroads have placed orders for 12,950 new automobile cars and another 5600 are included in tentative proposals for new equipment. Recent railroad orders for new automobile cars are:

Wabash, 1500 with staggered side doors in addition to which 500 large 40-foot box cars will be converted into automobile cars; N. Y., C. & St. L., 1000, and Père Marquette 500.

The St. Louis & San Francisco will place wide staggered side doors in 1000 long furniture cars now going through their shops for repairs. The Chicago, Milwaukee & St. Paul is considering the purchase of 500 and the Northern Pacific expects to contract for 1000 within a few days.

G. M. to Boost Bus Sales for District School Use

PONTIAC, MICH., July 10—Healthy demand is being met by the motor bus model being turned out by the General Motors Truck Co. at the plant here, according to W. L. Day, general manager. Day said that, while development of this field is naturally slower than with the standard truck models, there is every indication of big business ahead, and also stated that the production of the plant thus far had been readily absorbed.

No special effort is being made to push the bus model at present, though factory officials have indicated that it is likely efforts will be made to place the machine generally on motor bus lines for interurban traffic and in consolidated district school use.

Dam Hampers Ford's Plans in Northwest

Twin Cities Must Agree Before $10,000,000 Plant Can Be Built

MINNEAPOLIS, July 11—Whether Henry Ford will build a $10,000,000 automobile parts and tractor factory in the Twin Cities seems to lie with a settlement by the two cities of the difficulties between them which have allowed the water power at the high dam at the foot of Minnehaha creek in the Mississippi river to run waste since the dam was erected five years ago. The dam was built to create a head of water to make Minneapolis the head of river navigation, or to give to that city the benefits of water transportation in competition with the railroad freight lines.

Twin City men have conferred with Henry Ford at Dearborn regarding his wishes and again will confer with him at Duluth, where he may decide to build a plant.

Cities Have Different Plans

Under the Federal law preference for use of this power shall be given first to a municipality, second to a public utility and third to an industrial. Minneapolis wants half the power to go to lighting and water plant operation in that city and the other half to St. Paul. It has a power survey under way to that end. St. Paul favors the industrial site plan, and the Northern States Power Co., operating the Minneapolis General Electric Co., would like a franchise.

So to acquire the Ford plant, which will employ 5000 men, the two cities must get together and invite Ford to build on one of two sites to be offered by the cities. He can begin work at once. Meanwhile the Ford Motor Co. is operating an assembling plant in Minneapolis on half a block of land it owns, but never has completely equipped with buildings. If the water power deal goes through, any excess power the Ford company does not require will go to the two cities.

To Eliminate Branches

S. A. Stellwagen, manager of the Minneapolis factory branch, said:

We intend to abandon our assembling plant here because it costs too much to carry on this work in a 10 story building. It should be done on the ground floor only. We could dispose of more cars than this plant can build. Although we make 315 cars a day we are 3700 cars behind orders. Mr. Ford is planning to erect several huge plants at strategic points throughout the country. He has let the contract for a plant at Troy, N. Y., and wants one in the Middle West His idea is to do away with branches entirely because of their inefficiency.

The high dam between Minneapolis and St. Paul in the Mississippi river has the gate on the Minneapolis side and the power site on the St. Paul side. The dam is a hollow core structure.

Tire Development Takes Big Strides

Goodyear and Firestone Companies Producing New Product—India Plans Addition

AKRON, July 10—Tire development, which was held up first by the war, then by the period of unprecedented production expansion, and later by the industrial depression, has been revived, and new tires and new ideas in the tire field are following one another rapidly in the rubber center.

During the first part of the month the Goodyear Tire & Rubber Co. announced the production of a smaller diameter tire for buses and trucks.

Announcements of extending the cross rib tire line to bus and truck sizes followed the announcement of the new line. Innovations in the form of using the Goodyear cross rib design upon cushion tires and several new cord sizes for buses and trucks completed the Goodyear announcement.

New Firestone Cord

At the same time the Firestone Tire & Rubber Co. announced that a new line of small cord tires, especially designed for light trucks and buses, has been developed and will be placed on the market in the near future.

The India Tire & Rubber Co. announced that while the company is now making a smaller cord tire to follow the Goodyear cross-rib lead, plans are being made for the highest quality tire the company has ever produced and that production on the new tire will be started in a few months.

The Goodyear smaller diameter tire is intended to bring the body of both buses and trucks closer to the ground and facilitate loading and unloading, to decrease sideswaying of the vehicle, and also to decrease the danger of overturning. The company has made arrangements with several manufacturers to use the tire as new equipment. Changes in body and axle construction are necessary before the new tire can be used, but the manufacturers have assured the company that these will be made in the interest of the advantages to be given by the new tire.

Goodyear Extending Line

The extension of the cross rib tire by Goodyear into the bus and truck field means an actual price cut, in the opinion of some of the rubber men in Akron, because the new tire will sell for 25 per cent below present prices. The cross rib line was offered the public for passenger cars several months ago at 20 per cent below standard lists, and the industry as a whole immediately either followed the Goodyear lead or made concessions in price to dealers and consumers which amounted to a price cut. The same action is anticipated in the truck and bus line following the production of the larger cross rib tires.

The use of the all-weather design on cushion tires, designed for light trucks and, perhaps, buses will materially increase the traction of the tire. Goodyear was one of the first to build a hollowed out cushion tire, and the addition of the tread is the most important development made during the past few years, according to company officials.

Details of the Firestone tire designed for lighter trucks and buses have not been given out, the company thus far having confined its announcements to the bare statement that the new tire will be available in the very near future. That the new tire, made in passenger car sizes, will be able to stand a great deal more wear than those made for passenger vehicles, is the contention of the company.

India's Higher Priced Tire

While the tire prices have tended gradually and constantly downward during the past year, either through the production of cheaper cord tires, special discounts or actual cuts, the India Tire & Rubber Co. officials state that they have been assured by dealers that the consumers are ready to accept a new and higher quality tire than has heretofore been offered. For that reason plans are under way to make the highest quality tire at the highest price the company has ever made. Since its inception, the company has catered to quality trade rather than volume at a price, and the announcement regarding the present move is looked upon as remarkable in the face of present tendencies in tire prices.

RAIL CAR EQUIPMENT APPEARS IN CANADA

TORONTO, July 10—Canadian National Railways has placed in service between Picton and Trenton a gasoline motor car with seating capacity for 30 passengers, which will operate in conjunction with steam train service, giving five trains a day each way except Sunday.

Canadian National Railways is obtaining more of the individual unit type of cars which will supplement the steam trains and make possible the economic operation of train service of greater frequency in various localities.

LEADS CANADIAN IMPORTS

TORONTO, July 10—Canadian automobile importation for the fiscal year just ended totaled 7181 cars valued at $9,501,362 and 806 trucks valued at $1,534,765, according to a report made in the House of Commons at Ottawa. Last year 5907 cars valued at $8,399,537 and 1706 trucks, of which the value was $3,598,938, were reported. The bulk of importations was from the United States and covered the higher priced cars.

June Pace Followed in Output of Tires

Demand for Original Equipment Accompanies Increased Call for Automobiles

AKRON, July 10—Production of tires during the first part of July was maintained at the pace attained during the latter part of June in spite of the predictions made during the early part of the previous month that decreases in production might be expected during the early part of July.

The manner in which sales of new automobiles and used cars continue throughout the United States and foreign countries has proved a surprise to the rubber industry, which to a large extent depends upon sales to the manufacturers of original equipment tires for volume of business.

It is semi-officially estimated that production in the Akron district continues at the rate of approximately 105,000 tires a day, but no increases, with the exception of smaller ones in the smaller companies, have been registered during the past three weeks.

Companies at High Speed

Goodyear Tire & Rubber Co. production has crept above the officially announced total of 26,000 tires a day, largely because of the sale of the low priced cord tires.

Firestone Tire & Rubber Co. is maintaining an even keel at 26,000 tires a day.

The Miller Rubber Co. is operating at the peak of its history at very close to 7000 tires a day, while the B. F. Goodrich company, which for a time was behind its competitors, has now reached a production stage comparable with its competitors. The fact that Goodrich has not taken any original equipment business and is depending almost entirely upon dealers' business has not made possible the volume production which has been registered in some of the other large plants.

Unemployment has been entirely wiped out in Akron and every tire worker in the city is employed, as far as can be learned from the most authoritative sources.

ALLEN BUCYRUS PLANT SOLD

BUCYRUS, OHIO, July 11—The Shunk Manufacturing Co., manufacturers of magnetos and various metal products, has purchased the plant of the Allen Motor Co. here at auction. The sale has been confirmed by the United States District Court at Columbus and steps are being taken to occupy the plant.

All personal property of the company both here and at Columbus was also disposed of, but the real estate in Columbus remains unsold, the best bid being $150,000 while the appraised value of the property is $303,830.

Crops Portend Good Fall Farm Market

Automobile Executives Report on Conditions Through South and West

DETROIT, July 11—Business trips through three widely separated sections of the country by leading executives of three large producing companies in the latter part of June give indications of a satisfactory volume of business both for the immediate present and through the summer season.

W. J. Mattimore, advertising manager of the Maxwell Motor Corp., has concluded a trip from Richmond, Va., to Jacksonville, Fla., on which he visited important distributing centers along the coast. Practically all of the business now being done in this section, he said, is in the cities, with little buying in the farm sections. Prospects for crops, however, he said, were good and many farmers and planters are beginning to show an interest in cars. The district has been heavily in debt owing to the poor market conditions of the past two years, but bankers are looking to the marketing of this year's products to place the section in healthy financial condition.

Dealers Placing Orders

Bumper crops will be the rule in Texas and that section of the South adjacent to the Mississippi, according to D. Minard Shaw, assistant sales manager of Earl Motors. Texas farmers have cashed in heavily on tomatoes, and other products now approaching the markets promise to yield equally satisfactory returns. Louisiana and Mississippi farmers are also in a position to reap bountiful returns, and there is every indication of a strong market for cars. Dealers in this section are beginning to place orders for cars with more confidence, Shaw said.

Conditions in the West and Southwest are improving rapidly, reports J. J. Cole, Jr., of the Cole Motor Car Co. Dealers are ordering cars for summer delivery, and many new connections are being made indicating renewed interest and confidence in the sales possibilities for cars. Crops, including wheat, rye, and fruit in Minnesota and the Dakotas, berries in Arkansas and southern Missouri, and wool in Montana, are doing well and finding good markets. Oil is in better condition in Texas and Oklahoma than for some time, he said, and there is much greater activity in the mining centers of Colorado.

OAKLAND EXPECTS NO SLUMP

PONTIAC, MICH., July 10 — More orders are booked ahead for July production at the plant of the Oakland Motor Car Co. here than have been on the books at any time in the past ten months, according to W. R. Tracy, assistant sales manager. July promises to exceed June business, which was 50 per cent better than that of the previous June and closely approached that of June, 1920, according to Tracy.

Sales in June were greater than any month since the new Oakland 6-44 models were put out. The sales department, moreover, says advance indications are that August and September will see increased business, with the entry of many farmers into the automobile buying market. This is so strongly indicated that no "summer slump" in manufacture is anticipated by the Oakland plant officials.

Mason Starts Producing in Old Owen Tire Plant

AKRON, July 11—Mason Tire & Rubber Co. has started production of Ford size cord tires in the Owen Tire & Rubber Co. plant, which was purchased at receiver's sale several weeks ago, and new orders which are received by the company will make possible the increasing of production to the 2000 goal set when the plant was purchased.

At the same time it was stated by company officials that a fourth fabric mill would probably be purchased in the near future to provide sufficient fabric for the two plants. The company has three mills which produce a total of 5,000,000 pounds of automobile tire fabric at the present time, but this, it is said, is insufficient to provide the two plants with material. The fourth mill will probably be purchased in the South where two of the company's mills are located.

Mason sales for June were in excess of $1,250,000 in the tire department. The company has also announced resumption of preferred dividend payment as well as redemption of scrip dividend issued last year.

With the exception of the new Ford size cord tire, the company continues to specialize on one line of tires, thus reducing production costs. The original plant is operating three shifts a day.

WHITE REDUCES NOTES PAYABLE

CLEVELAND, July 10—Truck sales for The White Co. for the second quarter showed an increase of 40 per cent over the first quarter and 23 per cent over the second quarter of 1921. June was the best month since September, 1920. The company has on hand $2,500,000 in cash and its notes payable have been reduced to $1,200,000. Inventories now are at a minimum and the production schedule is being gradually increased to meet current demand.

RAILWAY INCREASES BUSES

AKRON, July 11—The Northern Ohio Traction & Light Co. has received the first of eleven new buses which will be added to the three already in operation as auxiliaries to the street car line. The company inaugurated the policy of supplementing street car service with buses several months ago and is now hauling approximately 4000 passengers a day. Increased private bus and "jitney" competition also made the bus innovation necessary.

Farm Products Move with Rising Prices

Minneapolis Bank Deposits Grow —Loans Reduced—Credit Facilities Improve

MINNEAPOLIS, July 10—With the reservation that some six weeks remain of the growing period before the crops of the Northwest get through the critical period, the Ninth Federal Reserve Bank strikes an optimistic note. Marked increases in the production of rye, oats, barley and spring wheat are noted as compared with last year's yield.

The closing month has been characterized by a movement of farm products to market greater than normal and at rising prices, while manufacturing and building operations have increased, giving practically full employment to labor. Employment has undergone a noticeable change in 30 days, because all labor wanting work is able to find it, and employers for the first time in two years are not able quickly to find needed help.

Improved conditions have been reflected in a greater use of credit facilities which remain amply sufficient to finance this activity. The commercial banking situation in the Northwest apparently has returned to the level of the fall of 1919. This does not take into account the new loans by the War Finance Corp. and the farm land banks, and the seed loans by the Government.

Bank Deposits Larger

Deposits in Minneapolis banks on the July call are more than $8,500,000 larger than a year ago, and loans are reduced more than $26,000,000 from a year ago. Deposits were $235,460,730. In thirty-five St. Paul financial institutions deposits gained $8,812,194 over last year, and resources $2,922,688.

Investigation by the Minneapolis Civic and Commerce Association shows manufacturing operations 95 per cent of normal. Only in the making of farm implements and farm machinery were the conditions below normal. However, these men are leaning on the crop prospect for increased volume of business later. Automobile accessory manufacturers were found operating at capacity, one of them planning expansion to keep up with business.

DURANT ADDITIONS IN CANADA

DETROIT, July 10—Plans for the erection of a $2,000,000 addition to the Durant plants at Toronto are being prepared by a Lansing construction company. This plant will provide for the manufacture of the Star car for the Dominion trade and will also be used to furnish additional manufacturing facilities for the Durant four.

The Oakland Car plant of the Durant company will begin production of the Durant four on July 15.

Men of the Industry and What They Are Doing

Jordan Addresses "Hundred Club"

Edward S. Jordan, president of the Jordan Motor Car Co., was one of the speakers before the "Hundred Club" of the Addressograph Co. at its convention at the Drake Hotel, Chicago.

Rieman Heads Air Bureau

Charles S. Rieman, president of the Elgin Motor Car Co., is president of the Chicago Aeronautical Bureau, under whose auspices an aircraft exhibition and aeronautical congress will be held in Chicago, Aug. 4 to 13. Contests of airplanes and hydroairplanes will be held in Grant Park, extending along the lake shore.

Chapman Goes with Dorris

W. A. Chapman, formerly connected with the Skelton car, produced in the automobile department of the St. Louis Car Co., has been appointed director of sales of the Dorris Motor Car Co. Chapman entered the automobile field from the farm implement business, having been manager of the Oklahoma City branch of the Rock Island Plow Co. Later he served as field supervisor for the Dort Motor Car Co. He joined Skelton as general manager of distributing firms in a number of southwestern cities. When Skelton organized the Skelton Motor Car Co., Chapman became vice-president and general manager.

Ewing, Martin-Parry Sales Head

Joseph Ewing, assistant to the president of the Martin-Parry Corp., has been appointed director of sales with George Hotte as his assistant. During his previous capacity he introduced unique angles of merchandising of the corporation's products, which improved the methods of marketing commercial vehicles. His plans of educational series throughout this year have proved notable in their success.

Peterson Succeeds Rogers

H. L. Peterson has been appointed assistant sales manager of the Nordyke & Marmon Co., to succeed A. J. Rogers, resigned. Peterson has been connected with the sales organization for a number of years. Rogers resigned in order that he might devote more time to other interests.

Welchans Joins J. & B.

Edward Welchans, formerly engineer for the American Bosch Magneto Corp., has become chief engineer for the J. & B. Manufacturing Co., Pittsfield, Mass. Welchans has specialized in the design and production of ignition systems and starting and lighting equipment. He is a graduate of Drexel Institute and Massachusetts Institute of Technology. With the J. & B. Manufacturing Co. he will have charge of engineering in connection with ignition products of that company.

Wetherbee Joins Eagle Truck

C. A. Wetherbee, for many years connected with the truck business in St. Louis, has been appointed general sales manager of the Eagle Motor Truck Corp., manufacturer of the Eagle Truck.

Sullivan with Hudson-Essex Agency

W. L. Sullivan, previously associated with the advertising department of the Oakland Motor Car Co. and later serving in the retail field in Washington state, is now connected with the Hudson-Essex agency at Mt. Clemens, Mich.

McEvoy Steps to Patent Section

James McEvoy, formerly in charge of the Detroit office of the legal department of the General Motors Corp., has been made director of the patent section, Advisory Staff at Detroit.

Kelly and Williams Organize

W. D. Kelly, for several years works manager of the Oakland Motor Car Co.'s plant, and G. Roy Williams, formerly with Oakland and recently a member of the Nash Michigan distributing company in Detroit, have organized the Kelly-Williams Co. to conduct a service garage, accessory shop and handle Willys-Knight, Overland and Nash cars in Pontiac, Mich.

Reeves Named for A. S. M. E.

Clifton Reeves, industrial engineer of the Willys-Overland Co., has been named chairman of the Toledo section of the American Society of Mechanical Engineers.

Waddell Joins Cooper Tire

Bart Waddell, formerly assistant export manager of the Firestone Tire & Rubber Co., has been appointed vice-president in charge of sales of the Cooper Tire & Battery Corp., Boston.

Cooke Distributing Racine

Russell Y. Cooke has resigned as general sales manager of the Racine Rubber Co. to become head of the Racine Distributing Co. of Chicago. He has been succeeded by L. M. Van Riper, for several years Western sales manager for the Ajax Rubber Co.

O'Rourke Now With Steelcraft

J. Slocum O'Rourke, recently purchasing agent for the Oakland Motor Car Co., is now a member of the Steelcraft Co. of Detroit, manufacturing steel furniture.

Fritz Leaves Research Club

George Fritz, who has been general manager of the Research Club, Chicago, for a year and a half, has resigned, his action to take effect Aug. 1. He has not announced his future plans, and no successor has yet been chosen by the club.

Fritz was the first manager employed by the club, which is an organization of jobbing houses. Prior to that connection he was for four years field secretary of the Automotive Equipment Association. He has been in the automobile industry 18 years.

Robert Weinstock, of the Weinstock-Nichols Co., San Francisco, is president of the organization.

New York Action Rouses Specialized Truck Makers

DETROIT, July 12—Motor truck companies manufacturing specialized unit vehicles are planning to investigate the reasons for discrimination by the city of New York against trucks in which specialized units are used. Decision to take this step follows the action of the city street cleaning departments in advertising for bids on trucks, in which it is specified that the engines must be built by the same company manufacturing the truck. By this stipulation the field of bidders has been limited to a half dozen companies.

It is planned to point out to the city that many of the specialized unit manufacturers have been long in the field, that trucks of this type are employed in many cities of the country with success and that the best interests of New York City or any community are not served by the limitation of its purchases to a certain restricted class. Furthermore, it will be asserted that this discrimination is unfair to the representatives of the companies doing business and maintaining properties in the city.

Durant Submits Plan for Buying Locomobile

NEW YORK, July 13—W. C. Durant has presented to the receivers of the Locomobile Co. a proposition to take over the property on a basis which is satisfactory to them. This proposal now has been put up to the creditors' committee with the recommendation of the receivers that it be accepted.

It is understood that the Durant plan does not contemplate a cash transaction, but rather the promotion of a new company and an exchange of stock for that of the present Locomobile Co. and to creditors in settlement of their claims. It is assumed that Durant will retain control. So far as can be learned he has not worked out in detail his plan for turning out the Locomobile in a lower price class if he gets the factory at Bridgeport. Announcement of a decision by the creditors' committee is expected very soon.

Midwest Engine Sold and Sale Confirmed

Court Overrules Motion of Stockholder Asking New Receivers Be Appointed

INDIANAPOLIS, July 12—Assets of the Midwest Engine Co. have been sold for $312,500 to the reorganization committee which assumes mortgages aggregating $1,750,000.

In confirming the sale, Judge Solon J. Carter of the Superior Court overruled a motion filed by George Ayers, a minority stockholder, seeking the discharge of the receivers and the appointment of new receivers. Counsel for Ayres intimated that further court action would be taken, asserting that the reorganization committee was seeking to destroy the value of the present capital stock and that this committee was formed prior to the appointment of receivers.

The reorganization committee contends that after the appointment of receivers, stockholders subscribed $1,000,000 for the refinancing and continuation of the business under the name of the Midwest Engine Corp. This committee includes L. E. Pierson of Cincinnati, E. W. Stout and Homer McKee of Indianapolis.

Marked improvement in the business of the company was reported to the court by the committee and announcement was made that the new contracts aggregating several thousand dollars would be assigned after the confirmation of the sale.

Winton Finances Advance Toward Normal Conditions

CLEVELAND, July 12—The Winton Co., which was caught in the aftermath of the depression of 1920, has been making rapid progress in restoring its finances to normal condition.

Since October, 1921, the company has been operated under the supervision of a creditors' committee, represented by Edwin McEwen as general manager. During that time 50 per cent of the indebtedness has been paid off in cash and the company has current assets double the amount of the balance remaining to be paid.

During the past nine months the company has brought out a new model which has met with favor in the trade.

Among more important matters of policy, it has been gradually substituting dealer representation for an extensive branch system for the distribution of its cars. In the past month it has disposed of the large New York and Boston branch establishments and has been fortunate in making strong connections in replacing the branches.

PROTEST URGING USE OF HORSES

TORONTO, ONT., July 11—The Ford Motor Co. of Canada, Ltd., has issued a strong protest against the campaign now being carried on by the Dominion livestock branch of the Department of Agriculture at Ottawa, encouraging the use of horses on farms.

The Ford company and other tractor manufacturers resent the use of their money in propagating ideas detrimental to their business. Appeals have been made to the Department of Trade and Commerce, the Canadian Manufacturers Association and the Association of Canadian Advertisers.

Hudson Reports Heavy Orders from Farm Belt

DETROIT, July 11—Comparing business for the first six months of this year with 1920, the former leading production year, Hudson Motor Car Co. declares that sales for the six months' period have been 95 per cent of the total sales in the same period of 1920. Before Sept. 1 production is expected to pass the production figure for the first eight months of 1920, and the output for the remainder of this year will run far ahead of the latter part of the former record holder.

July sales will be about 18 per cent greater than in July, 1920. The August output will be more than 50 per cent higher than in August, 1920, and more than 200 per cent greater than in 1921. June sales were the largest for any single month in the company's history.

Indications that the farmer will soon come into the market are found by the company in the fact that heavy orders are coming in from distributors in the farm belts. This is particularly true at the southern points. Dealers on the eastern coast and the Pacific Northwest down to San Francisco and east to Salt Lake City are also reported placing unusually large shipments.

Senate Begins Probe of Gasoline Prices

WASHINGTON, July 11—The Senate's investigation of the price of gasoline and oil got under way to-day. The inquiry is being conducted by a special committee, appointed from members of the Senate Manufacturing Committee, seeking to find the cause for recent increases in the retail prices of gasoline and allied products.

The personnel of the committee includes Senator Robert M. LaFollette, chairman of the committee, and Senators McNary of Oregon, Jones of New Mexico and Smith of South Carolina.

The taking of testimony will begin next Monday, the committee announces.

BEST OVERLAND QUARTER

TOLEDO, July 12—The Willys-Overland Co. reports that the second quarter of 1922 was one of the best business periods it has had in years. Orders on hand indicate that shipments for the next quarter will exceed 50,000 cars. Compared with the first five months of 1921, Willys-Overland sales increased 348 per cent in the same period of 1922.

Aeronautic Chamber Renames Governors

General Manager Bradley Reports 176 Members at First Annual Meeting

NEW YORK, July 11—Since its organization six months ago, the Aeronautical Chamber of Commerce has gained seventy-six members, and now has a total of 176. General Manager S. S. Bradley, in his report at the first annual meeting of the chamber held today, expressed the views of the governing board when he stated that the membership would be increased pretty generously during the coming year.

The old governors, who held office for 6 months, were re-elected.

Among the activities of the chamber the advocacy and encouragement of a plan to develop night flying of the air mail has received steady support from the chamber. At the request of the Post Office Department, the results of a canvass of the industrial needs for such a service were compiled, the different chambers of commerce of the country favoring such a plan.

Co-operate with Government

In these formative days of the aviation industry the chamber has devoted a good deal of its efforts to co-operation with such Government departments as the Army, Navy, Post Office, and Department of Commerce and to civil aviation organizations throughout the country. It has co-operated with Garden City, Long Island and Baltimore in the promotion of flying meets and is co-operating with Detroit and Chicago in their scheduled aerial contests.

The 1922 Aircraft Year Book has been issued by the chamber, and is a very useful volume. A new feature is 18 pages devoted to aviation engines, the illustrations including side and end elevations. The volume containing 250 pages is filled with information pertinent to aeronautics. One division of 40 pages is a country-by-country review of the present status of aeronautics. Other chapters tell of technical progress made during the past year, problems of aerial transport, and furnish lists of aircraft manufacturing concerns.

Governors of Chamber

The governors re-elected and from whom the officers for the ensuing year will be chosen are:

Grover C. Loening, Loening Aeronautical Engineering Corp.; Chas. F. Redden, Aeromarine Airways, Inc.; C. C. Witmer, Airships Manufacturing Co. of America; B. E. Bushnell, Stewart Hartshorn Co.; Chas. H. Colvin, Pioneer Instrument Co.; S. M. Fairchild, Fairchild Aerial Camera Corp.; John M. Larsen, J. L. Aircraft Corp.; Lawrence Sperry, Aircraft Corp.; Frank H. Russell, Curtiss Aeroplane Motor Corp.; F. B. Rentschler, Wright Aeronautical Corp., and S. S. Bradley, Manufacturers Aircraft Association, Inc.

Car Makers Keeping to June Schedules

Demand Reported Steady with Decline from Rush of Early Spring

(*Continued from page* 87)

Chevrolet Motors is continuing on its schedule of about 1000 daily. June production being about on a par with May. Buick has operated on part time in June owing to plant changes, but is prepared to resume on its regular schedule of about 350 cars daily in July. Oldsmobile is building at the rate of about 120 daily, a reduction from the May and June totals which were about alike. Oakland is running better than 100 cars daily and reports July business will be on a par with May and June.

Studebaker, because of the pressure of business, has postponed its regular inventory period and will continue manufacturing throughout July at the rate of 440 cars daily in all plants. This is at the same rate as in May and June and represents the utmost that the present plants are capable of producing. Paige produced about 4000 cars in June in its Paige and Jewett models, the total being about equal to the May output.

Cadillac is operating on a schedule of about 100 daily, but looks for a seasonal falling in business toward the end of the month and in August. June production was about equal with May. Wills Ste. Claire will be down for inventory in the first week of the month, but will resume on its schedule of 25 to 30 daily, working two shifts. Packard production in June on all models was about 1800. July schedules call for a total of 2000 cars and trucks. Lincoln is building about 35 cars daily and is four months' behind on orders.

Earl Motors reports June to be the banner month of the company and is continuing on a schedule of about 65 cars daily. Chalmers production is running at the rate of 25 to 30 daily. Liberty is building 30 to 35 cars daily, plant capacity, and will continue at this rate through July and August.

Rickenbacker is continuing its schedule of 25 cars daily through July, and reports June to be about equal to May. Reo closed in the first two weeks of July for the regular vacation period.

BUYS DENBY PLANT

DETROIT, July 12—The L. A. Young Industries, Inc., manufacturer of automobile equipment and material, has bought the plant of the Denby Motor Truck Co., which adjoins it in this city, and is preparing to extend its manufacturing facilities. With the Denby property and an addition to the present plant it is now building, it will have an additional 300,000 ft. of space.

The Denby company will continue its truck manufacturing business in two of the buildings of its former property, having taken a lease on these for a year while preparing to move to another manufacturing site. The sale of the property gives the Denby company a large addition to its working capital.

JUNE OUTPUT GAINS 6 PER CENT OVER MAY AND 51 PER CENT OVER YEAR AGO

NEW YORK, July 12—With the figures only 90 per cent complete, reports made to the National Automobile Chamber of Commerce show that June shipments of passenger cars and trucks totalled 271,000, a gain of 15,000, or 6 per cent over May and of 51 per cent over June 1921. The following table shows the factory shipment figures for the first six months of 1920, 1921 and 1922:

	Carloads			Driveaways			Boat		
	1920	1921	1922	1920	1921	1922	1920	1921	1922
January	20,057	6,485	15,241	29,283	3,185	7,397	....	93	154
February	25,505	9,986	19,600	43,719	1,507	9,950	....	99	169
March	29,236	16,287	27,380	57,273	9,930	15,800	....	75	264
April	17,147	20,187	30,200	64,634	14,197	22,500	....	1,619	3,200
May	21,977	18,608	33,810	74,286	15,193	28,710	....	2,381	7,220
June	22,516	20,269	33,000	60,746	18,384	30,500	8,350	3,947	7,900

Factory shipments for the other months of 1920 and 1921 follow:

	Carloads		Driveaways		Boat	
	1920	1921	1920	1921	1920	1921
July	23,082	19,470	52,342	15,320	8,702	3,725
August	23,386	20,350	34,060	14,290	7,095	3,565
September	20,804	20,150	24,431	13,550	5,469	3,580
October	17,209	17,323	14,127	11,257	2,519	2,300
November	13,253	14,061	9,497	10,509	659	1,385
December	11,802	12,100	6,469	7,500	89	134

Production in June Aggregated 271,000

(*Continued from page* 86)

of the companies are preparing to bring out new models, but there will be no revolutionary changes in design. Many refinements and comforts will be added and body lines will be modified.

Whatever price changes are made for the remainder of the year will be confined largely to the closed car field. The tendency will be downward. It is practically certain there will be few changes in price on open cars which now are selling as cheaply as it is possible to put them out and return a profit. The tendency is towards a whittling down of the differential in prices on the two classes of models.

Higher Court Reverses Decision in Tire Suit

ASHEVILLE, N. C., July 10—The Circuit Court of Appeals, sitting here, has handed down a decision in the case of the Firestone Tire & Rubber Co., appellants, vs. the Marlboro Cotton Mills, of Marlboro, S. C., reversing in part the decision of the district court at Charleston, S. C., directing that court to grant a temporary injunction until a final hearing should determine how the default judgment was obtained.

The case grew out of a default judgment issued against the Firestone company for breach of contract, involving $121,492.05 damages for the alleged failure to fulfill contractural obligations.

Associated Motors May Get Additions

NEW YORK, July 12—Associated Motor Industries, which was officially launched two weeks ago, is understood to be negotiating with four other companies in addition to those already included. It is stated that eight additional companies ultimately will be absorbed.

The company plans a production from July 1, 1922, to July 1, 1923, of 30,000 automobiles and 13,000 trucks. The passenger cars to be sold under the "National" name will embrace four-cylinder, light-six and deluxe six models. A complete line of "Traffic" trucks will be made, ranging from a "speed-boy" to a 3½-ton unit.

Associated Motor Industries, as it now stands, has assets of about $25,000,000, of which roughly half is fixed and half liquid. Against the $25,000,000 assets will be issued $6,000,000 10 year 7½ per cent bonds, which have been underwritten and will shortly be offered to the public; $9,500,000 8 per cent preferred and 187,000 shares of common.

Owners of constituent companies receive only stock in payment, and no company enters the combination unless net assets are three time liabilities. Application will be made to list the preferred on Chicago and New York Stock Exchanges. An early offering of $3,500,000 preferred is contemplated by Chicago banking houses.

NEW WHITE BUILDING

KANSAS CITY, July 10—Ground has been broken for the first of four buildings to be constructed here by the White Co. of Cleveland. The structure, which will be completed in four months, will cost $100,000. It will have a 100-foot frontage and will be 250 feet deep. Construction will be of concrete and brick.

Form Watson Truck from Old Company

Financial Affairs of Canastota Manufacturer Straightened Out —Business Advances

SYRACUSE, July 10—With the financial affairs of the Watson Products Corp. of Canastota, which has been in the hands of a receiver for more than a year, being straightened out in the winding up of the equity action, announcement is made that the company will continue to make one, one and a half and three ton trucks and five ton tractors. The new models are now on test.

The net value of the assets June 1 was given as $1,044,424. It is proposed to dispose of the claims of creditors amounting to $526,000 by issuing to them Class A 7 per cent cumulative preferred stock in that amount at par value in the new Watson Truck Corp. Watson Products Corp. stockholders will receive Class B 8 per cent cumulative preferred and common stock in the new corporation in exchange for their present holdings.

Net earnings of the corporation in May were $11,000. Sales are running 100 per cent above last year. When the receiver took charge of the affairs in January, 1921, the company had only $252 cash on hand and no accounts receivable. On June 1 the receiver had $19,744 cash on hand and accounts receivable of $11,160. A chattel mortgage has been reduced from $150,000 to $33,907 since the action in equity was started.

Federal Judge Ray to whom the reorganization plans have been submitted is expected to approve them within two weeks.

New York National Show to Be Held Week of Jan. 6

BUFFALO, July 13—The most important action taken at the meeting of the directors of the National Automobile Chamber of Commerce at the Buffalo Country Club yesterday was the decision to hold the annual New York show the week of Jan. 6.

Colonel Charles Clifton, president of the N. A. C. C., presided at the meeting. Reports received by General Manager Reeves show that sales of cars and trucks are holding up well all over the country but that something of a slowing-up can be expected soon. Much gratification was expressed over the extraordinary production record of 271,000 cars and trucks in June.

LONG DISTANCE BUSES

BOSTON, July 10—A new era in transportation in this section will be inaugurated when "The Mohawk" starts on the first of a series of trips through the Berkshires and over the Mohawk Trail to Albany, there to make connections with Hudson River steamers and the trains for Canada. It is owned and operated by George E. Master's, Inc. tourist agents.

This special job comprises a limousine built to order by the White Co. It will carry 15 passengers. The chassis has a 198 in. wheelbase with semi-elliptic springs, 41½ in. long in front and 60 in. rear. The engine is 50 horsepower. Dual wheels are on the rear to insure stability and prevent skidding, and large brake surface enables the car to be stopped quickly.

Sale of Pan-American Netted Receiver $17,425

DECATUR, ILL., July 11—Receipts of the Pan-American Motors Corp. auction sale amounted to $19,817, according to a detailed report filed in the circuit court by the receiver. The expense of the sale was slightly above $2,000, leaving $17,425 to be applied upon the dividend. The sale disposed of machinery, accessories, parts and other materials, which had been inventoried at $100,000, indicating a shrinkage of more than 80 per cent.

Roadster bodies brought $25, while a collection of nineteen taxicab bodies brought only $570 for the lot. Two sedan bodies went for $100. Wire wheels went for a song, 189 sets bringing as many dollars. One firm bought 66 sets of fenders for $147, while 330 tanks brought but $433. A collection of 344 springs went for $119.

The total was so far below expectations that the amount to be distributed among the stockholders will be very small.

Motor Bus Line Planned from Toronto to Buffalo

HAMILTON, ONT., July 11—Plans have been made by the United Lines, Ltd., for the inauguration of motor bus service from Toronto to Buffalo. This will be the longest bus line in the Dominion giving through single service over one connecting line.

Offices have been opened in the Landed Banking & Loan Building, and in addition to operating bus service, the corporation will establish truck lines to all outlying shipping centers in any way trading with this city. It is proposed to place approximately 50 freight trucks in operation first, to be run on a reliable daily schedule.

To Use Planes and Trucks for Mails, If Necessary

WASHINGTON, July 13—Postmaster General Work has had plans prepared under which the mails can be transported independently of the railroads if operations on the carriers are interrupted more seriously by the strike. Work says the department has available 70 airplanes in addition to 40,000 trucks which are in daily use throughout the country, and a surplus of 2000. Two thousand more trucks could be obtained from the War Department.

Highway Aid Given to Western States

Government Help Is Necessary in Order to Complete National Transport System

WASHINGTON, July 10—Additional Federal aid for construction of good roads in states thinly populated has been extended to ten states. Fifty per cent of the cost, not to exceed $16,500 per mile, is the maximum participation in all states except those containing unappropriated public lands in excess of 5 per cent of all lands in the states.

A survey made by the Bureau of Public Roads shows that this additional aid is necessary in order that construction of important trunk line highways, through thinly settled regions, may be constructed, giving the country a national highway transport system. The following are the ten states:

State	Percentage Payable by United States
Arizona	61.11
California	59.31
Colorado	56.12
Idaho	58.01
Montana	53.04
Nevada	87.22
New Mexico	61.50
Oregon	61.13
Utah	74.85
Wyoming	64.65

A total of 12,754 miles of Federal aid highway has been constructed since the inception of the Federal-states highway and highway transport program, the bureau announces.

Minnesota in Lead

Minnesota leads with 1109.7 miles of Federal-aid highways; Texas comes second with 1017 miles; Georgia, 697 miles; Illinois, 685 miles; Wisconsin, 673 miles, and Arkansas, Idaho, Montana, Ohio, Pennsylvania, and South Carolina, with approximately 400 miles.

Good roads construction is being pushed hardest in Nebraska, Illinois ranking second and Arkansas third. Of the states named, Nebraska has completed 93 per cent of her pro-rata of good roads, Illinois 84 per cent and Arkansas 69 per cent.

Federal aid road construction during the month of May was one of the largest in the history of the Bureau. During the month projects totaling 663 miles were completed and 541 miles went under construction.

IMPOSES DUTY ON COTTON

WASHINGTON, July 13—The Senate to-day adopted a paragraph in the cotton schedule which provides for a duty of 7 cents a pound on long staple cotton. The duty was imposed to protect the long staple cotton growers of Arizona and California. Senators from those states sought to have the duty increased to 15 cents a pound, but their proposals were overwhelmingly defeated.

Dutch Rubber Plan Helps Meet Problem

Economic Situation Regarded as Serious by American Manufacturers

NEW YORK, July 11—Advices from London say that the decision of Dutch producers of rubber to seek the intervention of the Government would appear to bring a little nearer a solution of the acute problem with which the entire industry is faced by the inability of consumptive demand to absorb the heavy surplus stocks of crude material.

At the conference of the International Association for Rubber Cultivation in the Netherlands East Indies at Amsterdam, proposed restriction of output with a view to restoring the industry to an economic basis was thoroughly discussed in all its hearings. In the result it was decided by 383 votes to 125 to invite government assistance, and a committee was appointed to open negotiations with the government and to study the best method of applying financial assistance, if granted.

Rubber Growers Divided

It has been well known for some time that the Dutch rubber growers were sharply divided upon the question of restriction of output, and because of this the Dutch Government maintained a neutral attitude, holding that it could give support only to agreements which had the full approval of both sides. In the meantime the economic position of the rubber industry has not improved.

On the contrary, it is more critical than ever, and is causing the larger manufacturers in America, who might be supposed to derive benefit from the present low price of crude rubber, to regard the situation with considerable misgiving.

Fear Demoralized Market

In a letter published during the week, President Carnahan of the International Rubber Co. of the United States writes that American consumers fear that the present advantage to them, as buyers of raw product, will have to be paid for later by a demoralized market and soaring prices. Consequently the larger men, he asserts, are strongly in favor of an effort being made to bring about price stability by restricting production on the lines proposed by the British Colonial Office committee. This outspoken declaration is looked upon as most important in London, because many producers have hitherto hesitated to support restriction on the ground that it might antagonize their best customer—America.

What particular plan will be adopted to ease the situation cannot at present be conjectured. The great and new factor is that the way has been paved to joint action by the British and Dutch governments, neither of which will be short of suggestions and plans put forward to help solve the difficulty.

The latest of these is a proposal by J. N. Burger, managing director of the Serbadjadi Rubber Co. and an opponent of any plan to restrict production. Burger's proposal is that producers and merchants should join to form a pool of 100,000 tons of crude rubber, which would be placed under the administration of the Rubber Growers Association, the rubber trade associations in New York and London, and the International Association of Rubber Cultivators in the Netherlands East Indies at The Hague.

If the market price of crude rubber should rise above 39 cents at the present rate of exchange per half kilo (i.e. 1.1 pounds), the managers would sell, say, 20 per cent of the pool, and so on in proportion. The pool, it is proposed, would be formed by holders delivering to the managers warrants for 35 per cent of their stocks and by producers delivering 35 per cent of unrealized rubber, or of a corresponding quantity out of coming production.

Tire Casing Shipments Show Gain During May

NEW YORK, July 10—Statistics of the rubber industry for the first five months of the year, as compared with the same period in 1921, follow

PNEUMATIC CASINGS

1921—	Inventory	Production	Shipments
Jan.	5,319,605	703,430	965,417
Feb.	5,193,018	819,892	1,973,756
March	4,597,163	1,163,314	1,614,651
April	4,527,445	1,651,418	1,785,951
May	4,451,668	2,100,917	2,085,882
1922—			
Jan.	4,174,000	2,055,000	1,597,000
Feb.	4,691,000	2,084,000	1,562,000
March	5,183,286	2,645,790	2,073,963
April	5,464,336	2,401,187	2,086,651
May	5,523,095	2,721,503	2,639,273

INNER TUBES

1921—	Inventory	Production	Shipments
Jan.	5,586,163	740,824	1,042,617
Feb.	5,415,164	916,627	1,129,881
March	5,044,861	1,246,483	1,643,630
April	4,916,772	1,762,122	1,983,571
May	4,751,380	2,210,040	2,342,567
1922—			
Jan.	5,247,000	2,313,000	1,890,000
Feb.	6,142,000	2,597,000	1,703,000
March	6,591,118	3,017,511	2,090,737
April	7,220,096	2,650,573	2,329,343
May	7,189,552	2,970,696	2,938,947

SOLID TIRES

1921—	Inventory	Production	Shipments
Jan.	303,753	21,220	29,116
Feb.	304,374	23,365	29,599
March	283,800	27,710	43,926
April	269,985	28,359	42,080
May	264,663	35,156	40,122
1922—			
Jan.	182,000	40,000	33,000
Feb.	183,000	39,000	37,000
March	182,197	49,433	48,350
April	173,748	46,664	52,309
May	170,504	57,640	60,711

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic work in factory and in transit to, or at warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

Would Unify System of Truck Transport

Consolidation of Private Delivery Service Into One Concern Proposed in Alabama

BIRMINGHAM, ALA., July 10—Motor transportation, conservation of individual operation transportation in Birmingham and nearby sections, spreading out as new roads are built and old ones improved, and providing a delivery system through operation of motor trucks by a single concern, promises to be a studied business in Birmingham.

Discussion of the problems of delivery before a meeting of business men called at the instance of Henry C. Goodman, transfer and warehouse man, brought out much valuable data concerning the possibilities of the proposed plan.

This plan, as proposed by Goodman, would have private trucks taken over by a general motor delivery concern at a fair allowance to the owners in return for service to be rendered. The private concerns would thereafter be relieved of the initial cost of the truck as well as the cost of upkeep.

A single large concern operating a delivery service for a large number of firms would be in position to have repairs made at a minimum cost and secure truck repair parts at minimum prices, he pointed out. He figured that a company operating on a large scale could save those making deliveries in the city and to nearby territory from 30 to 50 per cent of present cost of private truck operation.

Tells of Present Troubles

Sidney J. Bowie, who acted as chairman at the meeting, told of the difficulties of delivery by railroad, the several handlings necessary when shipments are made by rail, and the delays and costs incident to rail delivery. He pictured the progress in motor transportation as good roads are being provided, and declared that the future held great things in this line.

Railroads, he said, were getting most of their returns from long hauls, but had to meet the competition on short hauls. He said that Goodman had invited the assembly to the dinner for the purpose of discussing a system of delivery through established agencies instead of by the individual system.

Goodman, in going into details of the plan, cited instances where the system was being used. Merchants, manufacturers, wholesalers and jobbers were taking advantage of it, he said, because it offered a solution of the delivery problem.

FRANK L. MITCHELL DIES

NEW YORK, July 11—The death is announced at Monticello, Cal., of Frank L. Mitchell, founder and first president of the Mitchell Motor Car Co. He was 70 years old.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Last week call loans covered a range of 4 per cent to 5 per cent, as compared with 4 per cent to 5½ per cent in the preceding week. There was no essential change in the quotations for fixed date maturities. A range of 4 per cent to 4¼ per cent was covered for 60 and 90 days' and four months' maturities, and 4¼ per cent rules for five and six months, the same as in the preceding week. The prime commercial rate remained unchanged at 4 per cent.

Announcement was made July 7 of a reduction in the rediscount rate of the Federal Reserve Bank of San Francisco from 4½ to 4 per cent, effective July 8. Three institutions, New York, Boston and San Francisco, now maintain a 4 per cent rate.

The forward business on the books of the United States Steel Corp. as of June 30 totaled 5,635,531 tons, which is the largest amount since April of last year, and marks an increase of 381,303 tons over the amount reported on May 31. Inasmuch as shipments of steel during June were on approximately the same basis as in May, this gain in unfilled tonnage appears to be due almost entirely to new bookings. Despite the continued coal strike, the June pig iron production of 2,361,028 gross tons showed continued increase and compares with 2,306,679 tons for May and 1,064,833 for June, 1921.

The Government report as of June 25 estimates the cotton condition at 71.2 per cent of normal, as compared with a 69.6 per cent condition for the previous month, 69.2 per cent for June 25, 1921, and a ten-year average of 76.9 per cent. Based on this condition and the area in cultivation, the Department of Agriculture forecasts a yield of 151.9 pounds per acre, or a total production of 11,000,000 bales, as compared with an actual yield of 7,954,000 bales last year and 13,440,000 bales in 1920.

Although the obstacles to general business recovery have been increased by the railway labor troubles, no serious retardation has yet been noted. The June defaults, 1740 in number, marked the smallest monthly total since last October, and the June liabilities of approximately $38,000,000 are less than any other month since last September. For the second quarter of this year, 5867 defaults with liabilities of $156,000.000 were reported, as compared with 7517 defaults with liabilities of $218,000,000 for the first quarter.

DE BEAR STILL WITH MAXWELL

NEW YORK, July 11—Harry J. DeBear, whose term as president of the Maxwell Distributing Corp., the New York Maxwell-Chalmers branch, terminated with the purchase of the business by the Colt-Stewart Co. is retaining an executive connection with the general Maxwell-Chalmers organization.

The newly organized Colt-Stewart Co. has stepped into the Maxwell-Chalmers business in the New York territory with sales going forward at high speed. June was the largest month in the history of the territory, and July has started off with a large number of orders unfilled on both Chalmers and Maxwell cars.

FINANCIAL NOTES

Hayes Wheel Co. preliminary figures for the six months ended June 30 show net earnings, before taxes but after all expenses and charges including depreciation, in excess of $500,000. The earnings in June were substantially greater than those of the previous months in the present calendar year. Henry A. Rudkin of McClure, Jones & Reed, has been elected a director of the company.

Knox Tire & Rubber Co. property at Mt. Vernon, Ohio, which was bought by a group of stockholders has been fully paid for, the balance of $55,000 due on the purchase having been paid this week by the president of the new company, Judge Frank O. Levering, to Referee in Bankruptcy R. M. Greer. It is planned to place the plant in operation by Sept. 1.

Black & Decker Manufacturing Co. paid a dividend of 2 per cent on the preferred stock for the second quarter and at the same time paid a dividend of 2 per cent for the fourth quarter last year, which is the only dividend that the company had passed. Sales for the first six months of this year are reported to be nearly $1,000,000 gross.

B. F. Goodrich Co. are issuing $20,000,000 worth of the $25,000,000 6½ per cent bonds authorized by the stockholders July 24. The issue is primarily to redeem outstanding 7 per cent notes according to officials of the company and to extend the indebtedness for 25 years instead of the two years which the notes still have to run.

Reo Motor Car Co. announces that the present regular cash dividend of $1 per share on the old stock will also be paid on the new stock recently issued when a stock dividend of 100 per cent was declared.

Hupp Motor Car Corp. has declared a quarterly dividend of 2½ per cent on the common stock, payable Aug. 1 to stockholders of record July 15.

Allis-Chalmers Co. has declared the regular quarterly dividend of 1 per cent on the common stock payable August 15 to stock of record July 24.

Torbenson Axle Co. will redeem on July 15 the scrip issued to holders of the old preferred stock at the time of the recent reorganization.

Kelly-Springfield Tire Co. has declared a quarterly dividend of $2 a share on the 8 per cent preferred stock, payable Aug. 15, to stockholders of record Aug. 1.

PACKARD PROFITS, $317,959

DETROIT, July 13—Sales of the Packard Motor Car Co. for the third quarter of its fiscal year ending May 31, totaled 4305 vehicles and amounted to $11,226,958. Net profits from operations for the quarter were $317,959. Factory inventories were reduced from $9,527,575 to $6,144,289 and inventories at factory branches from $7,250,487 to $5,117,016. The company's holdings of cash and bonds amounted to over $15,800,000, an increase of $5,000,000 in the quarter.

Government Surveys Lighting Equipment

Plate and Tail Illumination Embraced in Work of Bureau of Standards

WASHINGTON, July 11—Because of the need of uniformity in illuminating registration plates on automobiles, the Bureau of Standards is investigating the proper illumination of these plates and the efficiency of the various forms of tail lights. The research by the government experts covers such points as color and position of tail lights on passenger cars and products. The Bureau is also engaged in work covering automobile headlights with the idea of aiding in the unification of state laws governing these appliances.

The bureau is co-operating with the National Safety Council as sponsors for a code of governing colors for street traffic signals.

It is also of interest to the automobile industry to know that the Bureau of Standards has completed its report on the results of tests of tires and tubes submitted by the Sub-Committee on Tires of the Federal Purchase Board. All government departments will base their purchases for the next fiscal year on the recommendations made in this report.

This government bureau has made considerable headway in investigating the reclamation of lubricating oils. Tests completed during the month show that, although an increase in the quantity of oil had been secured by a change in the process, it was done at the sacrifice of the quality. The last oil run out of the purifier contained too much sediment.

Canada Reports Gain in Exports for May

WASHINGTON, July 10—May automobile exports from Canada exceeded by 15.1 per cent those of the preceding month. Of the May exports the United States ranked seventeenth, with Australia, Great Britain, Argentina and South Africa ranking in their respective order.

The United States imports from Canada total seventeen passenger cars valued at $10,937; two trucks, valued at $1,000, and $3,250 worth of parts.

The Canadian May export figures show that a total of 2562 passenger cars were exported, valued at $1,498,276, an increase of 10.4 per cent in number and 10.3 per cent in value over April; 251 trucks, valued at $112,156, an increase of 160 per cent in number and 169 per cent in value; and $117,870 worth of parts exported, an increase of 16.8 per cent over the previous month.

Australia imported by far the largest number of Canadian automotive exports taking 1001 cars, valued at $464,083; 156 trucks valued at $69,186, and $65,608 worth of parts.

INDUSTRIAL NOTES

Lambert Tire & Rubber Co., Barberton, Ohio, producer of a patented cushion tire has announced that production is being doubled to meet increased demand. The company did not get into production until the middle of last year, although the present company purchased the plant at Barberton three years ago. Much of the increased business has come from foreign fields, according to Guy M. Collette, general manager. Sales in Mexico and England have shown great spurts during the past six months.

Robert H. Hassler, Inc., Indianapolis, manufacturer of shock absorbers, will build a new sales and service station in that city costing $75,000. The company recently exercised its option on the land upon which the building will be erected, having previously leased the property on a 99 year lease. At present there are 250 men employed at the factory. The May and June business of the corporation has kept pace with the large production of cars of the class that use shock absorbers of this type.

Clinton Tire Co., Clinton, Iowa, has secured a site for the erection of an automobile tire building and retreading plant to be in operation Jan. 1, 1923, according to Frank Gottstein of Des Moines. Associated with him in the concern is his son, Joseph. The plant will represent an investment of between $500,000 and $750,000 and will employ a force of from 150 to 200 workers. It will have a capacity of making and retreading 500 tires.

Firestone Steel Products Co. which manufactures rims and truck tire bases for the Firestone Tire & Rubber Co., has occupied a new single story brick and steel building in Akron more than 1/6 of a mile long and 250 feet wide. This, with a two story office building, gives the plant about five acres of floor space. The production capacity will be 20,000 rims and 4,000 solid truck tire bases daily.

Hendee Manufacturing Co. reports that its production in May approximated 1,100 motor cycles and side cars, the gross sales, including parts, amounting to $450,000. May was the best month the company enjoyed since the middle of 1921. Foreign business is reported as steadily increasing, the company having spent considerable money advertising in Great Britain.

Kansas City Tire & Rubber Corp., reorganized by the purchasers as the Rubber Manufacturing Corp., is again manufacturing tires and tubes. Approximately 200 persons are employed at the plant which consists of three buildings. Production averages 650 tires a day. P. E. Werner, an official of the company, is president.

Spicer Manufacturing Co. has put on two shifts at the Pottstown, Pa., plant. Three hundred men are employed and the number is being increased, while 1,400 are at work at the Plainfield factory. The July output will be 30,000 joints and the August production will be the same. In September the schedule calls for 60,000 joints.

General Top Co., the **Allwether Top and Body Co.** and the **Artcraft Top Co.** have been merged under the name of the **Artcraft Top Co.**, with offices and factory in Cleveland. Joseph Hayes has been elected president and general manager.

Nebraska Tire & Rubber Co. has increased its production of tires 500 per cent since 1920. The company reports that it is now producing tires at the rate of 1,000 daily, working three eight-hour shifts and employing about 225 men.

Monkey Grip Tire Patch Co., which has purchased the plant of the Texas Motor Car Association in Fort Worth is preparing to move from Oklahoma City. It is expected that the Fort Worth plant will be opened Sept. 1.

Hood Rubber Co. reports sales for the first five months of 1922 were $1,200,000 in excess of last year.

EMPLOYMENT 389 GREATER

DETROIT, July 10—Addition of 389 workers to the pay rolls of members of the Employers Association was reported last week. The total now is 181,360 as compared with 110,000 for the same week last year and 189,000 for the corresponding week of 1920.

Studebaker to Erect New Service Stations

CLEVELAND, July 10—The Studebaker Corp. of America will begin work at once on a new service station on East 25th Street near Payne Avenue, in this city, which will cost about $250,000. The building will be ready for occupancy about Oct. 1. The structure will be a model building of its type with 85,000 sq. ft. of floor space. It will be equipped with the most modern machinery and time-saving devices.

The floors will be connected with ramps in the center of the building, and all doors will be operated electrically. There will be a large reception room on the ground floor for the convenience of owners while waiting for minor repairs or adjustments. A separate department will be operated to prepare new cars for delivery to owners.

Building in Brooklyn

BROOKLYN, N. Y., July 11—Work has been started by the Studebaker Corp. of America on a new service station on property recently purchased at Bergen and Dean Streets. The cost of land and building will approximate $500,000. The building will be a model in all respects and will be ready for occupancy about Oct. 1.

Gasoline Consumption Broke Records in May

WASHINGTON, July 12 — Reflecting the tremendous increase in the use of motor vehicles during the late spring and early summer months, refinery statistics for May, as compiled by the Bureau of Mines, show that domestic consumption of gasoline is breaking all records. The May consumption figures are within 4,000,000 gallons of the August peak figures. It is expected that the June consumption figures will exceed the high mark of August of last year. Total gasoline consumption for May amounted to 499,242,343 gallons against a production of 513,658,966.

METAL MARKETS

Factors that make for an upward tendency in the steel market appear to be nicely balanced by those working in buyers' favor. Hence there is very little incentive to incisive changes in values in the immediate future. The effect of the coal strike is beginning to be felt more keenly by some of the smaller independents. Scarcity of efficient mill labor is more pronounced. There is talk of an increase in wage scales. Most of the mills catering to automotive consumers have a sufficient backlog of orders to carry them through to the end of August.

All of these influences furnish support to the strengthening of market conditions. They are offset, however, by a recession in fresh buying for deferred delivery and the general uncertainty that obscures the outlook. Seasonal easing off in demand as the year's last quarter approaches is a condition which even dyed-in-the-wool optimists can not overlook. All in all, it looks, therefore, as though, barring unforeseen developments, prevailing market levels would continue in effect over the remainder of the summer. It is fairly possible, however, that amid the dislocation of transportation conditions another premium market for spot deliveries will ensue and exert a certain influence on the major market. Steel producers fear that, what with the upset condition of the coal movement, the beginning of the grain shipping season will make so heavy demands on the supply of rolling stock that they will experience the greatest difficulties in keeping themselves supplied with raw materials and that the shipment of finished products will tax the resources of their traffic departments to the utmost.

The reduction in freight rates which went into effect at the beginning of this month has had no effect on the market. In the pig iron market rising prices have more than offset the saving to blast furnaces accruing from the diminished expense for the haulage of their raw materials. Steel warehouse men, especially those in the Detroit district, continue to enjoy almost unprecedented prosperity as the result of their foresight in stocking material which automotive consumers are urgently in need of, and which mills are unable to deliver within the brief space of time in which consumers want it.

Pig Iron.—Small lot buying by automotive foundries appears to be the rule. Prompt shipments of foundry iron in the Chicago market are held at $25.

Steel.—Although the $33 sheet bar price of the chief interest is largely nominal as it is extended to regular customers only, it serves to keep the general market at $35 when a few weeks ago this price level threatened to give way to a higher figure. Makers of cold-drawn steel bars are now working on merchant steel bars that cost them from 1.60 to 1.70¢, so that they are quoting 2.10¢ as a minimum for their product. So far the price for cold-rolled strips has not been affected by the $2 per ton advance in hot-rolled, the quotation for the former remaining at 4¢. Conditions in the sheet market are unchanged. Isolated sales of full-finished sheets at a premium of $7 over the chief interest's price are heard of. Further advances in bolts and nuts are predicted.

Aluminum. — The market has turned dull with prices unaltered.

Copper.—Labor shortage tends to keep fresh output down. Consuming demand, however, is light.

Calendar

SHOWS

Aug. 4-13—Chicago, Aircraft Exhibition and Aeronautical Congress.

Aug. 26-Sept. 1—Toronto, Ont., National Automobile Show held in conjunction with the Canadian National Exhibition.

Sept. 4-9—Indianapolis, Automobile and Accessory Show in conjunction with the Indiana State Fair, Auto Show Building, under the auspices of the Indianapolis Automobile Trade Association, J. B. Orman, manager.

Sept. 23-30—New York, Closed Car Show, Grand Central Palace.

Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

January—Chicago, Annual Automobile Salon.

Jan. 6-13—New York, National Automobile Show, under auspices of National Automobile Chamber of Commerce.

FOREIGN SHOWS

March 10-July 31—Tokio, Japan, Peace Exhibition.

July 1-24—London (Olympia), Aircraft Exhibition.

Sept. 1922 — Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Associação Automobilista Brazileria.

Sept. 15-20—The Hague, Automobile Show.

Sept. 25-Oct. 3—Berlin, Automobile Show at the Kaiser-Damm Hall under the auspices of the German Automobile Manufacturers Association.

September — Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.

Oct. 4-15 — Paris, Automobile Show, Grand Palais.

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 10 - Dec. 19 — Brussels, Automobile Show, Palais de la Cinquantenaire.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show, British Cycle Motors, The Tower, Warwick Road, Coventry.

November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

CONVENTIONS

July 17 — Baltimore, meeting, representatives of highway departments of ten Eastern states.

August 28-Sept. 2 — Detroit National Safety Congress.

Sept. 18-23, 1922 — Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

Sept. 13, 14, 15—Buffalo, Lafayette Hotel, Annual credit meeting, Motor and Accessory Manufacturers Ass'n.

Chicago Experiences Slowing Up of Sales

No Indication of Slump, However —Dealers Dispose of Used Car Stocks

CHICAGO, July 10—Although the first few days of July showed a slight slowing up of retail automobile sales in Chicago, there is no indication of a slump. Some dealers have not yet caught up with deliveries which they were unable to make last month. Others have availed themselves of the good selling season to dispose of stocks of used cars, some having sold all used cars in stock and advertised in the newspapers for more.

An analysis of sales made in Chicago and Cook county on the time payment plan, constituting probably 65 to 70 per cent of the total sales, indicates that the high point of the season was reached here in the week ending May 27, when 1261 time payment sales were recorded. The next highest week was that ending June 10, when 1248 such sales were recorded. The record since that time has been: Week ending June 17, 1197; June 24, 908; July 1, 927.

More Time Sales Reported

In the four weeks ending July 1 a total of 4280 time sales was recorded, compared with a total of 4275 in the four weeks ending June 3. This indicates that May and June were practically equal as sales months, with June having a slight lead. There is no expectation among dealers that July will reach the May and June level, but on the other hand the opinion is general that the decline will be slight.

The dealers affiliated with the Chicago Automobile Trade Association are preparing for an elaborate showing of cars at the annual Chicago Pageant of Progress on the Municipal Pier July 29 to Aug. 14. They have taken a display section more than twice the size of that taken by any other industry and are counting upon this show to give a decided stimulus to late summer and early fall buying. It is believed that nearly every resident of Chicago and thousands from surrounding territory will attend this exposition, and the dealers figure that it is the best opportunity of the year to have their goods seen by the maximum number of prospective customers.

New York Sales' Decline Merely Seasonal Feature

NEW YORK, July 13—A canvass of passenger car sales agencies in the metropolitan district indicates that the falling off in business since July 1 is nothing more than a normal seasonal decline. A number of the popular makes are still going strong, with dealers remaining behind on deliveries, and reasonably frequent sales are being made by representatives of lines less in demand.

Registration officials report listings of new cars for the first half of the month only slightly less active than in June. Many of these registrations are of delayed deliveries on June orders. The June registrations for the metropolitan area have not yet been compiled, but a survey of the work indicates that the total will equal and is likely to exceed May, which was the heaviest month in several years.

German Reports Show Decline in Exports

WASHINGTON, July 12—The March exports of automotive products from Germany totaled 972 cars, being an increase of 288 over the automotive exports for February, which numbered 684. The April exports totaled 493 passenger cars and 271 trucks, representing a slight decrease over the previous month.

The Automotive Division of the Department of Commerce has been advised that, according to German official statistics for the first quarter of 1922, 226 passenger cars were imported, two of which came from the United States.

Men Employed Show Plants at Top Speed

Shortage of Skilled Labor Continues to Be Problem at All Plants

WASHINGTON, July 10 — Figures compiled by the Department of Labor in an industrial employment survey under the auspices of the United States Employment Service shows that the automobile industry is running at top speed. Overtime is the rule in most plants in the Detroit area and similar conditions are reported in other automobile manufacturing centers. Practically all automobile manufacturers report a shortage of skilled workers.

Statistics of employment for June show an increase of 6.5 per cent in the automobile industry over the preceding month.

Agents of the employment service at Detroit declare that the factories are bidding for skilled and unskilled labor. A call for 400 jobs sent out in one day received no applicants. About 3000 men have been added to payrolls every week for the past five months.

In Flint, Mich., there was a shortage of workers, particularly tool makers, body builders, sheet metal workers and body finishers.

In Lansing and Muskegon, Mich., all plants are working full time with a shortage of skilled laborers. There is also a shortage of skilled workers in the automobile industry in Wisconsin and Ohio. In Dayton automotive and pump companies report inadequate supply of laborers.

BIG JORDAN QUARTER

CLEVELAND, July 13—Notwithstanding price reductions, the volume of business done by the Jordan Motor Car Co. in the second quarter of 1922 exceeded the volume in the same period last year of 41 per cent. Production was 69 per cent larger than in the second quarter of 1921.

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Freight Blockade Will Delay Industrial Recovery

Shop men's walk-out is putting much railroad equipment in cripple class. All available rolling stock will be needed to move coal and crops when strike is ended and harvests begin. Probable blockade may have a considerable bearing on motor vehicle production.

By James Dalton

THREE-QUARTERS of a million motor vehicles produced in three consecutive months of 1922! At the beginning of the year anyone with the temerity to predict such an astounding total for the second quarter would have been classed, without hesitation and without argument, as a lunatic.

But production figures don't lie. They stand before us in proud array:

April	219,448
May	256,302
June	271,022
Total	746,772

How long this quarter mark will stand remains to be seen, but it probably will be something to shoot at for some time to come. It runs far beyond what has become affectionately known as "the peak" of 1920, which has been so frequently referred to in tones of awe for two years. The total for the first half of 1922 is 1,140,000. Production for the last half of 1921 was 858,000. If the factories do as well in the next six months the year's output will reach 1,998,000 and 1922 will become a "two million car year."

PRODUCTION of passenger cars and trucks in the second quarter of 1922 reached approximately 750,000, shattering all records.

If the pace of the last half of 1921 is maintained for the rest of 1922 it will make this a "two million car" year.

The apparently insatiable demand for motor cars indicates that it would not be difficult to equal or exceed last year's output for the last six months, but there is one obstacle in the way.

That obstacle is an almost inevitable and probably unprecedented freight congestion when the miners' strike ends and the movement of coal begins practically coincidentally with the grain harvests.

An extraordinarily large amount of rolling stock is in bad order.

This situation cannot fail to have an effect on the automotive industry, but it will be peculiarly fortunate because it sells transportation.

The biggest year on record was 1920 with a total of 2,205,197 cars and trucks. The next best was 1919 with 1,974,016 and the third, 1917, with 1,868,947. The fourth best year on record was 1921, when business was almost universally characterized as "rotten," with a total of 1,668,550.

Were it not for one factor which is almost certain to complicate the situation seriously, it would be perfectly safe to predict that

sales for the last half would equal those of the final six months of 1921. If it doesn't reach that total it won't be due to lack of demand for there seems to be an insatiable thirst for cars.

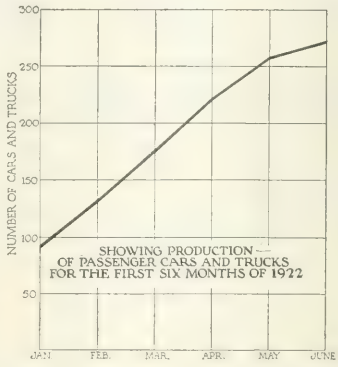
The complicating factor, strangely enough, is transportation.

Within the next three months it is practically certain there will be almost unprecedented freight congestion on the railroads. It is difficult to see how it can be averted, even if the miners strike and the shop crafts strike are settled immediately.

As soon as mining is resumed, it will be necessary to divert all available rolling stock to the shipment of coal if suffering is to be averted the coming winter in the northwest and other sections remote from the coal fields. Much of the winter reserve should have been accumulated before now, but on the contrary such stocks as have been on hand have been depleted.

Boats on the lakes which should be heading for Duluth and other ports, loaded with coal, are going back empty. This lake fleet usually relieves the railroads of much of the coal-carrying burden, but water shipments this year will, of necessity, be much smaller than usual.

If there is a resumption of work in the coal fields almost at once, as now seems probable, little progress will have been made in the laborious process of building up reserves before the railroads will be called upon to move the huge harvests in the great grain-growing belt. This is another emergency situation which has to be met each year by the diversion from other purposes of a large amount of rolling stock. It is significant that automobile cars serve admirably for the shipment of grain.



SHOWING PRODUCTION OF PASSENGER CARS AND TRUCKS FOR THE FIRST SIX MONTHS OF 1922

The coal strike alone has been serious enough, although the public generally does not seem fully to have understood its potentialities, but it has been complicated by the walkout of workers in the railroad shops. Few persons believed that in less than two weeks such a strike could cripple the railroads so seriously. Movement of freight trains has been slowed up materially, many passenger trains have been taken off and numerous mail trains cancelled.

While none of the men who actually operate trains have been involved, the strike has played havoc with rolling stock and the number of locomotives and cars reported in bad order has mounted alarmingly. Evidently the public did not realize, before the strike began, how close to the cushion the railroads were playing in the way of rolling stock. The number of new engines and cars ordered by the carriers in the two years up to the beginning of 1922 was pitifully small. That on hand has been subjected to a very severe strain and repairs made were in many cases of an emergency nature. The consequence has been that neither cars nor locomotives have stood up under heavy traffic as they would have done under normal conditions. Rolling stock ordered cannot be delivered soon enough to ease the situation.

Even before the strike began nearly 15 per cent of the freight cars of the country were in bad order and 25 per cent of the locomotives. No one knows how many have been added to the list of cripples as the result of the strike, but it is certain the number is very large.

It is easy to see, therefore, what will happen when coal production is resumed and it becomes necessary to move the grain crops. The railroads, handicapped by an extraordinary amount of broken down rolling stock, will have their hands full to handle these commodities alone.

The coal strike began April 1 and shippers have had comparatively little difficulty since that time in getting cars to carry their freight, BUT—

If the normal amount of coal were being shipped there undoubtedly would be freight congestion at this moment, even without the shop men's strike. If coal were moving in the usual volume, the railroads would be having an almost unprecedented volume of business for this period of the year.

It is significant that freight car loadings for the week ended July 1 were 876,896 compared with 776,079 for the corresponding week of 1921 and only 891,621 for the same week in 1920 when it was difficult to make shipments either of raw materials or finished products. The largest number of cars loaded in any week of 1921 was 962,292 in the week ended Oct. 22. The record for 1920 was established the week of Oct. 15 with 1,018,539. There were only five weeks in 1921 which exceeded the record of July 1.

It is also significant, under the present circumstances, that freight car loadings always are at their peak in August, September and October. The fact is of peculiar importance this year because the volume of miscellaneous freight, which usually contracts in midsummer when coal and grain shipments are heaviest, promises to expand steadily this year. The peak for the year was reached the middle of June and if reports are reliable the production of industry generally has increased each week since then, except that which included the July 4 holidays.

Experts who have watched the situation closely declare that industry and trade as a whole will continue to make progress throughout the year. That prediction obviously is based on the assumption that there will be no serious complications. It will be the duty of the carriers to give the right of way to coal and crops. If they do that and there is a shortage of rolling stock, it is difficult to see how a glut of miscellaneous freight can be avoided.

If freight backs up, production and distribution must slow down.

Such a prospect is not pleasant to contemplate when the country is recovering so rapidly from a long period of depression and deflation, but it seems to be one of the inevitable consequences of the strife between capital and labor.

Settlement of the coal strike, by government intervention or otherwise, has been too long delayed.

The shopmen's strike ought never to have started. The stiff necked attitude of the railroad executives in connection with proposals for a settlement will not strengthen their cause with the public. The railroads have had many problems for several years and they have not prospered, but their skirts are not clean and it ill behooves them to assume a "holier than thou" attitude at this juncture, especially if it means the relapse of business when it is just recovering after a long illness.

Regardless of the merits of the controversy, it is difficult to see the justice of the carriers' contention that their employees must obey to the letter the mandates of the Railroad Labor Board when a wage reduction is involved, when the carriers question the validity of the board's ruling when the interests of the railroads are concerned.

If there is acute traffic congestion in the third quarter, the automotive industry will be peculiarly fortunate, for it deals in transportation. Its finished products can be delivered overland without great difficulty except when the destination is remote. It also is better off than many other industries in relation to supplies of raw materials. It functioned with a surprising degree of efficiency when the railroads practically collapsed in 1920 because of the shortage of rolling stock, and it can do it again, although it will mean an increase in manufacturing costs at a time when profits are none too large.

Such a condition, if it continues long, will be an eventual boon to the truck branch of the industry, which is laboring heroically to come back. The truck makers are better off than their passenger car brothers in respect to inventories if they encounter trouble in getting in new supplies. Most of them have not yet worked off entirely the stocks they had on hand when the depression hit them.

Passenger car makers have been wise indeed in not accumulating inventories beyond their immediate needs in a period of uncertainty, but this foresight is likely to slow up their production when freight congestion comes.

Slowing up of production in the third quarter will not be an unmitigated evil, as a matter of fact. Dealers in various sections, especially in the industrial and mercantile centers, are beginning to worry again about the used car problem and if there were to be a smaller supply of new cars available for a time it would give them a breathing spell to get rid of their used stocks.

With sales slackening somewhat in the urban centers, however, there are increasing indications that the farm business is just getting under way, especially for those lines in the $1000 class.

What Became of the War Department's Cars and Trucks

MANY concerns and individuals have been interested to learn what finally became of the passenger cars and trucks which were turned over to the Agricultural Department by the War Department for delivery to the various State highway departments, following the war. The answer to this question is given in the appended table, which shows the number of cars and trucks delivered to each State. The materials delivered to the various States included, in addition to the automotive equipment, hardware, a few rolling machines, numerous concrete mixers and a few rock crushers.

The total number of each make of truck and car delivered is as follows: International, 432; Gramm-Bernstein, 128; Nash, 7155; Heavy Aviation, 1353; Federal, 455; Pierce-Arrow, 1900; Velie, 277; Light Aviation, 600; Hurlburt, 122; Packard, 2299; White, 585; Peerless, 682; F.W.D., 3067; Wilson, 76; Standard, 307; Standard Class B, 2508; Garford, 179; Kelly-Springfield, 972; Republic, 190; Mack, 102; Denby, 103; G. M. C., 406; Commerce, 72; Moreland, 164; Selden, 129; Riker, 291; Miscellaneous, 198; Ford, 2739; Dodge, 1118; Miscellaneous, 716.

The number of cars delivered is as follows:

Table Showing How Surplus War Material Was Distributed to the Highway Departments of the Various States

State	Per Cent	Estimated Total Cost of Material Delivered	Total Number of Trucks	Total Number of Cars
Alabama	2.12	$2,352,057	430	104
Arizona	1.44	2,436,823	326	30
Arkansas	1.72	2,376,257	372	76
California	3.37	4,463,012	775	133
Colorado	1.83	3,189,530	487	60
Connecticut	0.66	776,426	151	26
Delaware	0.50	419,263	45	14
Florida	1.21	2,126,165	287	73
Georgia	2.73	4,244,778	630	139
Idaho	1.28	1,563,328	298	37
Illinois	4.44	6,314,468	1,006	188
Indiana	2.68	5,067,439	677	125
Iowa	2.88	3,627,527	738	126
Kansas	2.87	3,819,984	727	99
Kentucky	1.94	2,415,469	475	101
Louisiana	1.36	2,001,044	343	59
Maine	0.95	1,129,080	206	42
Maryland	0.88	1,674,163	271	40
Massachusetts	1.50	1,286,304	207	76
Michigan	3.[illegible]	6,033,424	786	140
Minnesota	2.90	3,384,433	621	97
Mississippi	1.77	2,994,715	422	86
Missouri	3.35	4,448,381	919	115
Montana	2.12	2,291,787	408	64
Nebraska	2.16	3,210,623	456	86
Nevada	1.[illegible]	1,314,817	249	[illegible]
New Hampshire	0.50	532,853	122	17
New Jersey	1.29	2,128,139	369	98
New Mexico	1.63	2,148,374	369	50
New York	5.05	7,874,065	1,384	195
North Carolina	2.34	3,777,655	737	114
North Dakota	1.59	1,621,603	344	49
Ohio	3.86	5,372,866	1,000	176
Oklahoma	2.40	2,692,467	548	80
Oregon	1.62	2,058,265	363	47
Pennsylvania	4.65	4,528,909	834	167
Rhode Island	0.50	336,770	61	17
South Carolina	1.45	1,964,464	355	58
South Dakota	1.65	2,904,169	431	69
Tennessee	2.25	3,933,101	538	116
Texas	6.05	7,855,378	1,365	205
Utah	1.16	1,439,278	274	23
Vermont	0.50	748,818	126	23
Virginia	1.99	3,270,993	454	103
Washington	1.51	1,478,738	316	14
West Virginia	1.10	3,251,135	370	37
Wisconsin	2.59	3,735,374	604	153
Wyoming	1.28	1,133,277	236	28
	100.0	$139,752,988	23,506	4,037
Retained by Dept. of Agriculture		10,473,750	1,246	536
		*$150,226,738	24,752	4,573

*The value of the materials above listed is exclusive of the material delivered to the states from the surplus at Camp Grant, Rockford, Ill.

Revised World Registration Figures Show Increased Total

Principal differences recorded are in Australia, Hawaii, and Dutch East Indies. Returns from some countries not before included are now given. Revised total exceeds former estimate by about 61,000, but all figures given are not as of Jan. 1st, 1922.

By David Beecroft

SINCE the world statistics of motor vehicles were published in the Statistical Issue of AUTOMOTIVE INDUSTRIES, Feb. 16, 1922, many belated returns have been received from countries from which information could not be obtained after a campaign of nine months, but they alter the world total of motor vehicles, given at that time, by about 61,000.

The supplemental returns generally show an increase, however. In Australia, for example, the revised figures give a total of 89,191 as compared with 73,900 published. Another increase is in Hawaii with 15,000 vehicles as compared with 1,500. On the other hand some later figures tended to reduce the totals of last February, a conspicuous example being the Dutch East Indies where different authorities place the total at 25,000 instead of 45,000 originally given.

Figures have been obtained from many countries where no figures were available previously, such as Persia, with 812; Chosen, 400; Island of Martinique, 884; British East Africa, 1,650; Belgian Congo, 200; Libia, 700; Greece, 3,000; Serbia, 1,500, and Finland 2,000.

The revised total world registration, as shown by the accompanying table, is 12,649,793 cars and trucks.

North and South America

ALASKA at the end of 1921 had approximately 637 motor vehicles, of which 150 were trucks. In use in the following cities were:

City	Cars	Trucks
Juneau	109	53
Ketchikan	85	50
Fairbanks	150	30
Anchorage	40	20

According to the Department of Commerce, 100 additional motor vehicles were in use in other parts of the country. During 1921, seventy cars and fifteen trucks were shipped to Alaska.

The British island of Jamaica, according to latest figures from the American Consul, has 1,876 cars and 259 trucks. It is estimated that the cars are 95 per cent. of American manufacture. Of the 259 motor trucks seventeen are of British manufacture and the remainder American. There are sixty motorcycles on the island, of which twenty are equipped with side cars. Approximately 75 per cent. of these are of American manufacture.

The Republic of Argentina was credited in the previous census with a total of 75,000 automotive vehicles, this estimate being of the latter part of 1921. This registration, however, is increased to 85,000 by M. T. Meadows, manager of the Chamber of Commerce of the United States in the Argentine Republic, writing from Buenos Aires under date of June 14. This increase of 10,000 was made possible largely because of the heavy sales of Ford cars and trucks from the assembly plant maintained in the Argentine capital. During the 1921-22 sales season, this output averaged well above 1,000 monthly and, at the peak, reached a total of about 1,500 cars. Furthermore, shipments from Canadian plants of American manufacturers were heavy to Argentina during the last seven or eight months. Mr. Meadows gives 16,000 as the number of automotive vehicles in the city of Buenos Aires, a gain of about 2,000 since Jan. 1, 1922. This estimate is in line with previous calculations that about four-fifths of the automobiles in Argentina are owned outside of the cities.

Chilean Figures Increased

There were approximately 12,500 motor vehicles in Chile on Jan. 1, 1922, as compared with 10,000 previously reported. During the past three years the number of automobiles in Chile has increased 20 per cent. The numbers in use in some of the leading cities are:

Santiago	3,906	Iquique	107
Vina del Mar	718	Temuco	91
Valparaiso	690	Curico	86
Punta Arenas	495	Talca	84
Concepcion	383	Valdivia	67
Antofagasta	375		

OUR registration of 10,000 in Uruguay has been increased to 12,000. In the capital, Montevideo, there were registered in April, 1922, 5042 vehicles. There are approximately 450 trucks in Uruguay.

The Fiat company has given the following figures as to the number of motor vehicles in French Guiana and Dutch Guiana in South America and the three small islands known as the Dutch West Indies:

Dutch West Indies	200
Dutch Guiana	100
French Guiana	100

The French Island of Martinique, remembered for its earthquakes of years ago, has 884 cars and trucks. Its motor statistics are:

Cars	755
Trucks	129
Motorcycles	25

During 1920 there were sold 136 cars and in the first ten months of last year thirty-two. Farm tractors are not used.

There is considerable discrepancy as to the number of motor vehicles in Greece, Fiat placing the number at 3,000 and the American Consul at 1,986.

Jugoslavia also offers a conflict of figures, the Department of Commerce giving 3,000 and Fiat 1,866.

Serbia, on which there was no previous information, has 1,500.

Sweden has 20,000 motor cars and 5,000 trucks, a total of 25,000. To this may be added 17,542 motorcycles. This information has been furnished by Capt. Neren of Stockholm and corroborated by the figures of the Fiat company of Italy.

Motor vehicles have been practically barred from Iceland since April 1, 1921, the government having raised a prohibition against their importation.

Esthonia and Lithuania, two of the new Baltic countries bordering on Russia, have motor vehicles as follows:

	Cars	Trucks
Esthonia	1060	320
Lithuania	1800	405

Of the total of 1,380 in Esthonia, 726 are in Reval, the capital.

Finland in its total of 2,000 motor vehicles has 1,450 cars and 550 trucks. To this could be added 960 motorcycles, 135 taxicabs and four motorbuses. The capital, Helsingfors, has approximately half the cars and trucks, and all of the taxicabs and motorbuses.

Albania, located across the Adriatic Sea from the heel of Italy and with Durazzo as capital, is credited with 250 vehicles.

The island of Cyprus in the eastern end of the Mediterranean Sea has 200.

The British island of Malta in the Mediterranean Sea has 350 vehicles.

Asia and Oceania

THE Federated Malay States, with Singapore as capital, in which we recorded 8000 motor cars, according to the Fiat company has 11,000 cars, of which 4500 are in Singapore.

One of the biggest errors was in connection with the motor cars in the Dutch East Indies composed of the islands of Java, Sumatra, Celebes, and smaller ones. These islands have a motor population of 25,000, and not 45,000 as previously published. The figure of 25,000 has been corroborated from several sources.

Persia, a country on which no information was available, according to the American Consul at Teheran, has 812 motor vehicles. Previous to 1920 there were perhaps not over forty motor vehicles in private use but the withdrawal of the British military authorities at that time left large numbers of them at various points throughout the country. During the past year there were auctions of these vehicles and even today the number of Fords and other cars is not definitely known. Of the 812 vehicles listed, 283 are in Teheran and 406 are registered in Kazvin and Kermanshah. There are 123 others registered in six of the other towns of the country.

CHOSEN, known formerly as Korea, is a rich agricultural country with 16,000,000 population and an area larger than North Dakota, but there are not over 400 cars in this territory. The country has 1,135 miles of railroad, and Seoul, the capital, is a city of 250,000. Japan has spent $80,000,000 in building railroads and a program of highway building with modern bridges is under way.

Australian Figures Changed

Australia, on Dec. 31, 1921, had a total of 89,191 cars and trucks, according to figures issued by the Motor Traders Association of New South Wales. To this could be added 47,906 motorcycles. These are divided among the six provinces of the Commonwealth, as follows:

	Cars and Trucks	Motorcycles
New South Wales	32,189	13,305
Victoria	23,100	14,327
Queensland	13,446	7,728
South Australia	13,634	9,740
West Australia	4,040	850
Tasmania	2,782	1,956
Total	89,191	47,906

During 1921 there were imported into Australia 9,507 chassis.

Ownership of Cars and Trucks by Countries

Abyssinia	20	Egypt	5,084	New Foundland	600
Alaska	637	Esthonia	1,380	New Zealand	37,500
Albania	250	Federated Malay States	11,000	Nicaragua	370
Algeria	12,000	Finland	2,000	Nigeria	2 000
Angola	250	France	236,146	Norway	14,340
Argentina	85,000	French Guiana	100	Panama	1,950
Australia	89,191	French Togoland	66	Paraguay	500
Austria	16,350	French West Africa	230	Peru	3,343
Azores	80	French Equatorial Africa	230	Persia	812
Bahama	150	Germany	91,384	Philippine Islands	12,381
Barbados	1,000	Former German Southwest Africa	203	Poland	10,700
Belgian Congo	200	Gold Coast	3,500	Porto Rico	6,500
Belgium	33,200	Great Britain	497,582	Portugal	5,000
Bolivia	300	Greece	3,000	Portuguese East Africa	400
Brazil	25,000	Guadeloupe	500	Reunion Island	35
British Guiana	1,950	Guatemala	500	Roumania	8,500
British Honduras	68	Hawaii	15,000	Russia	35,000
British East Africa	1,650	Holland	13,500	Salvador	400
British West Africa	566	Honduras	200	Serbia	1 500
Canada	463,448	India	45,983	Senegal	127
Canary Islands	1,200	Indo China	2,300	Siam	2,187
Ceylon	5,350	Italian Somaliland	66	Spain	37,560
Czechoslovakia	4,133	Italy	53,000	Sweden	25,000
Chile	12,500	Jamaica	2,135	Switzerland	18,011
China	8,150	Japan	12,260	Trinidad	2,221
Chosen	400	Jugoslavia	3,000	Tunis	1,990
Colombia	2,000	Libia	700	Turkey	5,500
Costa Rica	200	Lithuania	2,205	Union of South Africa	26,468
Cuba	20 000	Madagascar	500	United States	10,505,660
Cyprus	200	Malta	350	Upper Senegal	23
Denmark	22,260	Madeira Island	131	Uruguay	[illegible]
Dominican Republic	1,800	Martinique	884	Venezuela	[illegible]
Dutch East Indies	25,000	Mauritius Island	1,600	Zanzibar Island	90
Dutch West Indies	200	Mexico	25,000		
Dutch Guiana	100	Monrovia	[illegible]		
Ecuador	500	Morocco	2,500		

The total figures for Australia are in excess of 73,900, published in the statistical issue, which were not as of the close of last year.

The previous estimate of 1,500 motor vehicles in Hawaii was wide of the mark, although the information came from what appeared to be a reliable source. However, on Dec. 31, 1920, there were 7,117 cars in Honolulu, and the Pond Co., Ltd., estimates that on the three remaining Islands of Maui, Kauai, and Hawaii, there are practically as many more, making an estimated total of 15,000.

NEW ZEALAND has between 4000 and 5000 motor trucks registered, according to J. J. Cousins, general secretary of the New Zealand Motor Trade Association, and consequently the February figure of 2500 trucks for the country was too low.

African Registration

No figures were available in February from British East Africa, but since this information from three different sources, all in practical agreement, gives some valuable facts. The Royal East African Automobile Association gives the following figures which are practically the same as those furnished by the American Consul for the country:

Cars	1500
Trucks	150
Motorcycles	1500
Tractors	98

These figures are as of Dec. 31, 1921, and are estimated to be within 2 per cent. of being correct. Of these vehicles 84 per cent. are owned by Europeans, and 16 per cent by natives. Practically 90 per cent of the automobile owners in British East Africa are members of the Royal East African Automobile Association which is doing excellent work in the construction and maintenance of good roads. British East Africa is comprised of four provinces, Kenya, Uganda, Zanzibar and Tanganyika.

Libia, one of the largest countries, except Egypt, bordering on the southern shore of the Mediterranean, according to the Fiat company, has 700 motor vehicles.

Abyssinia is a poor market for motor vehicles owing to primitive conditions and Fiat estimates that there are not more than twenty motor vehicles in the country, most of which are trucks.

The Belgian Congo has 200 motor vehicles.

The territory formerly known as German Southwest Africa, and which is now mandatory to the Union of South Africa, according to the National Bank of South Africa, has the following vehicles:

Motor cars	194
Motor trucks	9
Motorcycles	36

The numerous countries along the west coast of Africa, some of which constitute what is known as French West Africa and others which are British possessions are not large absorbers of motor vehicles. Recent figures show that the three French possessions have:

Senegal	127
Upper Senegal	23
French Equatorial Africa	230

The British territory of Nigeria which was reported in February to have 441 has many more vehicles, as the importations in 1919, 1920 and 1921 totaled 1,585. Perhaps 2,000 would approximate the total in this territory.

Recent figures show that in 1920 there were imported into the Gold Coast, a British possession, 2,040 vehicles.

THE figures for the French Island of Madagascar, as of July, 1921, were 500 cars and trucks, most of these being of French manufacture, according to P. J. Stevenson, United States trade commissioner at Johannesburg.

The small Island of Zanzibar, off the East Coast, in March, 1920, had ninety cars.

In French Togoland there are sixty-six vehicles, over two-thirds of which are American cars.

The Madeira island on the West Coast of Northern Africa has 204 motor vehicles registered, of which 204 are in actual service. These are divided as follows:

Private passenger cars	60
Private cars for hire	44
Motor trucks	27
Motorcycles	22
Motorcycles (side cars)	49
Tricycles	2

According to American Consul Stillman W. Eells, motorcycles are largely of American manufacture.

At present there are 1,200 motor vehicles in the Canary Islands, located off the coast of Northwestern Africa.

Tunis, a country in Northern Africa the size of Wisconsin, and bordering on the Mediterranean, has increased its number of motor vehicles approximately 17 per cent in the last year. The figures for June 1, 1922, were 2280 cars and trucks, made up of 2047 cars and 233 trucks. There the 321 motorcycles.

Canadian Automobile Imports

IN the House of Commons, Hon. Mr. Bureau gave the following details of the number of automobiles imported into Canada, their value and the amount of customs collected during each of the last five years:

Automobiles, Passenger

Fiscal Year	Number	Value	Duty Collected
1918	16,118	$11,317,245	$3.961,035
1919	6,473	5,326,510	1,864,278
1920	10,805	11,204,461	3,920,544
1921	5,907	8,399,537	2,936,004
1922	7,181	9,501,362	3,278,258
Trucks			
1918	964	$1,275,179	$446,312
1919	1,744	2,274,748	794,745
1920	2,274	3,831,084	1,338,386
1921	1,706	3,578,938	1,240,452
1922	806	1,537,765	533,541

Parts

Fiscal Year	Value	Duty Collected
1918	$6,671,419	$2,050,973
1919	6,660,770	2,095,035
1920	12,674,823	3,966,277
1921	11,760,367	3,642,198
1922	10,211,791	3,053,875

The fiscal years given in the above table run from March to March.

IN French Guiana, South America, there is an air service which has competition only from native canoes. Going inland, against the flow of the rivers, the canoes ocupy from 15 to 20 days for a journey which can be made by aircraft in two hours.

122 cu. in. Grand Prix Engines Better Last Year's 183 in. Record

Felix Nazzaro averages 79.3 m.p.h. in the winning two-litre Fiat. Engine of winning car develops 90 h.p. at 5,000 r.p.m. Not a single blowout but many mechanical troubles occur in 500-mile race. Knight-engined Voisin wins race for four-passenger cars.

By W. F. Bradley

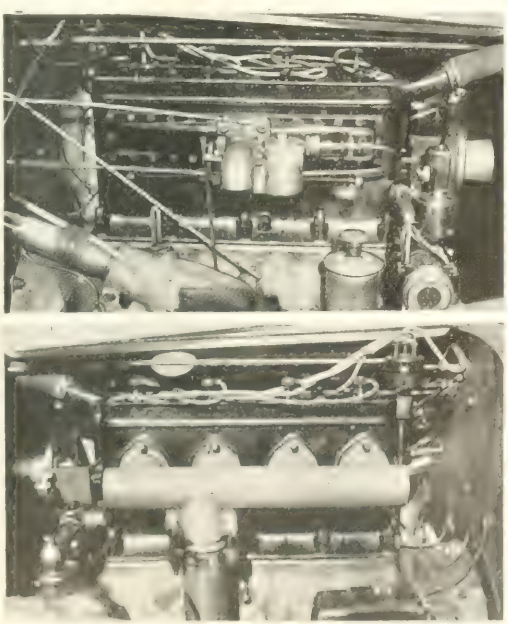
STRASBOURG, FRANCE, July 15—The 2-litre (122 cu. in.) cars demonstrated in the Grand Prix race to-day that they can give higher speeds than the 3-litre, 183 cu. in., ones did last year. Felix Nazzaro, a race driver familiar in America 12 years ago, won driving his Fiat the 499 miles at an average speed of 79.3 m.p.h. The time was 6:17:17. Last year Jimmy Murphy in his Duesenberg, 3-litre, averaged 78.1 m.p.h. for the shorter distance of 322 miles. This year's race was over a triangular course 8.3 miles per lap, and 60 laps were covered. All cars started in one group, three abreast across the roadway, a la Indianapolis, the first time such a start was ever used in a European road race.

It was a veritable Italian field day, the Fiats led one, two and three until near the finish when the second and third cars were eliminated, two Bugatti cars finishing second and third with another Bugatti running when the race was called off. Of eighteen starters only three finished the 60 laps. The times of the Bugattis were:

Bugatti-Viscaya	7:15:09 — 68.9 m.p.h.
Bugatti-Marco	7:48:04 — 64.1 m.p.h.

None of the French or English cars finished the race. All three Ballots had to retire as had the British Sunbeams.

Perhaps the greatest feature of the race was that there was not a single tire blowout from start to finish. All of the drivers had previously agreed not to carry spare wheels, being prepared to complete the circuit to the pits on a flat tire if necessary. It is the first time such sustained road race speed for approximately 500 miles has been maintained without tire blowouts.



Two views of the Voisin-Knight engine which was used in the first three cars to complete the fuel consumption Grand Prix

While there were no tire troubles there was a perfect landslide of mechanical troubles, indicating that the engineers of 122 cu. in. cars have still a good deal of refining to do before the engines are seasoned products. The mechanical troubles included broken crankshafts, connecting rods, pistons and valve stems. There were some cases of broken magneto drive and one of a wheel coming off. When it is remembered that the engines in some of the cars had a crankshaft speed of about 5000 r.p.m., it is not surprising that mechanical troubles developed. This was the first Grand Prix race in which the rules restricted the entries to two litres. Last year one 2-litre car competed and finished third.

The race was run on a course slippery after heavy rains, but which dried considerably because of the strong wind which blew during the race. It was necessary to take the turns with caution. Four-wheel brakes were used on most of the cars.

The race was a Waterloo for many of the classic drivers of Europe whose names will remain forever closely associated with early racing in Europe and America. Some of those to drop out were Goux, in a Ballot, who ran through a fence but was not hurt, and claimed to have been forced off by Nazzaro, the winner.

Wagner, winner of the American Grand Prix in 1908, went out due to a broken connecting rod in the engine.

Hemery, who so frequently drove the Benz in American road races, was eliminated when his car caught fire.

Chassagne, familiar in Indianapolis races, went out with a broken valve stem in his Sunbeam. The same fate befell his run-

French Grand Prix 2 litre race, Strasbourg, 1922

Car	Driver	No. of Cyl.	Bore & Stroke	Valves	Main Bearings	Ignition	Carburetor	Oiling	Clutch	Gears	Drive	Springs	Brakes	Wheels	Tires	Wheelbase	Track
Aston-Martin	Zborowski R. C. Gallop	4	65x112	4 Head	Ball	Magneto	Zenith	Pressure	Disk	4	Bevel	Semi-Ellip.	4 Wheel	Wire	Pirelli 710x100	98 ins.	51 ins.
Ballot	Goux Foresti Reville	4	69.9x13.	Head	3 Ball	Magneto	Zenith	Circulating	Cone	4	Bevel	Semi-Ellip.	4 Wheel	Wire	820x120	110 ins.	51 ins.
Bugatti	Ernest Friedrich Viscaya Mones Maury Marco	8	60x88	3 Head	7 Ball	2 Magnetos	2 Zenith	Pressure	Plate	4	Bevel	¼ Ellip.	4 Wheel	Rudge	820x120	99 ins.	47 ins.
Fiat	Pietro Bordino Felice Nazzaro Biagio Nazzaro	6	65x100	2 Head	8 Roller	Magneto	Fiat	Pressure Dry Sump	Disk	4	Bevel	Semi-Ellip.	4 Wheel Servo	Rudge	Pirelli Straight Side	98 ins.	47 ins.
Mathis	Lhams	4															
Rolland-Pilain	Albert Guyot Victor Hemery Louis Wagner	8	59x90	2 Head	Ball	Delco	Zenith	Pressure	Plate	4	Bevel	Semi-Ellip.	4 Wheel Hydraulic	Wire	820x120	98 ins.	47 ins.
Slim Pilain																	
Sunbeam	Jean Chassagne K. Lee Guinness Segrave	4	68x136	4 Head	3 Ball	2 Magnetos	Solex	Pressure	Disk	4	Bevel	Semi-Ellip.	4 Wheel	Wire	835x135	98 ins.	47 ins.

ning mate Guinness.

Guyot was eliminated due to a broken crankshaft in his Rolland-Pilain.

One fatal accident occurred. Biagio Nazzaro, nephew of Felix Nazzaro, the winner, was killed when his Fiat overturned in the fifty-third lap, when he was running in third position, and his mechanic was seriously injured.

The Fiat team dominated the field throughout the race, except for a brief period of five minutes when Frederich Bugatti took the lead. The Fiats ran one, two, and three, for most of the race, and two laps from the finish were holding second place, as well as leading. Bordino lost a rear wheel after having held all lap records during the race. His withdrawal and Biagio Nazzaro's accident happening within a few minutes of each other, lost second and third places when they were leading the nearest Bugatti by nearly an hour.

In addition to the two Bugattis which finished second and third three others that were never dangerous competitors were running at the finish.

The two British Aston-Martin cars, 1½-litre capacity, made a good showing during the first half of the race, holding their position with all the cars except the Fiats but were eliminated at 300 miles because of magneto trouble.

Voisin Knights Win "Fuel Consumption" Grand Prix

STRASBOURG, FRANCE, July 16.—Today's race for four-passenger touring cars in which each was given a definite quantity of fuel to cover the 444 miles was a great victory for the Knight sleeve valve type of engine, this type of engine winning three and perhaps more of the first positions. It was won by Rugier driving a Voisin Knight type. The race was an easy victory for Voisin, the winning car covering the distance in 6:35:09, or 67.4 m.p.h. The nearest competitor was Durai in another Voisin about two minutes behind, his time being 6:37:31.

In this race the cars were allowed 13.7 miles per gallon, and were given enough fuel to cover the distance at that rate. The cars carried four-passenger bodies, but the driver was the only occupant. Each car carried 154 lb. weight for each of the supposed three additional passengers.

Some of the cars ran out of fuel before the finish. The three Bignan poppet-valve cars abandoned the race.

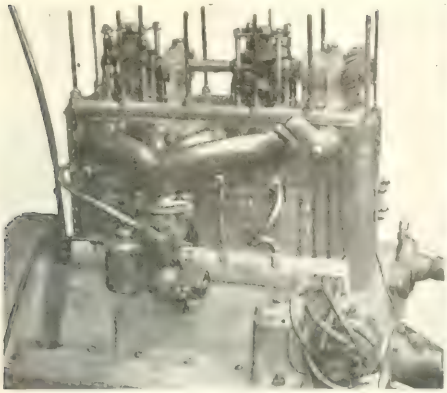
The winner used a Solex carburetor. The Voisin is a four-cylinder car, 95 x 140 mm., and used magneto and Delco ignition.

The finishers were:

Voisin	Rugier	6:35:09
Voisin	Durai	6:37:31
Voisin	Gauderman	6:42:57
Peugeot	Boillot	6:46:41
Voisin	Piccioni	6:49:58
Peugeot	Artault	7:21:25

French Fuel Consumption Grand Prix, Strasbourg, 1922

Car	Driver	No. of Cyl.	Bore & Stroke	Valves	Main Bearings	Ignition	Carburetor	Oiling	Clutch	Gears	Drive	Springs	Brakes	Wheels	Tires	Wheelbase	Track
Alfred Maridet	Maridet	4	90x180	2 Head	3 Plain	2 Magnetos	Zenith	Pressure	Cone	4	Bevel	Semi-Ellip.	4 Wheel	Wire	895x135	128 ins.	56 ins.
Bignan	Philippe de Marne Gros Nougué	4	75x112	2 Head	3 Plain and Ball	Battery	Viel	Pressure		4	Bevel	Semi-Ellip.	4 Wheel	Wire	895x135	125 ins.	55 ins.
Peugeot	André Boillot Artault Péan	4	95x130	Knight	5 Plain	Delco	Zenith	Pressure	Plate	4	Bevel	Semi-Ellip.	4 Wheel	Wire	895x135	128 ins.	55 ins.
Slim-Pilain	Lecot																
Voisin	Rougier Gaudermann Arthur Duray Piccioni	4	95x110	Knight	5 Plain	Magneto and Delco	Solex	Pressure	Plate	4	Bevel	Semi-Ellip.	4 Wheel	Wire	895x135	129 ins.	55 ins.





Left, Bignan engine used in fuel consumption Grand Prix. The valves are positively opened and closed by cams mounted on vertical shafts. There are four cams for the eight valves. Right, Knight engine, used in Peugeot car in same race.

Races and Cars Compared

IT is the practice of the Automobile Club of France to change its racing rules at rather frequent intervals with the object of developing design and opening up new fields of research. For that reason it was decided this year to abandon the 183 cu. in. or 3-litre rule and adopt a piston displacement limit of 2-litres, or 122 cu. in., with a minimum weight of 1433 pounds. Probably because of the fact that this rule was not likely to call forth any great novelties of design, it was decided to hold a second race for four-passenger cars having a fuel allowance such that they must travel at least 13.7 miles to the American gallon.

This fuel consumption race, held on the same course as the 2-litre event, and on the following day, did not receive very great support from manufacturers, and has been somewhat criticised. Objection has specially been taken to the fact that there was a minimum weight empty of 3086 pounds, which is considered to be unnecessarily high.

Fuel and Weight Limitations

In order to avoid criticism such as that which arose last year due to the fact that the air entering the carbureter was drawn through the crank case it was decided that all oil and grease required for the engine and the gearset should be deducted from the total quantity of fuel allowed for the 444 miles of the race. In other words competitors had as much oil and grease as they required to the detriment of their gasoline allowance. In order to make it more difficult to dodge the rules, the decision was reached to allow only the driver aboard the car and to forbid all outside supplies of any nature whatsoever.

Consequently the cars had to carry, in addition to 463 pounds of ballast representing three passengers, all the wheels and tires likely to be needed in the race. Minimum body dimensions were imposed and the length of the tail was limited, to the dissatisfaction of competitors, who were of the opinion that they ought to have been given greater liberty to develop stream line bodies.

Competitors entered in the 122-cu. in. race were Ballot, Rolland-Pilain, Bugatti, Slim-Pilain and Mathis representing France; Sunbeam and Aston-Martin from England, and Fiat from Italy. Delage entered the race with a team of cars, but decided not to start owing to unpreparedness. With the drop to 122 cu. in. the eight-in-line engine lost its numerical superiority. It was used by Rolland-Pilain and Bugatti only. Fiat used a straight six engine and the others had four cylinders.

The best results prior to the race had been obtained by Fiat. The power output per unit of piston displacement is higher than secured from last year's 183 cu. in. engines, and, despite the reduction in size, the small cars are faster than the bigger ones of a year ago. It is difficult to make direct comparisons, so far as the race is concerned, for the course and the distance change each year, but it is already possible to form the opinion that when the 2-litre cars are seen on the Indianapolis track next year there will be little if any loss in average speed.

The Fiat 2-Litre Cars

Fiat has developed the 2-litre cars on the same general lines as the bigger models. Cylinders are of steel construction with welded on sheet steel water jackets, one jacket being common to three cylinders, thus providing the engine with two groups of cylinders. Dimensions are 65 x 100 mm. bore and stroke. As on the bigger engines there are only two valves per cylinder, inclined in the head, with operation by two camshafts, with a very light follower between cam and valve. A vertical shaft and bevel gearing at the rear is made use of to drive the overhead camshafts. Ignition is by means of magneto, with a single plug in the head. Lubrication is under pressure, without any oil in the base chamber. A single carbureter of Fiat design is employed.

A peculiarity of the engine is the adoption of a special type of roller bearing, developed in the Fiat shops, and which is used in every part of the engine with the exception of the wrist pins. There are eight bearings for the main shaft. The engines have been run for several consecutive hours under full load at 5000 r.p.m. and develop rather more than 90 hp.

Main features of design, apart from the engine, are similar to those of the stock Fiat cars. A unit construction engine and gear box is adopted, with direct attach-

ment of the aluminum base chamber to the main frame members. The clutch is multiple-disc type and there are four speeds ahead and reverse. Instead of the open propeller shaft, double universal joints and Hitchkiss drive of last year's cars, the Fiat stock type of combined rear axle and propeller shaft housing is adopted. This is formed of two stampings in the form of a T welded together and has to take care of both the drive and the torque. Springs are semi-elliptic front and rear, supplemented by Hartford shock absorbers.

Brakes are fitted on front and rear wheels with foot operation through a servo-machanism for all four, and hand control for an independent set of brakes on the rear wheels. Track is 47 in. and wheelbase 98 in. Total weight is 1455 pounds empty; this is only 22 pounds above the minimum imposed under the rules.

Bugatti raced with a type of eight-in-line engine shown to the public at the last Paris show, but evidently never put into production. There are a number of new and patented features in the car, some of which were tried out for the first time in the race. The cylinders, which measure 60 x 88 mm., are in a single casting with separate head, this latter receiving three valves per cylinder; the single exhaust valve measuring 32 mm. and the pair of intake valves each having a diameter of 23 mm. The overhead camshaft drive is at the front, the water and oil pump drive is by means of a cross shaft at the foot of the vertical shaft and the two magnetos are at the rear, driven directly off the camshaft. Two carburetors, are used. The crankshaft is carried in ball bearings, with plain bearings for the connecting rods.

Buggatti's distinctive type of quarter elliptic rear spring, with the thick end rearwards was used in his racing car. Among the peculiarities is the use of compressed leather for most of the steering connections. Brakes are fitted on both front and rear wheels, a feature of the design being that no adjustment is required, for the brakes are said to maintain their full efficiency until the lining is completely worn down.

Sunbeam Has Special Axle

The Sunbeam racers were a development of the 1500 cc. Talbot Darracq cars which were so successful last year, for these two companies now form one organization. The four-cylinder engines of 68 x 136 mm. have ball bearing shafts with plain bearings for the connecting rods and four valves per cylinder operated by a train of spur pinions and two overhead camshafts. One of the distinctive features of the Sunbeams is the adoption of a three-piece front axle, the center portion between the road springs being I-section and the two extremities being cylindrical. This design has been adopted in order to increase the torsional strength of the front axle under heavy braking stresses.

The Rolland-Pilain cars, with eight cylinder engines of 59 x 90 mm. ran in the race with the ordinary method of valve closing by means of coil springs. It appears that the system of positively and mechanically closing the valves has not yet given the results expected of it. These engines are of the two-valve type, with the valves at an angle of 160 deg. and the spark plug in the head. Magnesium pistons produced in France under the German process known as Elektron are made use of in these engines. The Rolland-Pilains have hydraulic brakes on the front wheels; the rear wheel brakes are separately operated by hand.

Ballot this year raced with the same type of car used in last year's events. Some reduction has been made in weight, the engine has been speeded up and more attention has been given to stream lining. Aston-Martin took part in this race with two cars of only 1½ litres piston displacement, with which handicap it was a difficult matter for them to win even over a distance of nearly 500 miles. Mathis and Slim-Pilain entered only one car.

Of the six cars entered in the fuel consumption Grand Prix, Voisin and Peugeot were considered the most serious contenders. They both built engines of the Knight sleeve valve type, but not under Knight's license, for these patents are no longer valid in France. The Voisin is claimed to be the firm's standard sporting model, but while on the same general lines as the stock models has many detail modifications. Cylinder dimensions are 95 x 140 mm. There is a direct supply of oil to the sleeves, and in addition to a Zenith magneto driven off a cross shaft at the front there is Delco equipment. A compression of eight kilos (113 pounds) is declared to have been adopted on the Voisins and because of this a special type of plug, completely water jacketed, and designed by the Voisin Company, is made use of. Front wheel brakes of the Perrot type are fitted. Springs are semi-elliptic front and rear, supplemented by a double type of Hartford shock absorber built in France.

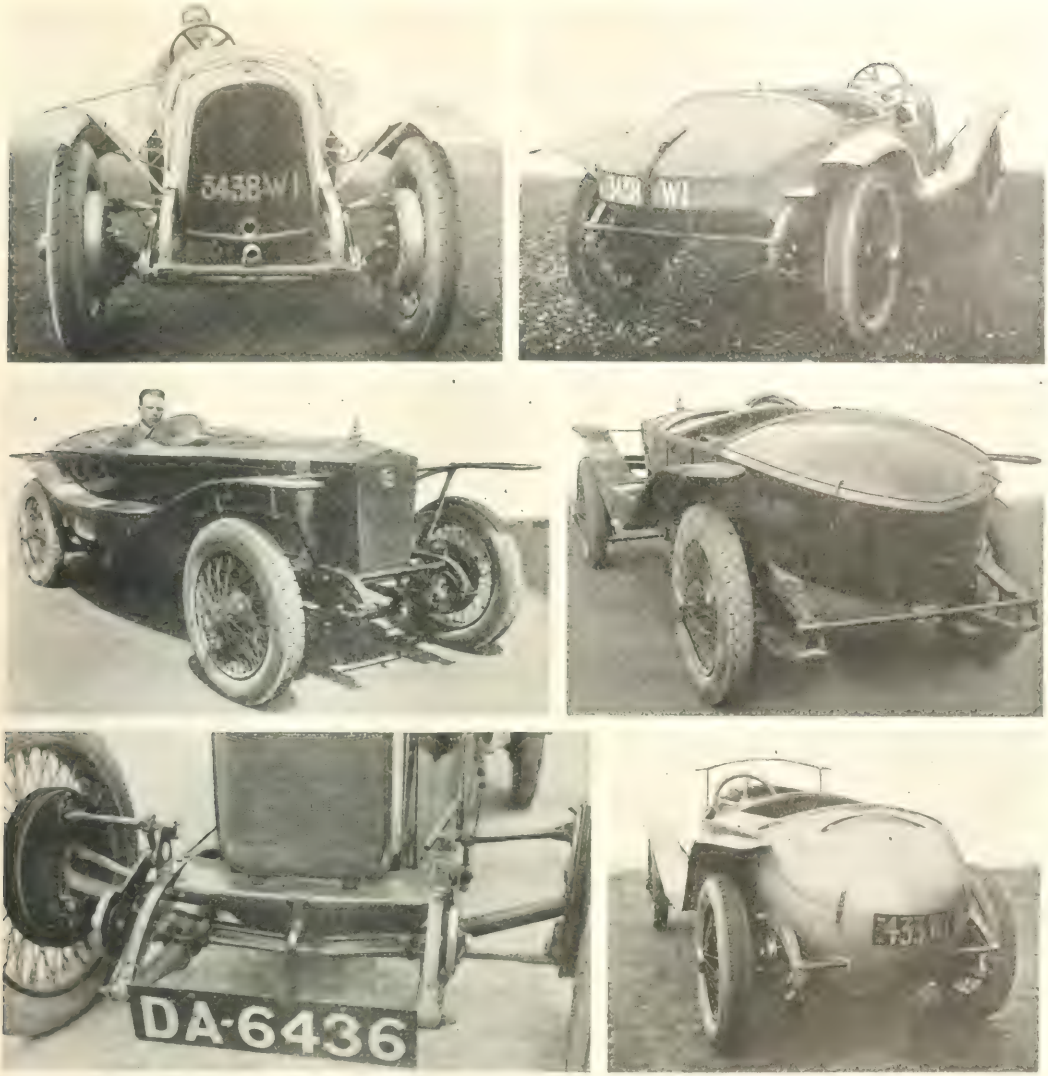
Knight Engine in Peugeot

The sleeve valve engine entered by Peugeot is the first of its type to be built by this firm. The company states that this model will be put on the market next year. The engine has four cylinders in a single casting of 95 mm. bore and 130 mm. stroke, with a five plain bearing crankshaft and plain bearings for the connecting rods. Delco ignition is used with the distributor at the front end driven off the same shaft as the water pump. With crankcase webs brought right up to the frame members and the dash a close fit to the clutch housing a particularly neat engine is secured.

The new Peugeots have unit construction engine and gearbox, left hand steering with center control, four speeds and reverse, semi-elliptic springs front and rear and front wheel brakes of Perrot design.

A very interesting feature of the Bignan cars entered in the fuel consumption Grand Prix is the method of positively opening and closing the eight vertical valves in the detachable head. Reno, the engineer responsible for this job, departed from previous European practice by the adoption of a couple of vertical shafts, each one of which carries two plate cams, one above the other, driven in opposite directions, each cam operating two of the four valves grouped around it. The cam operates the valves through a couple of rollers mounted by means of a sleeve construction on the valve stem, one roller being on the upper and the other on the lower face of the cam. No springs at all are used. This mechanism gave such satisfaction that the firm has decided to adopt it for next year's sporting model. The engineers declare that the ability of the valves to seat no longer constitutes a limit to the number of revolutions.

Magnesium pistons are used in the Bignan engines. The heads have a thickness of eight mm. and there is an entire absence of internal ribbing. The clearance is slightly greater than for aluminum pistons, and the skirt is only a trifle thicker. The piston displacement of the Bignan engine is two-litres, bore and stroke being 75 x 112 mm. It has an exceptionally heavy shaft carried in a combination of ball and plain bearings. Connecting rods are tubular and the lower cap of the connecting rod bearing is provided with light fins to assist in the radiation of heat. White metal is run direct into the caps. Battery ignition is fitted with the use of a new combined coil and distributor produced by the Italian



At top, front and rear views of the Voisin car which won the French fuel consumption Grand Prix race. The spare wheel is carried flat in the tail. Note also the front wheel brakes. Center, front and rear views of the Bignan car in the same race. Rear axle is enclosed to decrease wind resistance. Note combined running board and fenders. Bottom, left, three-piece front axle used on Sunbeam. The tubular end pieces are designed to take the torsional strains of the front wheel brakes. Right, rear view of Peugeot, showing type of cowling employed

Marelli company. The carbureter is a Viel, a new model not yet put into production, with which the engineers declare excellent results have been obtained. Ease of dismounting is one of its distinctive features; either one or other of the two jets can be taken out and changed while the engine is running.

The Bignan has an aluminum rear axle reinforced with steel tubes. In addition to front wheel brakes of the Perrot type it has the Hallot servo-mechanism, by the means of which it is impossible to lock the wheels. With the two-litre piston displacement this engine was at a disadvantage under the fuel consumption rules compared with the bigger sleeve valve engines built by Voisin and Peugeot, but it is nevertheless full of interesting features.

A few other manufacturers started out with the idea of building a two-litre engine which could be used in the two-litre Grand Prix and also in the fuel consumption event, but they discovered that a satisfactory engine under a piston displacement rule was not suitable for a race in which the amount of gasoline was limited.

"Automobiles Increase Agricultural Production"

James Howard, President of the American Farm Bureau Federation, considers automotive products essential to agricultural development. Service on power farming equipment important. More fundamental information needed concerning transportation.

By James R. Howard*

I SPENT five years in a county bank some years ago, and, among other things, carried the responsibility of making recommendations for loans. One experience I remember particularly.

Two farmers wanted to borrow approximately one thousand dollars each on hogs which they were feeding. When the board met I laid this request before it, and the president was glad to accommodate these men, when to tell the truth the farmers were accommodating the bank, for we had money to loan.

Then one of the directors reported that these two men were considering the purchase of automobiles. This was in 1907, when automobiles were not as common on farms as to-day. The president withdrew his consent for the loans, explaining that if ten farmers in each township in Iowa should buy automobiles the banks would go broke.

Now, this banker was honest in his convictions, but today we know that the automotive industry has been of material help to agriculture.

In the first place it has developed into a giant industry, furnishing employment in mines, forests and factories, to say nothing of increasing transportation and stimulating many other lines of activities. It has taken natural resources to improve our standards of living and given profitable employment to an army of laborers. It developed at a most fortunate time for agriculture, for there were unmistakable signs of a stagnation in the agricultural market. I am not sure, but it is entirely possible that the increased demand for agricultural products created by the development of the automotive industry has paid for the farmers' automobiles.

Nothing makes me more out of sorts than to have someone proclaim that the farmer should not have an automobile. The car is a necessity on the farm. Its use increases agricultural production. It relieves the monotony of farm life. It makes agriculture a more pleasant and profitable life work. It has brought contentment and happiness and never forget that a happy people are better off than a rich people. Above all, the automobile is one of the factors which is going to keep the American farmer from becoming a peasant.

The truck and the tractor both have an economic place on the American farm, although it will be a long time before they can replace the horse. My own experience, on a relatively large farm for Iowa, is that a combination of the tractor with horses gives better results than horses alone or depending too much upon the tractor. As we get better mechanical units, however, and better understand how to operate them, the use of the tractor and truck will increase. Service on power farming equipment is especially important.

The reduction in freight rates to take effect on July 1 will help materially in restoring the farmer's economic condition, but it is not enough unless the prices of agricultural products go up. The most helpful sign on the transportation horizon is the proposal of Bird M. Robinson, president of the American Short Line Railroad Association, for the formation of a National Transportation Institute to be financed by private funds.

We need to make a thorough study of our transportation problems and possibilities from a national standpoint looking toward a coordination of our highways, waterways and railways. The work of such an institute should be so thorough that its findings and reports will have wide, general acceptance. A temporary organization to develop such an institute is already at work.

Just to illustrate how the work of such an organization might affect the farmer, take my own case. I expect to

THE automotive industry needs the farm market. How big will that market be for the rest of this year?

* * *

The writer of this article is better able to speak for the farmer than anyone else in the country. Howard says that the farmer has been clearing off his obligations during the last two years, and that it is better that he should do this than purchase.

Howard also believes that "a good part of this year's crop will go to the bankers."

* * *

Here is an able article by a competent authority. It deals with probable developments in the farm market this fall, as well as the more fundamental relationships between the farmer and the automotive industry.

*President American Farm Bureau Federation.

build a house on the farm soon. There is also the hauling of farm supplies and products. Now I want to know whether I can haul the materials for that house at the least expense with horses and wagons, tractor and trailers or trucks. We need fundamental information describing the spheres of our different systems of transportation.

Standardization of farm operating equipment will come but progress will be gradual and the work must be kept within reasonable limits. If we could do away with present equipment and manufacturing facilities over night rapid progress could be made, but this is impossible. In any standardization program account must be taken of equipment in the users' hands and the manufacturing situation. There is much old equipment to be worn out before new equipment, even though it be standardized, will replace it.

During the past two years much has been said about the farmers' troubles. Well, I guess that we have had our share, but as I see it they center chiefly around three things: transportation, credit and markets. Of these three, markets are by all odds the most important. The farmer can have abundant credit, cheap. The farmer is more vitally concerned with an economic recovery in Europe than either the men of commerce or finance.

From a national standpoint the farmer is a big purchaser. He should be in position to buy all the necessities required and many of the things called luxuries. It is important that the standard of living on the farm be kept just as high as possible. During the past two years, as is too well known, the farmer has not been a good purchaser. Well, he has been doing a more important thing, clearing off his obligations, and I believe that the farmer is going to get square financially before he again enters the market in a large way. The farmer is liquidating, not buying. There is some substantial evidence on this point. For some time past money has been flowing to the financial centers in a volume which surprised the financial interests. At first it was difficult to explain this but gradually it came to be realized that the farmer was getting along with what he had and paying his obligations. This will undoubtedly continue. The farmer is going to get on his financial feet before he buys in a large way.

It is not known how long this will take but I believe that a good part of this year's crop will go to the bankers.

Motor Fuel from Corn Cobs

MORE than six years of research work by chemists in the Department of Agriculture Laboratories has resulted in the development of a process that will

(1) Make possible the production of low-priced substitutes for a wide variety of hard rubber and synthetic resin products,

(2) Provide a good market for waste farm by-products,

(3) Conserve the native supply of wood alcohol and the forest products, particularly hardwoods, used in the manufacture of wood alcohol,

(4) Provide a possible motor fuel supply.

The results of this work were recently announced through the American Chemical Society by Dr. W. W. Skinner, assistant chief of the Bureau of Chemistry. The achievement consists in the perfection of methods for producing a chemical compound known as furfural at a low price and by a simple process from corn cobs.

Dr. Frederick B. La Forge and Gerald H. Mains, of the Bureau of Chemistry, are credited with having done this work. They have successfully brought the process for the production of furfural to a commercial scale, and at the same time have aided in the development of a commercial market for furfural by supplying quantities of the material to manufacturers for co-operative research on its utilization.

The synthetic resins industry, since chemists discovered the secret of making them about 15 years ago, has had a remarkable growth. The materials used in this industry are chiefly formaldehyde and phenol (or bolic acid). These two compounds, chemically combined, condense into solid which is highly valuable as the basis for making material similar to Bakelite. Thorough tests have proved furfural to be an excellent substitute for formaldehyde in this work.

The possibilities of conservation may be seen when it is explained that the source of formaldehyde is wood alcohol, which is produced chiefly from the destructive distillation of hardwoods, such as birch, beech, oak, maple and elm. The softwoods, while they are more plentiful in America, produce such low yields of wood alcohol that they are of small value as a substantial source of supply.

Newspaper reports have in several instances unduly emphasized the possibility of furfural as a motor fuel. A few tests made by the General Motors Company (see article by H. Hibbert, *Jour. Ind. Eng. Chem.*, Sept., 1921) in the ordinary type of engine, developed pre-ignition trouble. Further experimentation to overcome this difficulty was not pushed, doubtless due to the high cost of furfural.

Recent work at the Bureau of Chemistry experimental plant for furfural production indicates that furfural can be produced from corn cobs for about 6 cents per pound on a large scale, using, say, 100 tons of cobs per day equivalent to 6 tons of furfural. Since gasoline sells for from 3½ to 4 cents per pound, with increasing cost in sight within the next few years, and since further improvements in the process of furfural manufacture will likely reduce the price of the latter, the use of furfural as a fuel becomes a possibility for the future, but it is not immediately practicable.

IN spite of the increased imports of automotive products from Germany during the first quarter of 1922 as compared to the same period in 1921, well-known automobile agents generally agree that German cars are not popular and that competition in the future is not likely to be serious.

The unit value of imports of passenger cars, during the first quarter of the current year decreased 35 per cent, and unit value of trucks 44 per cent, as compared to the same period last year.

Of the 652 passenger cars, valued at $807,092 imported during the first quarter of 1922, Germany supplied 388 and the United States 148. Of the 302 trucks imported, valued at $230,010, Germany supplied 289, France 9 and other countries 4. However, the United States furnished 100 of the 145 truck chassis imported as against 30 supplied by Germany.

The large imports from Germany may be accounted for by contracts made last year which Germany has been unable to fill until the last few months.

German Buses Follow Truck Lines with Special Features Added

Spring construction is novel on several makes and arranged to improve riding qualities at all loads. Over-geared transmission used to secure higher economy in one case. Disk wheels and pneumatic tires are popular. Special starting facilities frequently used.

By Benno R. Dierfeld

GERMAN bus chassis still follow conventional truck design to a considerable extent, but many manufacturers of buses are making alterations in various units with a view to better suiting the vehicle to the requirements of passenger carrying service. Spring suspensions are being improved, by the use of progressive type springs in some cases, while pneumatic tires are quite generally employed in combination with disk wheels. The relatively high price of fuel, the cost of which is always a large item in the expense of bus operation, is being reduced in some instances by employing a special type of gearset which affords less gear reduction and a better load factor, with consequent improvement in economy.

Many buses have electric starting and lighting systems, and some employ primers or other special means to facilitate starting. Radiators usually have sectional or replaceable cores and are sometimes provided with a cushioning means to protect them from the effect of vibration and distortion. Clutches and universal joints used are much the same as those fitted in trucks and propeller shaft brakes are quite generally employed. These are provided with convenient means for adjustment, and are foot operated. Frame trusses are employed in some instances.

Since buses are usually operated at higher speeds than truck chassis a larger engine is often employed. For example, the Magirus works in Ulm use engines of the following type for trucks and buses:

Useful load in tons	Engine horsepower for Truck chassis	Bus chassis	Number of seats
1–1.5	25	34	up to 14
2–2.5	34	40	14–22
3–3.5	40	55	23 or more

The power of the engine employed naturally depends also upon the road surface, grade, and whether or not a trailer which is often employed is used. The N.A.G., which makes one of the best known bus chassis, employs a valve-in-head engine, from which the valves can be removed without dismantling when grinding is required.

Most of the new bus chassis have electric starting and lighting systems. To facilitate starting in cold weather the Buessing buses are fitted with a primary device operated from the dash and arranged to feed each cylinder with a rich mixture. Mannesmann-Mulag buses are provided with a special carbureter shown in Figs. 1 and 2. The choke *A* is raised by the lever *B* in starting. This gives a high velocity air stream over the jet, thus helping to produce a good mixture for starting purposes. As soon as the start is made the choke is lowered to the position shown in Fig. 1. The N.A.G. bus has hand controls on the steering column for regulating the water temperature by opening and closing the water outlet of the radiator and the air temperature by regulating a valve which

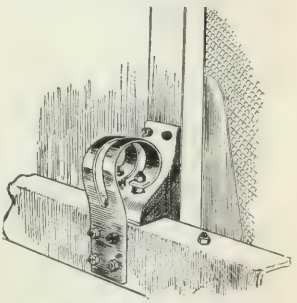


Fig. 3—Flexible radiator support used on the Adler bus chassis

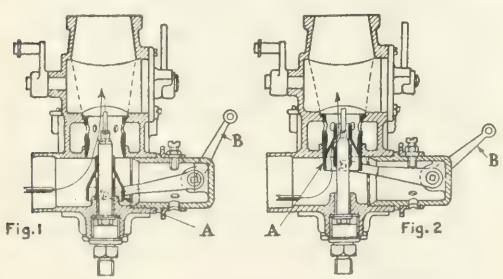


Fig. 1 and 2—Carbureter with special choke used in starting employed on Mannesmann-Mulag buses

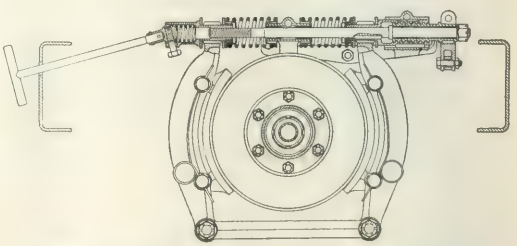


Fig. 5—Propeller shaft foot brake employed by Buessing has convenient hand adjustment projecting through side of frame, and special means for lubricating the brake spindle shaft

controls the quantity of heat added to the air entering the carbureter. A thermometer on the radiator cap is employed to guide the operator in adjusting these controls.

Most buses are fitted with radiators having easily replaceable sectional cores. In some cases the radiators are provided with a flexible support such as that used on the Adler bus, Fig. 3.

Inasmuch as most buses are operated a large proportion of the time on light loads, it is desirable to use some means for increasing economy at these loads. This is accomplished in a new gearset employed on the N.A.G. chassis, which is shown diagrammatically in Fig. 4. This gearset is provided with the usual four speeds and the constant mesh gears *A* and *B*. It is also fitted with a second set of gears *C* and *D* which when engaged become the constant mesh set. Gear *D* is operated by a separate change speed lever. When *C* and *D* are engaged there is less total reduction, and three higher speed gears than were possible with gears *A* and *B* in mesh are made available. This results in a better load factor and in decreasing the engine speed or increasing the speed of average bus operation with corresponding decrease in fuel consumption and in running time over a given distance.

In order to realize the largest possible saving in fuel when solid tires are employed, the gear ratios are so arranged that the engine speed is reduced about 30 per cent by use of the constant mesh gears. When pneumatics are employed the engine speed is maintained the same as before, while the bus speed is increased. This over-gear arrangement is said to be equivalent to the use of a two-

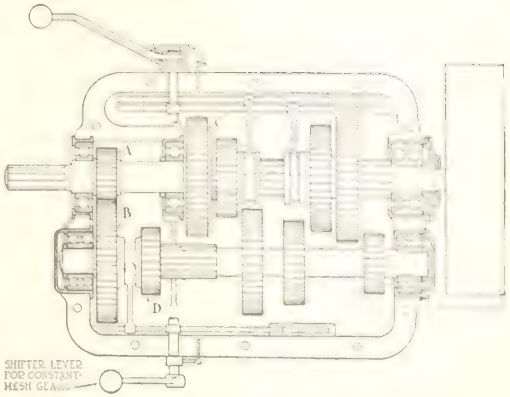


Fig. 4—Diagram of new type of gearset employed in N. A. G. bus chassis

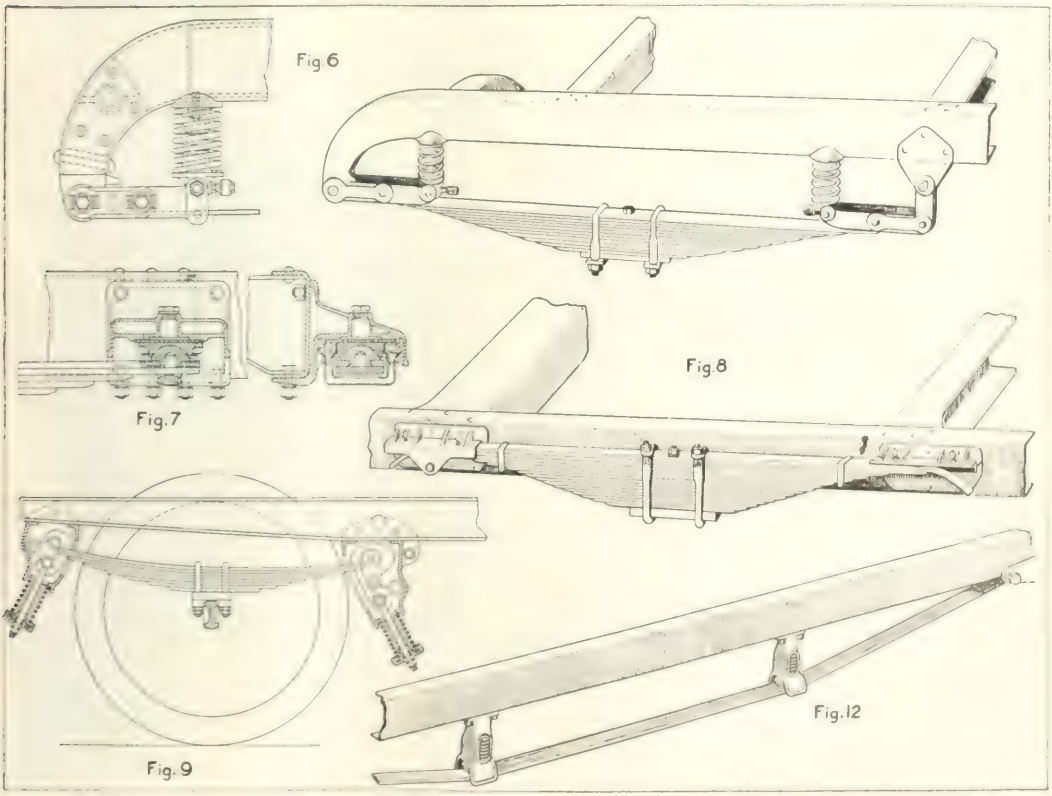
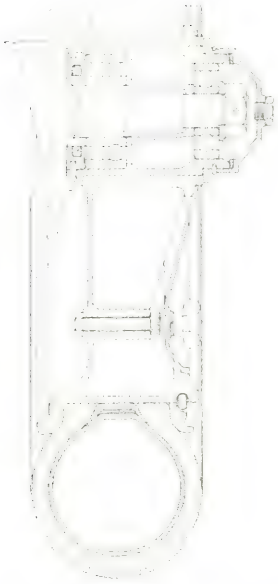
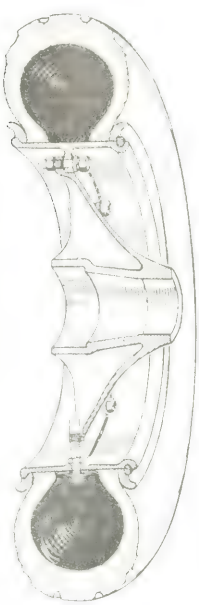


Fig. 6—Front spring suspension used on Buessing chassis. Fig. 7—Spring with sliding end plate used in the Buessing bus. Fig. 8—Rear spring employed by N. A. G. It requires no shackles and its effective length decreases with increase in load, thus improving the riding qualities at all loads. Fig. 9—Spring construction employed on rear of Mannesmann-Mulag buses. The helical springs care for light loads. The leaf spring becomes effective when the load is increased. Fig. 12—Method of trussing employed on the Mannesmann-Mulag bus frame





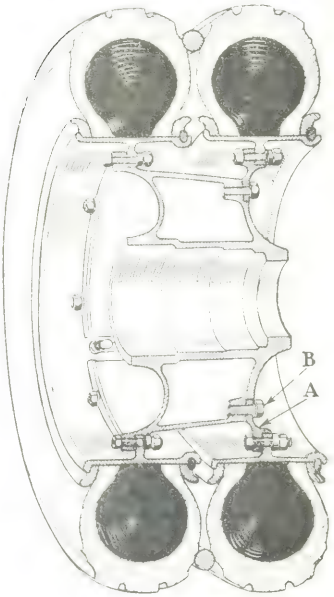


Fig. 10 (left)—Sectional view of front wheel used on Buessing bus. The dust cover, held in place by wing nuts, is of aluminum. Fig. 11 (right)—Sectional views through front and rear wheels used on the N. A. G. bus chassis. The central portion is cast steel and the detachable rims are of aluminum

speed axle, but is less expensive and involves no increase in unsprung weight.

In truck chassis the correct adjustment of brakes is of great importance. The propeller shaft brake is very generally used and some special convenient means of adjustment is employed in some cases. The Buessing, for example, use the brake construction shown in Fig. 5, in which adjustment is facilitated by a rod with a handle projecting through the frame side member. This rod is connected by ball joint to the brake spindle.

Many firms who furnish buses with solid tires employ the same half-elliptic spring arrangement used on truck chassis. If, however, pneumatic tires are furnished the rear springs are raised considerably. Many efforts have also been made to improve the riding qualities of buses. An example of this is shown in Fig. 6, in which each front spring is fitted with two additional supplementary helical springs, arranged in such a manner that the supplementary springs carry only half the load resting on the main spring eye-bolt. In the Buessing bus only the rear end of the front spring is provided with the usual eye-bolt, while the front end is arranged to slide as in the case of the rear spring illustrated in Fig. 7. It will be noted that a ball segment is riveted to the end of the main spring leaf. This segment rests in a corresponding seat or recessed block to which it is loosely attached. The upper face of the block is flat and is arranged to slide over a corresponding surface attached to the frame bracket. This surface is dust tight and well lubricated. The ball surface is said to require only the usual coating of grease and graphite when the springs are assembled.

Inasmuch as rear springs are a controlling factor, so far as the comfort of passengers is concerned, many efforts have been made to improve their riding qualities. A construction somewhat similar to Buessing is employed by N.A.G. This bus is provided with rear springs in which the ends of the main leaf are bent downward and rest in side brackets of the frame member as shown in Fig. 8. This construction has the added advantage of decreased spring length as the load increases, a factor which improves riding qualities both when the bus is riding light and when loaded. When the bus is light the effective length of the springs is said to be 56 in. Fully loaded, their effective length is about 43 in.

The rear springs used by Mannesmann-Mulag are shown in Fig. 9. This is so arranged that the helical springs take most of the deflection at light loads, while at heavier loads the leaf spring becomes the more effective.

Most German bus chassis are now fitted with giant pneumatic tires and the cast steel wheels are quite generally replaced by lighter and more resilient disk wheels. In some cases, such as the Buessing bus, it is the practice to mount an engine driven air compressor in the chassis and to use no quick detachable rim, while other designers, such as N.A.G., contend that complication is avoided by eliminating the air compressor and providing spare tires with quick detachable rims. A sectional view of the front wheel used on the Buessing bus is shown in Fig. 10. This is provided with aluminum dust cover held in place by wing nuts. Axial thrust is taken by a bronze sleeve.

Fig. 11 shows sectional views through the front and rear wheels used by N.A.G. The central portion of the hub is cast steel, on the outside of which a detachable rim of aluminum is mounted. This has a T-section, the flange being fastened with bolts to the central portion of the wheels. In the case of the rear wheel the inner tire can be dismounted after removing the outer tire with the rim and ring *A* after loosening rim bolts *B*. The ball bearings of the front wheel hubs are so arranged that the wheel can be taken off without special tools.

The frames of German bus chassis are usually longer than those employed for truck purposes and a longer wheelbase, together with a wider tread, is quite general. To avoid the use of a heavy frame which would otherwise be required the Mannesmann-Mulag bus is provided with the truss shown in Fig. 12. This truss is made from strip steel arranged with the helical springs carried in sockets attached to the side member as shown. This arrangement is said to avoid frame breakage and at the same time provide a desirable degree of resiliency.

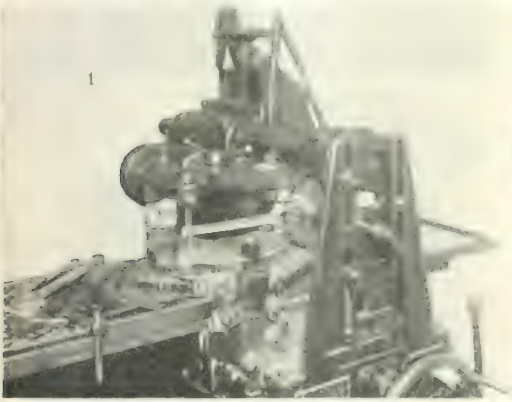
The Vomag Co. avoids the use of an unusually long wheelbase by placing the driver's seat beside the engine, thus giving additional space for passenger seats.

Economy and Precision in Connecting Rod Manufacture

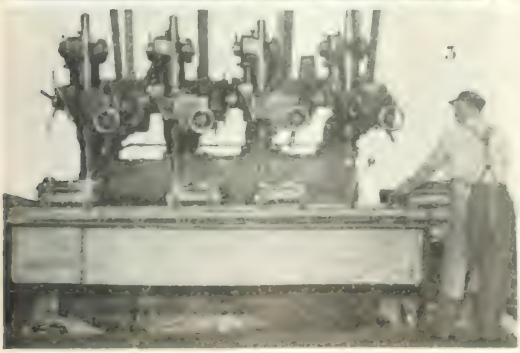
Machining operations in finishing Hupmobile rods are described. Great care is exercised in assuring parallel axles for wristpin and big-end holes, most operations being located by mandrels through these holes. Several of the machines used run continuously.

By J. Edward Schipper

CONNECTING rod manufacture, as has been frequently pointed out in these pages, offers some very interesting problems. Engine makers realize the importance of carefully laying out operations for connecting rods, not only with the idea of getting the best possible rod for the least expenditure of time and effort, but also to make this department tune up with the other engine manufacturing departments. The connecting rod offers an interesting production study because there are sometimes temptations to make short cuts which are apt to result in a large percentage of faulty rods. It is absolutely essential that the center lines of both the

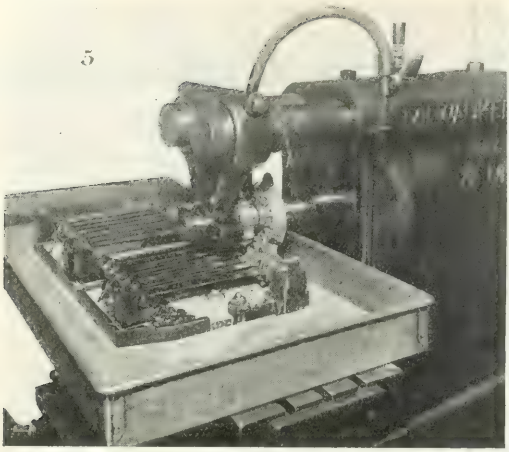


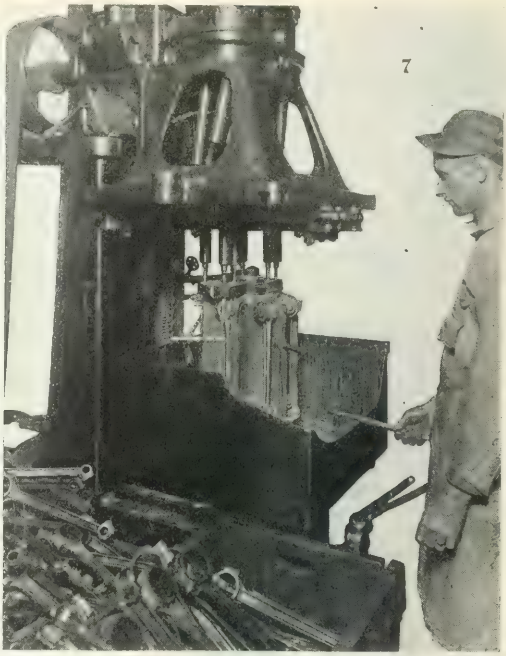




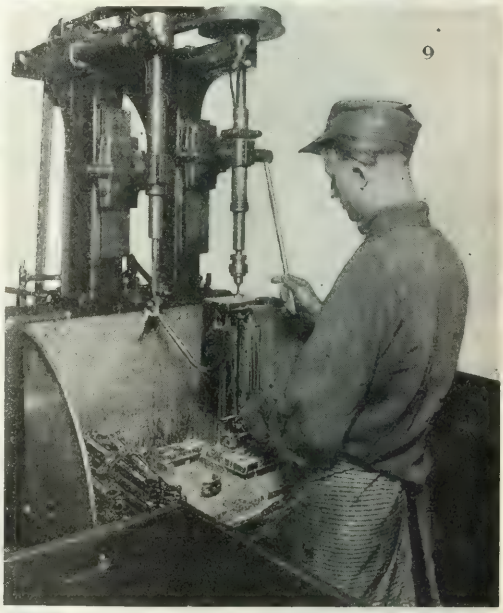


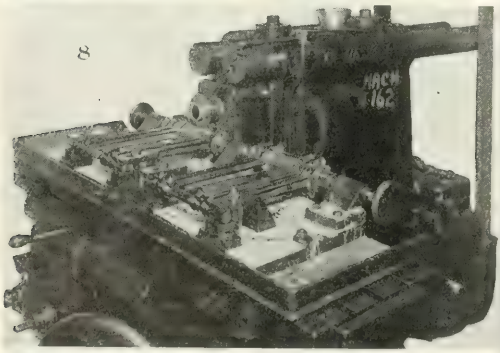
1—Straddle milling ends of rods to fix width. Note the indexing fixture which permits rod to be swung around. This is a Brown & Sharpe mill. 2—Straightening Hupp connecting rods after primary milling operation and before machining. Note inspection gage. 3—Four-headed Colburn drill which drills and reams wrist pin and large bearing hole on same jig. Note rails for jig permitting them to be rolled from spindle to spindle and back again. 4—Broaching small and large ends of connecting rod simultaneously on LaPointe broaching machine. This is a self-centering operation











5—Six rods are put through at the same time on a Milwaukee miller which faces the bearing cap bolt hole bosses. The rods are loaded in one fixture while the other is in operation, allowing the machine to work continuously. 6—Allen radial machine drilling angular holes through piston pin bolt hole boss. 7—Fox drill press which drills two rods and reams two rods at the same time, permitting another four rods to be loaded while the operation is taking place. This is a very effective machine and works sufficiently rapidly and efficiently to permit the operator to handle another operation as well. 8—Splitting the bearing caps on Milwaukee miller. This is handled by the same operator who takes care of the drilling and reaming shown in Fig. 7. 9—Two Allen drills take care of the dowel pin holes in the caps and also chamfer the bolt holes in the bearing boss. The Magic chuck permits of rapid change from the drill to the reamer

upper and lower bearings be parallel. No twist or bend can exist in rods if a perfect performance is desired.

When a twisted or eccentric rod is put in a gasoline engine it means that the piston, for at least a part of its stroke, is going to be cocked in the bore. This results in rapid ring wear and also rapid wear of the ring grooves. If the case is a bad one, it is apt to result in scored cylinders. It is essential to maintain absolute parallelism of the center lines of the two bearings.

In the following description of the operations on the Hupmobile connecting rod, this point should be borne in mind. It will be particularly noted that bending or strenghtening of the rod occurs early in the operation and that after the rod has been straightened and the preliminary operations have been carried out, location for further machine work is based on the centering of both the upper and lower bearings. Instead of using a single mandrel and a V-block, as is customary in some shops, these rods are located on two mandrels which pass through the upper and lower bearing openings, so that the rod will not go in the fixture unless it is true. Also, because of this method of location, it is practically impossible for machining operations to distort the rod.

Straddle Milling Bearing Caps

The Hupp connecting rod has a clamp bolt through a split boss at the wrist pin bearing. The first operation on the rod is to straddle mill the bearing cap and the wrist pin cap, Fig. 1. This is accomplished on a Brown & Sharpe mill, two rods being handled at a time. The forgings are located from the wrist pin bolt hole boss and from the bearing cap bolt hole bosses for this operation. The lower ends of the rods are handled together and the upper ends similarly. This is accomplished by utilizing a revolving indexing fixture. This operation fixes the width of the rod. The work is checked on a snap gage and is held to .0001 in. limit.

With the width of the rod fixed, the straightening operation is performed. This is done by hand in a vise, Fig. 2, and checked by a gauge which shows whether there is any twist in the rod. The same operator who is checking the rods also center punches over and under the bearing cap joint so that when it is finally cut off, the cap is put back in the same way as it is taken off.

After the straightening operation, the rods are passed to a Colburn drill with four heads. The jigs holding the rods operate on tracks under the drill heads, Fig. 3. They are passed from operation to operation until they are finally completed, after which they are switched back on an outside track. The first operation on the Colburn drill is on the wrist pin hole. This is a drilling operation. The second and third operations are to rough drill and semi-finish drill the big end bearing while the fourth is a finish reaming operation on this same bearing. Location is from two set screws against the lower end of the rod. This end lies against a bushing and the two set screws set against the lower end. A clamp screw at the upper end of the rod pushes the rod back against the set screws at the big end. A clamp in the center of the rod holds it firmly in position. A connecting rod goes through all four of these drilling and reaming operations in 1¼ min., two operators being used.

The last man on the Colburn drill also gages with a go and no-go gage the holes at the upper and lower end of the bearing. The go-gage is .849 and the no-go, .851 in. On the big end the go-gage is 2.042 in. and the no-go, 2.048 in.

The rods are now ready to be broached, this operation being performed on a La Pointe machine. Both ends of the rods are broached at the same time. The average time on these is one rod per minute. The broaching operation is self-centering and requires no close locating arrangements, Fig. 4. This operation establishes the two bearing holes, and following this all of the operations are located from the two holes on arbors. The care used in the establishment of the big end bearing openings may be noted when it is remembered that this hole was first rough drilled, then semi-finish drilled, finish reamed and finally broached. After the broaching operation, the big opening must be between 2.060 and .062 in., these being the dimensions on the go and no-go gages.

A Milwaukee miller is employed for facing the bearing cap bolt hole bosses, Fig. 5. This is a straddle operation, six rods being put through at a time. These rods are mounted on two arbors passing through the upper and lower ends. The arbors rest in V-blocks on a fixture. Two of these fixtures are employed, making it possible to load one while the other is running. This permits the milling machine to keep running all the time, and it is cutting practically all the time, the only gap being between the two fixtures when a small interval of time occurs between the finishing of one fixture load and the beginning of the operations on the next six rods on the fixture which has just been loaded.

With this arrangement, the operator has time also to take care of the operation of drilling the wrist pin bolt holes through the boss. This is a compound drilling operation, two drills being used on the same machine. There is a 21/64-in. hole which goes all the way through and a 13/32-in. hole which goes half-way through, the bolt employed being a step bolt. The machine used is an Allen radial. The fixture has the usual two arbors for both ends of the connecting rod, Fig. 6.

Continuous Drilling and Reaming

The holes for the bearing cap bolts are drilled on a Fox press. This is another case in which the machine is kept running continuously. Two of the rods are drilled and two reamed at the same time. An indexing fixture is used for the work, and, as the illustration in Fig. 7 shows, the machine is being loaded and is drilling and reaming at the same time. This is a very effective machine, for it not only handles this work very rapidly, but also allows the operator sufficient time to take care of the splitting operation on the wrist pin boss. This is done on a Milwaukee miller, Fig. 8. The holes in the bearing cap bolts are held so that they will check on a .436 go and .438 on a no-go gage. Location is as usual on two arbors in this and in the splitting operation.

The bolt hole boss is tapped with a ⅜-in. 24 tap for the wrist pin bolts. This is handled on a Strong Carlisle radial. The bearing caps are split from the rod on a Milwaukee miller which loads four and cuts four at the same time. The rod is located on two arbors and clamped.

Two Allen drills take care of the dowel pin holes in the caps and also chamfer the bolt holes in the bearing boss, Fig. 9. This same machine takes care of both the drilling and reaming operation on the dowel holes, a magic chuck being employed to make the change over from drill to reamer. The drill is a 15/64-in. drill and the reamer a ¼-in. The machine handles 70 per hr.

The final operation on the rods is a hand trimming or filing to remove burrs. The rods then go to a bench, where they are given a thorough final inspection before being sent to the babbitting department. The cap belonging to each rod is wired to the rod itself so that the same cap which was cut off the lower end of the rod is returned to the rod on assembly. The center punch mark, as previously described, enables the assemblers to put the cap on in the correct way.

These operations give an economically manufactured yet accurate rod.

Fractional Distillations of Fuel and How to Make Them

It is said to be impossible to secure consistently comparable results with present standard apparatus. The desirable characteristics of satisfactory apparatus are herewith developed and a new type of still which fulfills these requirements is described in detail.

By P. S. Tice *

THE automotive industry has by now definitely set aside its Baume hydrometers and is using stills, as prescribed and directed, to classify and compare its fuels. But in spite of this state of affairs, to the attainment of which much effort has been expended, it is rumored about that distillation tests of fuels are, after all, of comparatively little value. It will have to be acknowledged that there is much justification for this opinion of the average distillation data. Most of it is highly misleading because of its failure of even approximate truth on points of great import to the user of engine fuels.

Why results of questionable value are obtained in the execution of an excellent general method is a matter that will bear some looking into.

Taking precedence even of the matter of cost of a fuel, the item of interest and importance is its volatility or, in the usual case, its range of volatilities. Information on this point can be obtained only by fractional distillation; and recognition of this fact explains the active campaign instituted some time ago to make the distillation test a standard method of fuel examination. In the abstract there is everything to be said for it, and nothing of any importance to be said against it; hence its present universal adoption.

A GREAT mistake was made in placing the stamp of approval upon an apparatus quite unsuitable for the purpose in hand, even though a reason of expediency probably accounts for what was done in this direction. The industry was asked to substitute a relatively intricate and tedious operation for a very simple one —to substitute for the familiar hydrometer a still with its heater, thermometer, condenser and receiver. No doubt the idea was to make the apparatus as elemental as possible, to the end that the method might meet with the less resistance. It is certain that no like considerations now have weight. The aim should be to make the most of the knowledge available, and to extend both the scope and accuracy of that knowledge. In every branch tools of new design continuously supplant older and simpler ones because they do finer work more expeditiously and more nearly automatically.

Any petroleum analyst will agree that a fractionation of a petroleum fuel is not to be undertaken loosely and with elemental apparatus, if the results are intended to convey useful information. Certain precautions and features of apparatus design must be included or the work might almost as well be left undone.

* Engineer directing Carbureter Division, Stewart-Warner Speedometer Corporation.

What Fractionation Can Tell

A FRACTIONATION of any one of our commercial engine fuels can and should yield data from which can be plotted and deduced:

(a) Truthful relations between temperature and percentage of distillate;
(b) A closely approximate statement of the boiling points of the majority of components of the fuel (with some additional knowledge of the fuel this amounts to the same thing as naming the components themselves);
(c) A reasonably close estimate of the proportions of the several components present in excess of three per cent;
(d) A general recognition of the presence of substances occurring in quantities of not less than one per cent.

Interpretation of these data in the light of a general knowledge of vaporization and combustion characteristics of petroleum fuel substances give practically all the information needed for the purposes of classification.

As distinguished from the comparatively open book that fractionation can place at our service, the present standardly used method of distillation results in: (1) initial point values that are anywhere up to 40 deg. C. (72 deg. F.) too high; (2) end points that are too low by a like amount, and (3) no direct recognition of any one of the substances present, and hence nothing on which to base estimates of the characters of the substances or the extents of occurrence. Added to this is the deplorable fact that two men using identical standard apparatus cannot consistently check each other with identical fuel samples. A highly skilled chemist, who makes periodic distillation tests as a matter of routine, states that he despairs of getting reasonably close checks on repeat distillations.

These are the points that need looking into, to the end that the easily realizable possibilities of fuel fractionation may be understood and put to work.

In order to clarify the discussion of apparatus design details that must of necessity be brought in, the following description of fractionation is inserted:

When a mixture of different liquid substances, such as any of the usual engine fuels, is placed in a distilling flask and heated, boiling occurs as soon as the temperature is raised to a value at which the vapor pressure

of the mixture is equal to the atmospheric pressure. The vapor evolved saturates the space above the liquid and then passes into the neck of the flask. The latter is at a lower temperature than the liquid in the flask bulb or the vapors driven off from it, because of its exposure and remoteness from the source of heat.

Some of the vapors coming into contact with the wall of the neck are condensed upon it, and the condensate runs back toward the bulb. This condensation is the first important step in the process of fractionation; and the extent and therefore the truthfulness and value of the analysis depends wholly upon what happens subsequently in the condensate and in the column of vapor moving in opposition to it.

As it leaves the surface of the liquid a volume of vapor contains representatives of each of the substances comprising the mixture in the flask, in quantities approximately proportional to the vapor pressures of those substances at the temperature of the liquid. Since at any temperature the vapor pressure is greater the more volatile the substance, it is clear that the more volatile substances have the greater quantitative representation in a volume of vapor. This explains why the evolved vapors are richer in the more volatile substances than is the liquid left behind.

Immediately upon leaving the surface of the liquid, and all along their further course, the vapors are subjected to progressive cooling; and, since they are saturated vapors, this results in progressive partial condensation. But while all of the substances comprising the vapor mass contribute to the condensates thus formed, the less volatile are condensed relatively more extensively than the more volatile, because of their respective vapor-pressure-vs.-temperature relationships. Thus it is that as unit volume of vapor passes away from the boiling liquid it: (1) progressively loses by condensation greater and greater proportions of its less volatile constituents; and (2) progressively includes more and more of the substances of greater volatility. Item (2) follows from the fact that the total pressure in the column of vapor is unaffected by the condensations.

But the vapor column has been moving continuously outward from the bulb while these condensates were forming, with the result that there is a volatility gradient in the vapors along the length of the neck, the more volatile substances preponderating higher in the passage. And the same sort of gradient, in the same direction, exists in condensates on the walls of the neck.

SINCE the condensate forms and accumulates toward the bottom of the neck more than at the top, and because the vapors are hotter when they first enter the neck than when the survivors reach the top, there is also a temperature gradient along the flask neck. The heat represented in this temperature gradient subjects the descending condensates to a progressive partial revaporization which drives back into the vapor phase portions of the substances comprising the condensate. The same conditions apply here as noted for the original evaporation in the bulb of the flask, i.e., the evolved vapors are richer in the more volatile constituents than is the liquid left behind. But there are distinctions to be drawn between the effective fractionating values of the initial vaporization in the bulb and revaporization of condensates in the neck of the flask: (1) the latter takes place from a liquid mass that is richer in the more volatile components, hence the relative purification is greater than that occurring in the bulb; and (2) partial revaporization of the condensate is accomplished under conditions that preclude the possibility of superheating, and takes place at lower temperatures because of the sensibly different composition of the liquid; thus the partial pressures of the less volatile substances included in the condensate are relatively lower and contribute less to the total vapor pressure, than in the case of vaporization in the directly heated bulb.

As distinguished from the comparatively open book that fractionation can place at our service, the present standardly used method of distillation results in the recording of too high initial points and end points that are too low by a like amount.

It is a deplorable fact that two men using identical standard apparatus cannot consistently check each other with identical fuel samples. A skilled chemist states that he despairs of getting reasonably close checks on repeat distillations.

These are the points that need looking into, to the end that the easily realizable possibilities of fuel fractionation may be understood and put to work.

Requirements for Close Fractionation

TO secure the extensive fractionation of a petroleum fuel mixture, the two steps in the process, partial condensation and partial revaporization, must be repeated very many times and under conditions that promote the most intimate contact possible between rising vapors and descending condensates. Of the two steps that of revaporization is the more effective, particularly if it is handled with sufficient delicacy and in proper environment.

A most important consideration in treatment of the condensates is that they shall descend at rates and in paths such as to effect complete heat interchange with the rising vapors. This presupposes that at any level in the neck or still head there is a minimum and heterogeneous temperature gradient. To state the case negatively, there must not be on the wall of the still head a rapidly descending and comparatively cool sheath of condensate surrounding a freely ascending core of hot vapors.

A further point of prime importance is the momentary relation between the temperature of the still head and that of the vapors passing through it. If the still head is relatively too hot, fractionation is reduced because insufficient condensate forms to give a material purification of the vapors; and also the benefits of revaporization of condensate are largely lost because of its meager quantity and unfavorable composition. If the still head is relatively too cool compared with the vapor temperatures, too much condensate forms in relation to the mass of the vapor column, thus minimizing revaporization and causing the return of too much of the more volatile constituents to the still.

Since the relative temperature of the still head controls both the rates of condensation of the vapors and the rates of revaporization of the condensates, it appears that its careful regulation is one of the most important single items in the process.

Enough description and discussion have been offered up to this point to justify the immediate enumeration of general design essentials of a highly fractionating distilling outfit:

(1) Close and consistent regulation of the temperature of the still head walls.

(2) Intimate thermal contact between vapors and condensates.

(3) Minimum temperature gradient across still head section at any level.
(4) Sufficient space and time intervals between still and side tube.

These features, as well as the several other more widely recognized and more perfectly embodied ones, are capable of easy and simple realization in practice.

OF the great number of still head types and forms from which choice can be made, there is only one, the Hempel,[1] inherently embodying an approach to still head temperature regulation by controlled means. In this form the greater part of the passage is filled with beads —elipsoidal aluminum beads according to Bureau of Mines suggestion. This gives the still head a mass and heat capacity not possessed by any of the others, thus largely protecting its contents from wide accidental temperature fluctuations. The result is that the head is a comparatively efficient fractionator.

But while the Hempel head possesses the advantage of a considerable heat inertia, and also satisfies item (2) in considerable measure, it falls far short of the highest possible realization of the first two essentials. Much more condensate is always found at the walls than in the bead interstices along the axis. And while thermal contacts between condensate and beads are good, those between beads are quite imperfect. Thus item (3) is very incompletely satisfied. This, taken together with the always exceptionally large amounts of condensate compared with the vapor mass, brings the fractionating efficiency well below that attainable.

The reason for discussing the Hempel still head at this length is that it is easily the best of all the fractionating apparatus obtainable in the market to-day, considering its efficiency together with its simplicity, ruggedness and cost.

None the less, no great sacrifice of simplicity, and only unimportant increase in cost of apparatus need be endured to make great gains in fractionating efficiency and ruggedness, to say nothing of greater convenience, automaticity and foolproof qualities in manipulation. The two qualities last named are obviously of the greatest importance in commercially used apparatus and are realized to negligible extents in the operation of any of the usual set-ups.

[1] For a general discussion of fractional distillation and the experimental examinations of a great number of still heads, see Sydney Young's "Fractional Distillation" and U. S. Bureau of Mines Bulletin No. 125, "The Analytical Distillation of Petroleum," by Rittman and Dean.

A Specially Designed Fuel Still

IN 1916 the writer became keenly interested in the present subject, and, after considerable experimenting with available apparatus, designed and built the fractionating unit shown in Fig. 1. The idea back of the design was to secure the greatest possible fractionation in a single run. If the efficiency in this direction could be made great enough, a single run would yield all the information needed for ordinary purposes, and it would become unnecessary to make the usual very intricate and troublesome redistillations of primary fractions. It was recognized that the most useful apparatus would have to be a completely self contained unit, practically non-breakable, always set up, easy to handle, closely but almost automatically regulable, and at the same time free from disturbance by outside influences.

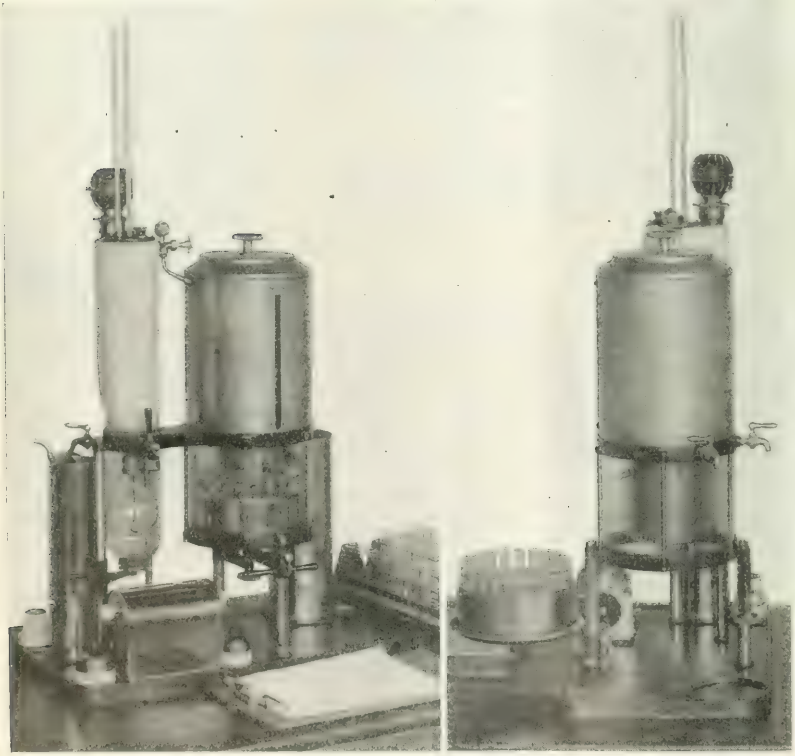


Fig. 1—The special self contained distilling apparatus built by the author in 1916. The important features are a highly efficient fractionating still head, close and nearly automatic regulation of the still head temperature, complete protection from disturbance by outside influences, and a high degree of convenience in manipulation. Repeat distillations in this apparatus check each other within plus or minus one per cent (cumulative) throughout the distilling range

Referring to the views of the apparatus, the still is a 200 cc. Pyrex flask mounted in a fitting which seats upon a lead gasket to make the joint with the still head. Boiling of the still liquid is caused by passing 110 volt current, under external resistance control, through a small coil of Nichrome wire immersed in the liquid and in contact with the bottom of the flask. Surrounding the still flask is a readily removable shield which protects it from air currents.

The still head is made up of copper spinnings, silver

soldered together, and is a modification of the well known "pear" head, so arranged, see Fig. 2, that the rising vapors thoroughly scrub small amounts of condensate in each section.[1] There are twelve sections or chambers having a total height of 12 in., including the upper elongated one in which the still head thermometer is mounted.

An oil jacket which surrounds the still head, is provided with a controlled electric heater unit at its base, and has a large return tube at one side in which a propeller is driven by a stirring motor. A thermometer having its bulb immersed in the oil of the jacket stands beside the still head thermometer.

At the top of the still head is a fitting including a shut-off needle valve and a manometer connection for use in vacuum distillations. The vapor down-flow tube is joined to the still head fitting by a union and is soldered to the condenser tube. The latter is quite short (16 in. of 5/16 in. o.d. copper tube), is zig-zagged instead of coiled, and passes steeply down through a condenser chamber provided with a heavy heat insulating lagging. The condenser chamber, which is also provided with a heater and a thermometer, is continued at reduced diameter well below the level of the condenser tube outlet, for the purpose of providing cooling for the distillate receivers.

THERE is capacity in the receiver carrier for twenty tubes; and the carrier is rotated to change receivers, as required, by turning a large knob at the top of the condenser chamber. A spring-pressed ball engages its notches in the carrier spindle boss for positive location of the receivers under the condenser tube outlet. The whole receiver carrier, together with the bottom cover or sealing plate of the glass enclosed chamber housing the receivers, slides vertically downward upon release of a spring catch, and can then be swung around to the front for charging with receivers or changing them. The glass walled chamber can be made up air tight, as for vacuum distillation, when the carrier is in position; and the pressure is then reduced as desired by connection with a pump. In ordinary distillation this pump connection is left open, venting the apparatus to the atmosphere.

At the base of the still head, at the front, is a combination cock and funnel for use in refractionation of primary distillates. With the handle up the still is sealed. To introduce a fraction for redistillation, the tube containing it has slipped over its open end a stopper which fits the funnel. The tube and its stopper are engaged tightly in the funnel while the latter is inverted; then a half-turn of the handle introduces the primary fraction to the still with negligible loss. For redistillation of fractions the 200 cc. still is removed and in its place is mounted a Pyrex test tube of about 40 cc. capacity.

[1] The writer is about to build in a modification of Sydney Young's "evaporator" still head, shown in Fig. 3, which possesses several features of important advantage over the form shown in Fig. 2, as well as compared with Young's original form. The head of Fig. 3 is also made of metal, silver soldered together, each section being ⅞ in. long. Young's sections were made in glass, and ranged from 3 to 5 in. in length each. The important advance here made is that the condensates have minimum duration of contact with the outer cooled wall of the still head; and once condensate has drained down from the outer wall in any section it never again comes into contact with the outer wall (in the liquid state), but is continuously spread over the heater interior surfaces that are swept by the vapors. Revaporization goes on at a very high rate, the condensates actively boiling on the [illegible] of each of the inverted cups, as seen in the experimental [illegible] when metal "evaporator" sections were packed into a glass still head tube. Great practical advantages of this head are: (1) that it is impossible to block it, since the up flow of vapor does not interfere with the down flow of condensate, thus permitting high distilling rates; and (2) a distilling rate up to 250 drops per minute with a nine section head and 100 gr. of fuel does not materially reduce the fractionating efficiency, as compared with the more usual 90 to 120 drops per minute.

[2] Where the receiver is out in the open room, as is usual, it is obviously impossible to saturate the space in which it stands.

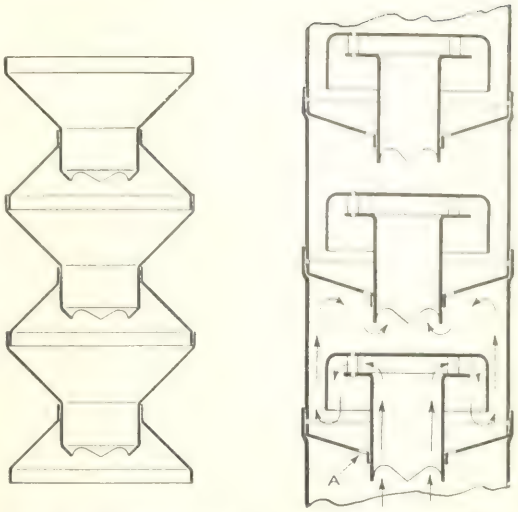


Fig. 2 (left)—The modified "pear" still head originally built into the apparatus of Fig. 1. Fig. 3 (right)—Sydney Young's "evaporator" still head as modified by the author. The condensates seal the small drain holes through which they pass and force the vapors to take the paths shown by the arrows

The whole apparatus is mounted on a cast iron base, which has locating depressions for draining vessels for condenser and still head jackets, and also carries the still and still head heater resistances, switches for stirring motor and heaters, a fuse plug and a line socket.

Operation of the Special Still

IN a distillation of gasoline the oil for the still head jacket, contained in the smaller draining vessel, is cooled to nearly 0 deg. C. (32 deg. Fahr.) by setting that vessel inside the larger one and packing ice around it. The cold oil is then poured into the still head jacket and its drain vessel set under the overflow tube of the jacket. Some 5 lb. of shaved ice and salt is put into the condenser jacket, which is then filled with cold water.

Twenty receivers are located in their carrier, and about 50 cc. of the fuel to be fractionated are poured into the bottom of the carrier. The latter is then raised into position and No. 1 receiver located under the condenser tube. Having weighed 100 grams of the fuel sample into the still flask the latter is screwed tightly into place and the run can start.

It will be noted just above that the jacket oil is considerably cooled and that a quantity of the sample is poured into the bottom of the receiver carrier. The latter is done to saturate with fuel vapors the space in which the receivers are located. If this space is not saturated[2] the small amounts of very volatile fuel substance coming over as the still head temperature is raised to find the initial point will be largely lost by evaporation at the condenser tube outlet, even though they are liquefied in the condenser. This loss makes any determination of the lowest boiling constituents very problematic.

Considering a comparison of gasolines for winter use, a reasonably exact knowledge of initial points and the percentages coming over below about 40 deg. C. (104 deg. Fahr.) is of great importance, since that is the portion of the fuel which largely determines, by the extent of its presence or by its absence, whether the car starts

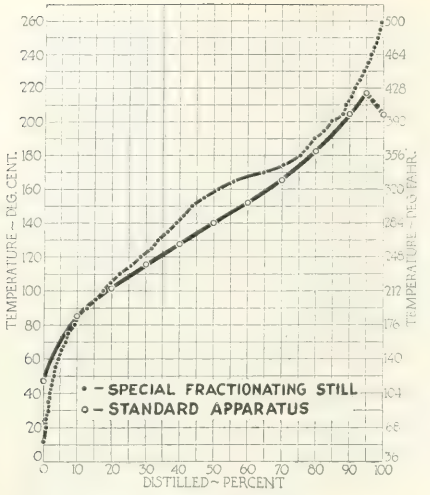


Fig. 4—A direct comparison, or conventional coordinates, of runs on the same fuel, as carried out in the standard apparatus almost universally used and in the special still described in the text. The differences are considerable and very important

easily, with difficulty, or not at all. In order that these most volatile substances may appear in the record it is necessary to start a distillation with the still head at so low a temperature that their vapors will not pass through. If the still head is at room temperature, as is usual, those substances in the fuel boiling below room temperature will be assigned grossly misplaced boiling points, for the perfectly plain reason that the still head thermometer is indicating a too high temperature when they come over. It is a fact that if our fuels really had initial points and earliest fractions as described by standard distillation tests, it would be found almost impossible to start a cold motor car engine in winter weather. The plottings of comparative distillations show the importance of getting the initial points and earliest fractions accurately into the record.

WITH everything set as above, the stirring motor is started and heat is applied to the still to induce fairly active boiling. As a rule, the still head thermometer stands higher than the jacket thermometer at this time; but they quite rapidly come to equality when the vapors enter the still head—the jacket rising very slowly and the still head dropping rapidly .

In fuels that have been available this last winter practically nothing shows up at the condenser outlet below about 10 deg. C. (50 deg. Fahr.). But in the saturated atmosphere in which this outlet is located the first drop forms very rapidly once the outlet tube shows moisture. The temperature at which the first drop falls is taken as the initial point.[4]

In the procedure most used with this apparatus: (1) the jacket is maintained at from 1 deg. to 3 deg. C. (1.8 to 5.4 deg. Fahr.) behind the still head; (2) the boiling is regulated to discharge distillate at an average rate of about 90 drops per minute, and (3) the receivers are shifted at each 5 deg. C. following the first drop.

[4] The true initial point is always well below the value found as the initial point in primary distillations of complicated mixtures. The reasons for this are discussed near the end of the paper. Specific gravity determinations made on the first distillate to appear, at from 10 deg. to 14 deg. C., show that it is probably largely butane, which boils at 1 deg. C.

It has been found that more easily interpreted data results from taking cuts at definite small temperature increments, than from doing so at certain volume increments, however small they may be. There remains a choice of method in determining how the quantity of each fraction shall be measured. Accurately graduated receiver tubes may be used, and the volumes read directly. But the preferred method is by weighing. Not only is it more accurate, but weight percentage gives a truer picture of the effective composition of a fuel, because of the usual wide range of specific gravities of the fractions. Then, too, no account need be taken of temperature in determinations by weighing. The reason for the narrow temperature increment of 5 deg. C. between cuts is that a truer differentiation between substances is obtained than would be possible with greater increments. Study of the differential plottings, Fig. 5, will make this clear.

MAINTAINING the jacket at from 1 deg. to 3 deg. C. behind the still head outlet minimizes the temperature gradients in any cross section, promotes the revaporization of condensates and keeps the quality of condensate in very favorable relation to the vapor mass, at least in the upper two-thirds of the still head. Of course the presence of the jacket completely protects the still head from accidental fluctuations of temperature, so that there are no out-of-control accelerations or retardations of the process. With the still head of metal, the jacket oil most successfully imposes its temperature upon the vapors; and carrying the whole still head at substantially the same temperature throughout its length heavily condenses the higher boiling substances as soon as they enter the head, while interfering comparatively little with the vapors of those substances boiling in the immediate neighborhood of its temperature.

Having started boiling in the still, its temperature steadily rises and steadily maintains evolution of vapor with very little attention to its heater control. And because the still vapors, directly and upon condensation, contribute to the rise of temperature of the jacket, the only attention the jacket heater requires to maintain the desired temperature relation is an occasional small reduction in the resistance in circuit, to make up for the increased heat loss from the jacket as the temperature goes up.

As the fractionation goes on an appreciable quantity of relatively pure substance accumulates in the top sections of the still head, and, as the jacket temperature rises steadily, a temperature is reached at which the greater part of this accumulation boils off very freely and passes into the condenser. While this is happening the rate of rise of the still head temperature reduces and the rate of dropping from the condenser tube increases. But as soon as this comparatively purified substance has left the still head the conditions reverse, and the still head temperature runs up quite rapidly while the rate of dropping of distillate falls off strongly, until a relatively appreciable quantity of the next higher boiling distillate is forced over by the continued rise of the jacket temperature.

No attention is paid to these momentary fluctuations in rate of rise of still head temperature, nor to the accompanying changes in rate of dropping of distillate. By this it is meant that no changes are made in the heater adjustments to compensate for them, since they are perfectly normal to the operation of the apparatus. The only attention given is to the general maintenance of the average desired temperature difference between jacket and still head and of the average desired rate of dropping.

Any fractionating apparatus has an upper limit of

distilling rate beyond which a considerable loss in efficiency of separation is experienced. There is no lower limit; but for ordinary purposes the gains from an inconveniently low rate (less than 30 to 40 drops per minute with 100 grams of fuel) are so small as to be not worth while in an efficient apparatus. For the size of sample used in the special still, the upper limit beyond which it is ordinarily undesirable to go is an average of about 120 to 140 drops per minute. At this rate the fractionating efficiency is less than at the usual average of about 90, although it is still good enough to permit a fair estimate of the proportions of the majority of the components, if it is continued to take cuts at 5 deg. C. increments.

So efficient is a single run fractionation in this apparatus,[1] when handled as described, that when substituting fresh receivers to carry the distillation further, only the last one of the earlier group need be left in place, and only a few additional drops discharge into it before the temperature again attains the end value for that cut.

Results Obtainable in Single Runs

INSPECTION of the curves here presented makes clear the reasons for the foregoing lengthy discussion. In Fig. 4 are compared in the conventional way the results of fractionations of the same fuel, as carried out respectively, in the present standard set-up and in the special apparatus just described. There are several striking differences. The initial point and the appreciable percentage coming over below 40 deg. C. (104 deg. Fahr.) are shown to be entirely lost from the record in the use of the ordinary apparatus. Other important differences occur all along the line, and the very nearly true end point shown by the one curve is perhaps just vaguely suggested by the other.

The general reason for differences of this latter class is, of course, the relative degree of fractionation obtained. But the underlying reason is found in the vapor-pressure-vs.-temperature characteristics of mixtures of the sort of substances composing petroleum engine fuels. These are compounds that are, in the main, both chemically and structurally similar, and they are all infinitely miscible. Mixtures of this class of substances have boiling points intermediate between those of the pure substances, depending upon the proportions of the mixture.

If only the temperature range of distillation is sought, without regard for the quantities of material volatilizing at the several temperatures, the foregoing considerations cause distortion of the results only at the two ends of the run—the initial point will be too high and the end point too low. But it is very necessary to know the true initial and end points, as well as the percentages volatilizing between them, as has been discussed. The only recourse is to carry the relative purification as far as possible by efficient fractionation.

Differential Plottings of Fractions

THE conventional plotting of cumulative per cent-distilled-vs.-temperature, as in Fig. 4, hardly does more than show the boiling range for the fuel examined, and

[1] The body of this paper is concerned with a method of distillation that will give a valuable record in the minimum time. From the very nature of the happenings in a still head having close temperature regulation, it follows that the greatest possible separation will occur with exactly equal jacket and still head temperatures and a very low rate of dropping of distillate. Furthermore, if the jacket temperature is held constant, the composition of the distillate is constant. The possibilities of the special still for truly analytical distillation are thus seen to be very great. The method of handling for maximum possible separation is to cause the jacket temperature to rise very slowly (not more than 1 deg. C. in two minutes, and to regulate the boiling in the still to keep its head temperature just equal to that of the jacket.

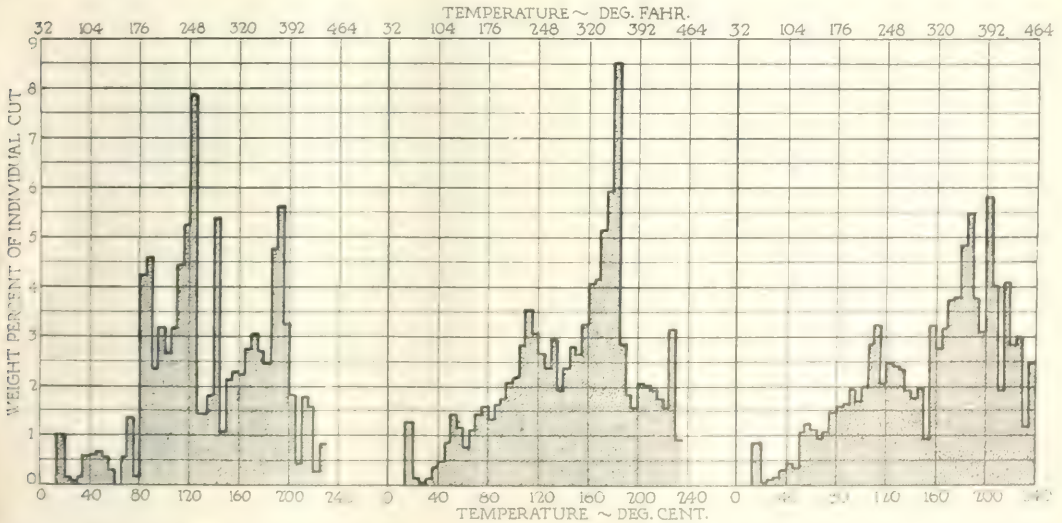


Fig. 5—As distinguished from the curves of Fig. 4, which may be called "cumulative" plottings, these curves may be styled "differential" or "direct" plottings. The three gasolines represented are those most widely sold in Chicago, and were bought at filling stations on March 8, 1922. They are arranged (from left to right) in what seems to be their order of general merit for use in the average carburetion system. No. 1 gasoline (left) is said to be a straight run, non-blended product, which claim is amply supported by the distillation. It is only such a fuel that permits of the relatively sharp definitions between substances as appear in the curve. The more complicated the fuel, however the complication may be caused (by blending, cracking), the more pure substance boiling points there are, and the closer together they will be. This makes it more difficult to separate the components by fractionation; and, in a group of plottings as above, provides important information on the nature of the substances comprising the fuel

gives only a very vague idea of the substances and the quantities of their occurrence. However, if the data are plotted as in Fig. 5, where the percentage of each cut is treated as a separate entity, much important information is graphically presented. This kind of graph from an efficient and effectively handled fractionation gives at a glance (1) the approximate number of fuel substances appreciably present; (2) approximate boiling points of the substances; (3) the relative importance of their occurrence, and (4) a close approximation to the percentage representation of each of them. The strikingly graphic properties of the direct fraction percentage vs. temperature plot, for the comparison of several fuels, are well brought out in the several sections of Fig. 5.

What Is Wrong with the Standard Test?

IN closure it can be said, in the light of the foregoing, that the things that are wrong in the standard fuel distillation test are:

(a) No control of the still head temperature;
(b) Use of an unnecessarily rudimentary still head;
(c) Distilling rate too high, considering (a) and (b);
(d) Large distillate percentage increment per cut; and
(e) No provision for conserving the earliest distillates.

The following values have been taken from the Smithsonian Tables, Van Nostrand's Chemical Annual and the work of Mabery and Goldstein as published in the American Chemical Journal. While this list does not include all of the substances found in gasolines throughout the country, it does include all those that occur in significant quantity.

TABLE I

Substance		Specific Gravity	Boiling Point Deg. C.
Paraffin Series:			
Butane	C_4H_{10}	.600	1.0
Pentane	C_5H_{12}	.647	36.3
Isopentane	C_5H_{12}	.638	30.4
Hexane	C_6H_{14}	.663	69.0
Isohexane	C_6H_{14}	.676	62.0
Heptane	C_7H_{16}	.701	98.4
Isoheptane	C_7H_{16}	.706	90.3
Octane	C_8H_{18}	.719	125.5
Nonane	C_9H_{20}	.733	150.0
Decane	$C_{10}H_{22}$	.745	173.0
Undecane	$C_{11}H_{24}$	.756	195.0
Dodecane	$C_{12}H_{26}$	.765	214.0
Tridecane	$C_{13}H_{28}$	.771	234.0
Tetradecane	$C_{14}H_{30}$	.775	252.6
Pentadecane	$C_{15}H_{32}$	.776	270.0
Hexadecane	$C_{16}H_{34}$	.775	287.0
Ethylene Series:			
Butylene	C_4H_8	.635	1.0
Amylene	C_5H_{10}	.666	36.0
Hexylene	C_6H_{12}	.760	69.0
Heptylene	C_7H_{14}	.703	98.0
Octylene	C_8H_{16}	.722	119.0
Nonylene	C_9H_{18}	.767	135.0
Decylene	$C_{10}H_{20}$	.763	160.0
Undecylene	$C_{11}H_{22}$	.773	190.0
Dodecylene	$C_{12}H_{24}$	.785	213.0
Tridecylene	$C_{13}H_{26}$	.844	232.0
Tetradecylene	$C_{14}H_{28}$	.794	244.0
Pentadecylene	$C_{15}H_{30}$	.814	263.0

Steel Made Direct from Ore

THE present method of making steel from the ore comprises two distinct stages. In the first pig iron or cast iron is made from the ore by reduction with carbonaceous matter and in the second the cast iron after being melted is decarburized by blowing air through it or over it. Theoretically there seems to be no reason why steel could not be made direct from the ore, but in practice a number of difficulties are encountered. The direct process would seem to be much simpler and quicker and to permit of material savings in the production of steel.

Last year considerable excitement was caused in steel circles of different countries by the announcement of a new process invented by a French metallurgist, Basset.

At the time it was reported that a company with a capital stock of 60,000,000 francs had been organized to work the process.

The Basset process is carried on in a rotary kiln 8 ft. in diameter by 130 ft. in length which is inclined from the horizontal at an angle of about 20 deg. At the lower end, where the fuel is burned, the diameter is increased so as to give sufficient capacity to hold the molten metal and slag. Powdered coal is used for fuel. The air for the furnace is heated in a suitable blast-heating apparatus to about 1832 deg. Fahr. At the throat of the furnace finely ground ore is charged, together with the necessary limestone and coal needed for reduction. Basset claims that he is able to burn his fuel to carbon monoxide instead of to carbon dioxide, and in the light of criticism by metallurgical writers, it appears that any novelty there may be in his process must reside in this feature, as the general type of rotary kiln shown in Basset's drawings has long been known. Ordinarily the fuel, whether coke or charcoal, will burn to carbon dioxide and if the amount of carbon from the fuel is limited it is apt to abstract carbon from the red hot, carburized metal and cause re-oxidation. In fact, chemists generally seem to hold the view that the production of carbon monoxide by the direct combination of carbon and oxygen is impossible. Basset claims that re-oxidation of the reduced iron is completely avoided.

A critique of the Basset process by Fritz Wuest appeared in *Stahl und Eisen* of Dec. 22, 1921. The advantages for the Basset process are claimed to be as follows: Coal consumption is only 1000 lb. per ton of steel. Labor cost is reduced 75 per cent. Plant cost is reduced 80 per cent. Cost of production is reduced 50 per cent. Wuest analyses these figures on the basis of German costs and comes to the following conclusions:

"The amount in favor of the new process as regards cost of production is 6.78 marks per ton which is a reduction of 10.4 per cent from the cost with the old process. This comparison favors the new process, but the figures of daily production, which affect only 50 per cent of the cost, cannot be agreed with.

"It must be remembered that Basset can only produce finished steel in his furnace if he commences with very pure ore. Usually a product between steel and pig iron will be the result, which must be further refined, whereby the cost of production will be increased, and the new process will not be advantageous compared with the old one. Furthermore, the Basset process cannot be worked without a part of the reduced iron being slagged, and this process is no better than other direct processes as regards complete utilization of the iron."

Improved but Cheaper Closed Bodies Are Predicted

Manufacturers who are ready for the fall trade with substantial but inexpensive closed cars are expected to profit in large sales. Earlier types of cheap closed cars are said to have lacked several features which are considered necessary for unqualified success.

By J. Edward Schipper

NEVER in the history of the automobile business has body design occupied so important a position as it does now. No one who is in close touch with the industry fails to realize that there is a tremendous amount of closed car business to be had this fall. It may be taken as a maxim that the manufacturers who hit the nail most squarely on the head in respect to body design will be leaders in the fall selling. The low-priced closed bodies which have been on the market for a year now have done more to educate the public to the closed car than years of sales arguments and expert coach work.

To put this in another way, the public has never failed to realize the value of the closed car, but it has failed to comprehend the vast difference in price between the closed and the open car. The market has been hungry for a long time for the utility closed car, but it cannot be gainsaid that the market is to a considerable extent disappointed in the earlier types which have been put out. It may be that the pendulum swung too far the other way, and that in order to get down to a price which approximates that of the open car, a certain amount of durability, appearance and other qualities desirable in a closed vehicle were sacrificed. Indications that many manufacturers believe this to be the case have already begun to make themselves apparent. We are finding more substantial construction, involving chiefly the use of pressed steel parts where wood was formerly employed. It is quite apparent that the successful utility body of the very near future is to be a compromise between the earlier form where everything was sacrificed for price, and the regular coach maker's closed job wherein quality was the prime requisite.

IT will very likely happen that after we have learned how to build the closed body as it should be manufactured, the result will be a product which is superior to many of the so-called coach maker's jobs. It is certain that the extensive use of pressed steel is replacing wood in many of the parts where formerly it was believed impossible to use anything else, but steel has not only added to the simplicity and strength of the structure, but has also eliminated a great amount of hand fitting work and made it a machine cut proposition.

The all-steel closed body has a great many problems wrapped up with it. Primarily, it is impossible to manufacture an all-steel closed body without making a large quantity job of it. It is quite apparent that the tremendous die costs for the pressed steel parts for such a body can only be absorbed through tremendous production if the real benefits of pressed steel are to be derived. On the other hand, if it is possible to eliminate wood altogether as one very large manufacturer has recently done, it is possible to save money in other directions outside of manufacturing. One of the biggest sources of saving is in the finishing of such a job. Instead of using 15 or more coats of paint, it will be possible to get down to 2 or 3 coats of hard baking enamel which can be governed more uniformly, and also provides a surface which stands up under weather conditions and under even more severe washing conditions.

A NEW angle of the used car problem is presented in the merchandising of closed bodies this fall. The new economical type of closed body on a new chassis must be put out at an attractive price to compete to some extent with the used closed bodies which are on the market. To put this in another way, the new type of closed body will be most successful if it gives all of the comforts, appearance and durability of the former coach maker's type of closed body, together with the manufacturing economies made possible (1) by the greater use of pressed steel, (2) by the elimination of expensive curves and bends, and (3) by so designing that to some extent sub-assemblies may be employed which will eliminate the necessity for interior hand fittings, which require the highest class of labor and, owing to the awkward position of the operator in performing the work, is necessarily expensive and laborious.

It cannot be denied that the low-priced closed cars of last fall have been of tremendous value to the industry. They have taught the public to buy closed cars. They have taught the industry that it is possible to manufacture an enclosed car cheaply, even if it has to be done at the expense of what was formerly considered good practice in the coach builder's art. The final outcome will undoubtedly be a body which will cost the public a little more money than the first of these economy closed cars and less money than the old line closed bodies. This is the type of body which is going to sell this fall, and the manufacturer who rings the bell with a closed job is going to find it difficult to keep demonstrators on his dealers' floors.

Peru in Need of Motor Transportation—American Car Makers Can Supply It

Peruvian public must be shown utility value of the automobile. Economic value of good roads must be proved. American manufacturers can play an important part in this educational movement. Consignment sales should be seriously considered.

IN going after the Peruvian automotive market, the American manufacturer should not neglect the industrial centers outside of Lima. At present there is no great amount of business there, but there is a worth while amount of future business to be cultivated. The difficulties of financing sales are great because few people in the provinces have money and they do not want to part with what they have to meet their obligations.

At the present time the principal American automobiles in Peru are the Ford, Dodge, Hudson, Chandler, Buick, Willys-Knight, Overland and Reo. The European manufacturer of automobiles has made very little headway since the close of the war. The Renault and Fiat are well represented and there are a number of other makes, but they are limited in number to one of each kind. German automobiles have appeared and there are at present five or more represented, but in negligible quantities. One factor which doubtless has bearing on the scarcity of European cars is that they are generally admitted to be inferior in quality to the pre-war product and this applies to all the countries. That American cars have a foothold is evidenced by the fact that less than 10 per cent of all the cars in Peru are of European manufacture.

Trucks Suffered From the Depression

Truck sales have not been making much headway and the sale of such heavy units as have been made are mostly of European manufacture. Tractors have suffered from depression more than any other automotive products. The future for lighter truck units should be considered favorable as the motor bus service in Lima has grown rapidly and is capable of much expansion. This latter is dependent on an improvement in the condition of the highways.

Importers in Lima have refused to buy and this is due to business instability and the unfavorable rate of exchange. The Peruvian pound is now worth about $3.50. Recently it fell to $3.35 but soon recovered. The returns of the Lima Clearing House show a falling off in the daily average of bank clearings in March as compared with February. Considering the number of days in the months the difference in the sum totals was not very great. Even with this falling off in March the situation is better than it was in the corresponding month of the two previous years. It is possible that temporary uncertainty in regard to possible banking developments may have momentarily checked business.

In view of the fact that the unfavorable rate of exchange makes the carrying on of business a difficult task it is necessary to find some way of obviating this difficulty and getting the business. The method of selling on consignment merits the consideration of the American manufacturer as this appears at present to be the only answer to "How can business be carried on?"

Since Peru depends so completely on her export market, it is necessary that this open up before there can be a great business revival. The chief exports of the country are cotton, copper, wool, rice, sugar, petroleum and rubber. When the foreign demand for these picks up then there will be a market for automotive products. In fact, it may be said that when cotton begins to move in the United States then automobiles will begin to move in Peru.

At the present time the market for the sale of automobile parts is much better than the market for the complete product. This is a fact which is worthy of consideration by American manufacturers.

It is customary in Peru to celebrate the National holidays and this celebration takes place from July 28 to 31. Just previous to the holidays is a very good time to make automobile sales and by the end of the holidays the stock of old cars should be pretty much cleaned out. This starts the last half of the year with a clean slate and the American manufacturer should be able to secure some orders.

There are several things that may be done to cultivate the Peruvian market, most important of which is a campaign of education. The people need to be educated to the value of the automobile and to know how to handle it. They also need to understand the economic value of good roads. Therefore the primary need is to make the public and the roads ready for the use of automobiles. One way to achieve this is to increase the circulation of automotive magazines written in Spanish and by means of this medium, foster an enlightened public opinion.

Another factor which should lend impetus to the use of the automobile is the use of alcohol as an engine fuel. Much space has been given recently in the press as to the possibilities of its use. Fuel alcohol is produced very cheaply in Peru and could its manufacture be fostered it would create a new manufacturing industry for the country.

Belgium Duties on German Cars

INCREASED import duties are now levied by Belgium on various German goods, including automobiles. This measure was taken as the result of a general protest of Belgian manufacturers against German competition made possible by the low monetary value of the mark. In taking this protection, Belgium has only followed the example of France, which has an import duty of 45 per cent on foreign automobiles of all nationality except German, which have to pay 180 per cent.

New Cletrac and Rogers Tractors Undergo Nebraska Tests

Cletrac Model F develops 19.61 b. hp. at 1620 r.p.m. and 9.84 drawbar hp. at about 3 m.p.h. Rogers tractor, which is a much larger machine driving on four wheels, developed 63.04 b. hp. at 822 r.p.m. and 35.47 drawbar hp. at a speed of 3.34 m.p.h.

TWO additional tractor tests have recently been completed by the Nebraska Board of Tractor Test Engineers, which, under the Nebraska law, are required to test all tractors offered for sale in that State. The two machines recently tested are the new Cletrac, Model F, which has been fully described in these columns, and the much larger Rogers tractor, which is a four-wheel drive type fitted with a much lower-speed engine than that used in the Cletrac. Both machines completed the test successfully, the Cletrac being operated on kerosene and the Rogers on gasoline.

The tests made include a two-hour brake test at rated load and speed, a one-hour test at varying load, a one-hour test at maximum load and a ten-hour test pulling rated horsepower at the drawbar.

The Cletrac tractor had an Eisemann high-tension magneto and a Tillotson carbureter. It is of the creeper type and weighs 1920 lb. Following are the results of the brake horsepower tests: Rated load test—Horsepower developed, 16.36 at 1611 r.p.m., running on kerosene with a consumption of .79 pt. per hp.hr. Together with the fuel there was consumed 0.29 gal. of water during the 2-hr. test. In the maximum-load test the engine developed 19.61 hp. at 1620 r.p.m. and consumed kerosene at the rate of 1.19 pt. per hp.hr., with a water consumption of 1.47 pt. per hr. In the half-load test the engine developed 9.38 hp. at 1826 r.p.m. for 60 min., consuming kerosene at the rate of 1.08 pt. per hp.hr. together with a total of .67 pt. of water.

In the drawbar tests at rated load, extending over a period of 10 hr. the tractor developed 9.84 drawbar hp., that is a drawbar pull of 1251.5 lb. at a speed of 2.945 m.p.h., whereas in the maximum load test the tractor developed 13.145 drawbar hp., or 1780 lb. drawbar pull at a speed of 2.77 m.p.h., the engine speed in both drawbar tests being 1568 r.p.m.

During the complete test, consisting of about 30 hr. running, the following oil was used: For the engine, 3⅝ gal. of Mobiloil A (3 gal. to fill crankcase and transmission and 5 pints added during test).

No adjustments were made. During the 10-hr. drawbar test one roller, washer and retaining key for shoe pin were lost. Test was not interrupted. At the end of the test the engine and tractor were in good running condition and there were no indications of undue wear in any part nor of any weakness that might require early repair.

Test of Rogers Tractor

The Rogers tractor was fitted with a Berling magneto and a Zenith 2-in. carbureter. The engine of this tractor is a Buffalo 4-cylinder, vertical L-head of 6¾-in. bore by 9-in. stroke, with a rated speed of 800 r.p.m. This is a four-wheel drive tractor with disk clutch and two speed forward and two speed reverse gear, the low speed being 1.6 m.p.h. and the high speed 3.6 m.p.h. An hydraulic steering gear is fitted. The tractor weighed 19,500 lb.

In the rated load test the engine of this tractor developed 61.3 hp. at 815 r.p.m. for a period of 2 hr., consuming gasoline at the rate of 1.26 pt. per hp.hr. The atmospheric temperature during the test was 64 deg. and the temperature of the cooling water leaving the engine, 192 deg. Fahr. During the varying load test a belt slippage of 1.5 per cent was noted, and when the engine delivered 37.9 hp. at 831 r.p.m. the fuel consumption was at the rate of 1.64 pt. per hp.hr., the atmospheric temperature being 60 and the water temperature 173 deg.

In the maximum-load test the engine developed 63.04 hp. at 822 r.p.m. and consumed gasoline at the rate of 1.23 pt. per hp.hr., whereas in the half-load test it developed 31.48 hp. at 827 r.p.m. and consumed 1.68 pt. per hp.hr.

In the drawbar tests at rated load the horsepower output was 35.47, the drawbar pull being 4215 lb. at 3.34 m.p.h., corresponding to a crankshaft speed of 828 r.p.m., the slip of the driving wheels being 4.42 per cent. The fuel consumption was at the rate of 1.88 pt. per drawbar hp.hr. and the loss of water at the rate of 0.65 gal. per hour. The atmospheric temperature was 79 deg. and the water temperature 199 deg. In the maximum-load test in high gear the tractor developed 39 drawbar hp., that is 4215 lb. drawbar pull at 3.47 m.p.h. During a maximum drawbar hp. test in low gear the tractor developed 34.85 hp., or 10,000 lb. drawbar pull at 1.31 m.p.h. The wheel slippage in this latter test was 3.36 per cent on the basis of the circumference of the wheel rims and 14.79 per cent based on the points of the wheel lugs.

During the complete test, consisting of about 78 hours running, the following oil was used: For the engine, 23½ gal. of Mobiloil B (9 gal. to fill crankcase and 14½ gal. added). For the transmission, 1½ gal. of 600 W. For steering gear reservoir 4 gal. heavy Polarine.

The following adjustments were made before any official data were taken: Shortened fan belt, 4 new spark plugs, adjusted one valve tappet, put on larger vacuum tank, put on new governor spring, removed belt clutch throwout arm and tightened spring, pulley clutch throwout not used during test.

The following adjustments were made after the test began: Magneto points dressed 4 times, magneto points replaced, put in 4 new plugs, repaired broken fan bracket, lacing on fan belt broke three times, welded water manifold, enlarged suction line on oil pump.

At the end of the test the compression was slightly lower on all cylinders. Right steering cylinder was leaking oil, otherwise the tractor seemed to be in good working condition.

No fault was found by the Board of Test Engineers with the advertising literature issued by the manufacturer of either tractor.

Industry Well Served by Automotive Division, Department of Commerce

Annual report reveals extent and effectiveness of work already accomplished. Automotive statistics being revised and trade lists containing much valuable information prepared. Close contact with industry maintained through important trade associations.

THE annual report of the Automotive Division of the Bureau of Foreign and Domestic Commerce, Department of Commerce, covering the fiscal year ending June 30, 1922, has just been issued, and indicates that the effective co-operation with the automotive industry planned by Secretary Hoover has been established and is bearing fruit.

A summary of the report follows:

The Automotive Division of the Department of Commerce was organized in the early part of September, 1921, by Gordon Lee, Chief, and Wm. I. Irvine, now Automotive Trade Commissioner in the Far East, with a view of assisting manufacturers of passenger cars, motor trucks, motorcycles, accessories, airplanes and motor boats, in their foreign trade activities. During the year the Division personnel has increased from two to eleven people. The number of commercial inquiries answered by the bureau and the district offices regarding automotive products, which amounted to 40 in the week ending Oct. 8, 1921, totaled 1090 during the week ending June 10, 1922. This increase in work demonstrates the extent to which the organization of the division and its contact with the industry has proceeded.

Accomplishments

The following work has been accomplished by the division during the year:

1. Contact has been formed with members of the important automotive trade associations representing approximately 1500 of the automotive manufacturers of the country. The members of these associations were invited by the Automotive Division direct as well as through their foreign trade secretaries to become listed on the Exporters' Index and subscribe to "Commerce Reports."

2. Approximately 1500 non-associated members of the automotive industry were circularized with a letter explaining the co-operation afforded them by the Automotive Division.

3. A reclassification of automotive statistics has been brought about, passenger car exports being divided into three groups beginning Jan. 1, 1922: cars valued at less than $800, $800 to $2,000, and above $2,000; motor truck exports: motor truck of a capacity less than 1 ton, from 1 to 2½ tons and over 2½ tons.

4. Revised automotive trade lists outlined by the division are to include the following information on automotive importers and dealers: name, address, size, nationality, motor vehicles or tires handled, selling organization, facilities for storage, service and vulcanizing and side lines handled. To the names of dealers and importers is to be added a list of banks handling automotive paper, giving their name, address, capitalization and branches. It is expected that a number of these revised trade lists can be furnished the industry in the course of the coming year.

5. In December and January Messrs. Lee and Irvine visited approximately 40 automobile manufacturers, to get the industry's viewpoint.

6. Wm. I. Irvine, Automotive Trade Commissioner, left for the Far East where he has undertaken an investigation of the automotive market as well as carrying on educational work along the lines of good roads promotion and automotive transportation.

7. The Division was called upon to make a study of the automotive production facilities in France, England and Italy on behalf of the Limitation of Armament Conference. This investigation furnished the first reliable basis by which the productive capacity of European automotive manufacturers could be estimated.

8. Upon request of the Senate Finance Committee, the Associated Advertising Clubs of the World, the National Automobile Chamber of Commerce and the Association of Motor Truck Industries, an investigation was undertaken regarding the reimportation of American motor trucks from war surplus stocks in Europe. From 1918 to 1921, 10,926 American motor trucks were reimported into the United States and 2,700 are held by British concerns at present for reimportation.

9. The Automotive Division has been endeavoring to bring about the prosecution of fraudulent exporters. Several of these cases which were reported from foreign countries were turned over to the Postmaster General's Office and will be carried through either with the co-operation of Government agencies or automotive trade associations.

10. The first official automotive world census has been established through a questionnaire which was forwarded to the foreign representatives of the Department of Commerce and Department of State.

11. Questionnaires were sent to all members of the trade associations with whom contacts had been formed, with the purpose of arriving at standard export practices by analyzing the trade practices followed by automotive exporters in the past and communicating the results of this investigation to the industry in terms of percentages.

12. With the co-operation of the Division of Foreign Tariffs and the American Minister in Berne, a modification of the Swiss customs regulations was brought about, as a result of which more favorable treatment than heretofore is accorded American automotive manufacturers importing into Switzerland.

13. The Automotive Division was instrumental in bringing about, through the motion picture engineer of

the United States Department of Commerce in co-operation with the Studebaker Corporation, the production of a five reel motion picture film, "The Story of an Automobile." This film promises to enjoy great popularity and as it will find wide distribution here and abroad its educational commercial value can hardly be underestimated.

14. The middle of June, Mr. Lee left for a two months' speaking tour through the West. On this trip he will give approximately forty addresses with the purpose of making more widely known the services offered by the Bureau of Foreign and Domestic Commerce and in particular by the Automotive Division.

15. "Selling the World Automotive Transportation," a booklet outlining the services offered to the industry by the Automotive Division, has been issued by the trade associations co-operating with the Division. Approximately 4,000 copies were distributed to the members of these associations and nearly 1,000 to the foreign representatives of the U. S. Department of Commerce and Department of State.

16. A foreign trade meeting, held in the middle of April, attended by the chairmen and secretaries of the Foreign Trade committees co-operating with the Automotive Division and representatives of automotive trade papers, resolutions were adopted endorsing the services rendered the industry by the Automotive Division and extending appreciation and cordial assistance to the Secretary of Commerce, the Director of the Bureau of Foreign and Domestic Commerce, and the Chief and Assistant Chief of the Automotive Division.

AUTOMOTIVE manufacturers who are not availing themselves of the service extended by the Automotive Division will do well to consider this report.

Others who have followed the work or taken part in it will find in this review of accomplishments ample justification for continued support and co-operation.

The Division is seeking to stimulate foreign automotive trade as well as to provide information concerning present and future markets and the conditions which will be encountered in selling to these markets.

The first part of the organization work consisted in creating facilities for the distribution of incoming information as well as establishing permanent files in which this information could be held for ready reference. With the exception of one questionnaire, no instructions were given as to the nature of the information desired.

1. Information is being disseminated to the trade by commerce reports, special and confidential circulars, exhibits, monographs and trade papers.

In order to give reports from field representatives as much space as possible in Commerce Reports, the number of original contributions from the Division was limited, but many important articles (several of which have appeared in the columns—Editor) were published.

Short items of interest to the industry are being published in the "Automotive Digest" which forms a part of the Automotive Section of Commerce Reports. Information of particular importance to the trade or to a small group of automotive manufacturers is being disseminated through special and confidential circulars, eighty of which were mailed out in the course of the year.

In order to stimulate interest in the Automotive Division and with a view to inducing manufacturers to become listed on the Exporters' Index, information concerning a large number of particularly attractive trade opportunities was mailed out in the form of confidential circulars besides being referred to in Commerce Reports.

Numerous requests have been received for exhibits which were referred to in Commerce Reports and which represented articles of a technical nature or exhaustive studies which could not be published in Commerce Reports.

Monographs on the following automotive markets have been completed: Dutch East Indies, Argentine, Bolivia, and Chile.

The majority of articles published by the Automotive Division have been reprinted in automotive and other trade papers.

2. Automotive trade information is kept in a file arranged by countries, each of which is subdivided into sixteen headings, among which are included production, distribution, service, sales promotion, preferences, status of market, fundamental potentiality, automotive transportation, automotive legislation, roads and fuel.

Establishing Contact with Industry

The interest which has been taken by the industry in the work of the Automotive Division has been based largely on the close contact which was formed with the following trade associations: National Automobile Chamber of Commerce, Motor and Accessory Manufacturers Association, Motorcycle and Allied Trades Association, Aeronautical Chamber of Commerce, National Association of Engine and Boat Manufacturers, Association of Automotive Equipment Manufacturers, and the Automotive Equipment Association.

Considerable work was contributed by the Division toward the compilation of a Manual which the National Automobile Chamber of Commerce is issuing on behalf of its members. An extra supply of Manual sheets are being turned over for distribution to the Automotive Division as issued. Through the latter the Manual is made available to the entire automotive industry against a nominal charge.

After completion of the National Automobile Chamber of Commerce Manual, the Automotive Division proposes to compile similar manuals for the other branches of the automotive industry, including accessory manufacturers, motor boat and engine manufacturers and airplane manufacturers.

Strengthening of the Division's Organization

While in the past the flow of information for dissemination as well as for the files was not directed through any specific channels, the Division, in the coming year, will request the foreign representatives of the Department of Commerce and Department of State to submit specific data covering the various points outlined in the filing system of the Division. For this purpose a general instruction sheet will be forwarded to all the foreign representatives which will be followed later on by individual requests for specific data.

It is expected that by following such a procedure, the Division will be able to better inform its field men of the particular needs of the automotive industry. Furthermore, by establishing individual contacts, the educational work along the line of good roads and motor transport promotion, which has been successfully started in several countries, can be carried on more extensively. The Automotive Division is formulating plans to supply all the material which is necessary for such educational work.

What Kind of Educational Work Is Good for the Foreman?

The basis of the foreman's education is proficiency in the work he is required to direct. Consequently he should be helped to acquire that proficiency. Square dealing and a knowledge of the company's policies and the use of its products are also important.

By Harry Tipper

THE developments in the educational work conducted by industrial establishments for their employees and, particularly, those courses directed toward the improvement of the foremen in the shops, indicate how largely we are experimenting with education as yet, and how little we have coordinated education with the actual requirements of industry. Educational work and the acquiring of knowledge, which has no visible application to the man's occupation or to the necessities of his life do not improve either his capacity as a worker or his value as a citizen. It is much more likely to enlarge his aspirations, making him more restless without increasing his capacity to grow to the point where his aspirations are satisfied. After all, the most important job in industry is to educate the leaders so that they are competent to fulfill the tremendous responsibilities of leadership devolving upon those in charge of the manifold interests of industry to-day.

THE foreman's education should include:
1—A wide, definite and specific training in occupational technique and theory.
2—Careful consideration of the responsibilities of the supervisor and the need for square dealing with the men under him.
3—Instruction in the policies, purposes and organization of the concern and the use to which its products are to be put.
At least half of this education can be developed out of the organization at interest while the remainder is securable from recognized educational sources.

Leadership, because of the responsibility for the actions of the thousands of workers and the relations between the organization and the other industrial elements, demands an efficient, wide, fundamental education and a varied experience, if the leaders are to fulfill these large responsibilities wisely in the future of industry. It is easily possible to educate men on a lot of subjects which, however valuable in themselves, do not have any particular relation to their activities either as workers or as citizens, and a good deal of our experiments in education have generally resulted in this kind of work being carried on.

Undoubtedly, the education of the foreman is of great importance because he is the leader of the workers, the most intimate supervisor, and, consequently, the hinge control in the development, the understanding, and the carrying out of any policy. It is of importance that his education should be developed along practical lines. The foreman should be a leader. It is important that he should be recognized as a leader by the men of whom he is in charge. Upon this recognition depends, to a large extent, efficiency of production and the lack of unrest in the shop.

What are the qualities which the worker recognizes as those of leadership in the foreman?

It is not possible to state them all concisely for foremen of various types are equally successful in their work, but there are one or two important elements always present in the foreman who is notably successful in maintaining a high degree of efficiency and a low turnover. One of the most important of these qualities is proficiency in the particular work his men are called upon to do. Men are not willing to submit to the leadership of other men who are not as proficient in a particular occupation as they are. Skill must be matched by a larger skill and understanding in the leader himself. Whatever valuable qualities the supervisor may have, they do not inculcate the respect, without which there can be no leadership, unless the practical skill is visible and the practical knowledge always on the job. This is the most important point in the education of the foreman. He must be skillful in the work of which he has charge. His general skill and his understanding should be greater than that of the worker and his judgment more sound. Consequently, the basis of the education of the foreman is the development of his proficiency in his particular occupation and requirements. He must be able to win the respect of the men for his knowledge—and this means that his knowledge must be translatable into practical skill and understanding so that it becomes visible to the men.

Beyond that, the most important requirement of the foreman is that he shall be square in his dealings with the men so that his judgment in dispute is recognized; his statement accepted and his justice understood. This amplifies his leadership by adding to the leadership in work, the leadership in human quality, which enables him to hold all the men under him sure of the treatment they will secure and confident of the judgment rendered.

The third element of importance is that he should understand the purposes and policies of the company, the uses of the product, and the general organization, so that

he can readily interpret these in his contact with his subordinates.

The educational program which proposes to add to the capacity of the foremen so that their average efficiency may be increased, should be based upon these requirements as the primary requirements of foremen and the necessary elements in successfully leading a group of men in that intimate supervision. This means that the education should include:

First—A wider, more definite and more specific training in the occupational technique and theory.

Second—A careful consideration of the responsibilities of the supervisor and the necessity for honest and honorable judgment and consideration of each man.

Third—An education in the policies, purposes and organization of the concern, the usefulness of the products and the general operations with which the organization is dealing.

Such a course of education as this requires that at least one-half of it shall be applied strictly to the conditions under which the foremen are working and, consequently, developed out of the establishment itself. The other half of the educational work can be secured from the proper selection of educational material of a more general character, such as can be secured from recognized educational sources.

The theory back of the practice and the general human requirements of leadership can be secured because they are sufficiently general to apply to most cases. Increased proficiency in the particular occupational development, and education in the company's organization policy and operations, must be gathered together from the particular establishment and arranged in connection with that particular requirement of work. Applied education—that is, the education which is applied to the work or to the social requirements of the individual—is always much more valuable than the abstract education which can be secured by general study.

Comparatively few men are able to think abstractly in regard to their problems. They learn by the concrete necessities of their work or their social life; consequently, the educational effort needs to be strictly applied to the particular requirements of the concern and the locality, in most cases where foremen are being dealt with. Even where the general basic theory of the practice, such as can be secured from general educational sources, is being considered, it is necessary that the illustrations pertain to the particular work of the organization and apply themselves, consequently, to the particular group who are engaged upon the study.

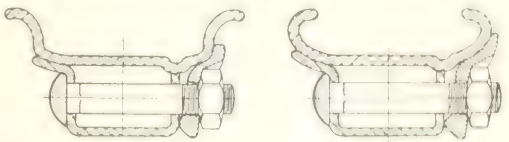
It is not wise to experiment in the type of education to be given to workers or foremen very much. Any education which is provided should be strictly along the lines of the known necessities and applied definitely along the lines of known value. No mistake can be made with any workers in giving them additional education or training which increases their applied skill in connection with their particular work. A certain amount of theory is necessary with this applied work, and, in the case of the foremen, a good grounding in theoretical fundamentals is important.

All these should be strictly applied to the company's policies, purposes and operations wherever possible, or illustrated by practices in the particular concern and other concerns of a similar character. Any larger education should be reserved for those whose actions suggest a capacity for greater responsibility, and who are, therefore, fitted to receive a larger educational attention necessary for the larger responsibilities.

Leadership in skill—leadership in company development—and leadership in square-dealing—are the three important elements of education of foremen in industry and should form the backbone of every educational program.

Steel Wheel Felloe Introduced by Standard Parts

A NEW steel wheel felloe intended for use in place of the usual type of wood felloe has recently been placed on the market by the Standard Parts Co. As will be seen from the accompanying cut, the felloe is of channel section but in external appearance closely resembles the conventional wood felloe which it replaces. It is said to possess the advantage of light weight without sacrifice in strength and to give full circumferential contact on both sides between the detachable rim and the felloe and thus eliminate squeaks which often occur at this point. It also prevents the entrance of dirt and water. It is adaptable to both clincher and straight side rims. The clamps are shaped to conform to the contour of the rim and are so arranged that the retaining nuts come well within the wall of the tire. In general, the construction is said to be such as to prevent bending of clamp bolts, loosening of rims and wear on clamps.



Sectional views of the new Standard Parts steel wheel felloe as adapted to straight side and clincher type rims

Swiss Concession in Tare Rates on Automobiles from Overseas

BY a ruling of the Swiss Director General of Customs, effective May 1, the minimum addition for tare to the weight of automobiles shipped boxed, which formerly increased the duty on the car itself by 30 per cent, has been reduced to 10 per cent, which is the tare hitherto assessed on automobiles only when shipped in light or no packing, and a special rate of 20 per cent of the net weight established for detached pieces and spare parts, provided such automobiles and parts are unpacked from their original crating in the free custom houses of Lausanne or Geneva, or in those which may subsequently be created. The concession was granted as a result of continued representations by the American Legation at Berne on behalf of American exporters of motor vehicles.

The exact phraseology of the new Swiss tare regulations on automotive products, which are understood to apply only when they are unpacked from their original crating at the named points on the Swiss border, is as follows:

(1) On automobiles imported with or without bodies, the additional weight of the container will be determined at 10 per cent of the net weight.

(2) For detached pieces and repair parts for vehicles of all kinds, at 20 per cent.

AUTOMOTIVE INDUSTRIES
THE AUTOMOBILE
Reg. U. S. Pat. Off

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Effect of Strikes on Industry

SURPRISING indifference has been shown by industry and business as a whole to the long-continued coal strike and the walkout of railroad shopmen with the threat of even greater defections from the ranks of the carriers' employees. Even if both these disputes are settled before this issue of AUTOMOTIVE INDUSTRIES reaches its readers they will have exerted a seriously adverse effect upon the commercial machinery of the country.

The ever-present and constantly recurring controversies between labor and capital constitute one of the most serious problems with which the country has to deal. The Washington administration has been criticised, and perhaps justly, for permitting the coal strike to drag along for more than three months.

But the most unsatisfactory part of strike settlements up to this time has been their temporary nature. The people of the country, who always are the innocent bystanders who usually suffer most in any kind of battle, would hail with delight the establishment of some machinery which would prevent the almost perennial walkout, or threatened walkout, in the coal fields with the inevitable price increases. President Harding seems to have started along this road, and if he reaches the goal it will be a valuable achievement.

Settlement of disputes between the carriers and their employees was the avowed object of the Railroad Labor Board. That body would function more efficiently if there were a few teeth in the law which created it. Moral suasion, which is about the only weapon it possesses, does not exert a very potent influence in such disputes.

There is apparent at present a trend toward compulsory arbitration. It is generally conceded to be a good system as long as it hits the other fellow. When it comes closer home its merits are harder to see.

Lessons of the Grand Prix

IT is rather early to draw from the meagre cable reports thus far received any final conclusions regarding the performance in the French Grand Prix Race of engines with so little as 122 cu. in. piston displacement. There are, however, some more or less obvious speculations which will arise in the minds of those accustomed to follow events of this character.

One hundred and twenty-two-inch engines should probably not be judged by the results of the first important race in which this limiting capacity was imposed, but it must be admitted that the number of mechanical failures is not encouraging, although the winner succeeded in maintaining a higher average speed than the winner of last year's race with an engine 50 per cent larger. The Fiat engine is said to be capable of developing 90 hp. for long periods, but to do this it turns at 5000 r.p.m.! Such an extraordinary speed is possible with the refined design, materials and workmanship used in racing engines, but anything approaching this in quantity production, granting for argument that it is desirable from other standpoints, is unthinkable. It is true, of course, that with so small an engine reciprocating parts can be made light, but when it is remembered that the stresses involved increase with the square of the speed while the number of reversals of stress are in direct proportion, is it small wonder that mechanical failures were numerous?

On the other hand the tire performance recorded is most encouraging. Six hours running over highways with numerous turns and at very high speeds without a single blowout is unusual if not unique. More details regarding the type and construction of the tires used will be awaited with interest. It is probable, however, that comparatively light loading of the tires was a most significant factor in the results. Some of the cars are said to have weighed less than 1500 lb. which would give a very low weight per tire.

Four-wheel brakes were much in evidence as was to be expected for racing purposes where cost is

entirely secondary. They are increasing in popularity on stock European cars, but even this is not especially significant to the American manufacturer who is seeking to decrease rather than to multiply parts. Nevertheless there is still much room for improvement in brake design and construction on American cars and any lessons in this connection which the race may teach should not fall on deaf ears.

It is interesting to note that several of the engines used in the race were fitted with anti-friction bearings on the crankshaft and in some cases all bearings except those on the wrist pins were of this type. This is a matter which should be noted by engine designers as well as bearing makers. The practice is old and yet new. Its revival is evidently made possible through the advent of better methods of manufacture and better materials, as well as by better lubrication and a desire to minimize friction losses.

Knocking and Its Control

IN the automobile engine built eighteen or twenty years ago compression pressures as high as 100 lb. p. sq. inch. were occasionally used, and no great amount of trouble was experienced as a result of these high compressions, although at times when the cylinder walls had become covered with rather heavy layers of carbon deposit there may have been unpleasant knocking. But as the fuel characteristics began to change and the end point rose higher and higher, it became necessary to lower the compression pressure.

Some of the tractor engines designed to burn kerosene are reputed to be operating at a maximum compression of 45 lb. p. sq. in. This, however, is not even the worst case of low compression, for altitude has an influence on this factor. At the recent S. A. E. meeting it was reported that in Denver 10,000 ft. above sea level, Ford passenger car engines operate at a maximum compression of only 35 lb. p. sq. in. With a decrease in the compression ratio the thermal efficiency drops and now that we are facing a scarcity of fuel and fuel prices are again on the rise, this is certainly a serious matter.

Various measures can be taken that will permit of the use of higher compressions without danger of causing the engine to knock. It is generally agreed that the introduction of a considerable proportion of the fuel into the engine cylinders in an unvaporized state has a tendency to increase knocking, and thorough gasification of the fuel prior to its introduction into the engine therefore tends to check the trouble.

Alcohol and similar substitute fuels have been used experimentally practically ever since the automobile first came into general public use, and the fact that with this fuel it is impossible to produce knocking even with compressions twice as high as ordinarily carried in gasoline engines, could not escape attention. Neither could the excellent results obtained as to thermal efficiency, which largely make up for the low calorific value of the alcohol.

The high compression required to burn alcohol to the best advantage accentuated the disadvantages associated with high compression, such as difficult cranking, and the plan of mixing the alcohol with gasoline and thus obtaining a fuel with an intermediate maximum compression ratio, suggested itself. Unfortunately commercial alcohol and gasoline do not mix, and it was necessary to add a third substance.

So far the endeavor in the use of mixed fuels with non-knocking characteristics always has been to eliminate trouble from knocking in engines with an average compression ratio. But once means are found of effectively controlling the knock there is apparently no reason why the possibilities in the way of increased fuel economy due to higher compression should not be taken full advantage of.

Once the doped fuels of which we have heard so much the past few years are commercially obtainable, the compression ratio should be increased from the present average of about 4 to 1 to 7 to 1. But it is obvious that such engines cannot be sold to the general public until the doped fuel is pretty generally available, because if attempts were made to operate them on the ordinary gasoline with this high ratio there would be no end of trouble.

Taxation and Regulation

MEN in all branches of the automotive industry might find a worse use for their time than to spend a little of it mulling over the question of legislation. In these days of high taxes, when possible sources of revenue have been milked almost dry, the motor vehicle is rapidly becoming the universal legislative goat.

When a State Legislature needs a few million dollars for something or other it says to itself, without a single twinge of conscience, "Let's take it out of automobiles or trucks or the gasoline which is used to run them." Motorists have been hit with the legislative mace so often, without making much of a howl about it, that it seems to be accepted without argument that they never will howl.

But motorists are making up their minds that they have been stepped on often enough. They don't mind paying the taxes necessary to maintain highways but they can't see why they should build all the little red school houses and city halls. Motor vehicle taxation is building up sales resistance, and manufacturers and dealers should take a direct personal interest in the situation. They are the ones who will ultimately suffer most.

While onerous and unfair taxation is bad enough, there is another form of legislation which is worse. It is that which is designed, theoretically, to promote safety and prevent needless damage to highways. Motorists and the automotive industry would welcome sane legislation along these lines but they should object most strenuously to statutes which provide, figuratively speaking, that the highways can be used on Mondays, Wednesdays and Fridays only by blondes, on Tuesdays, Thursdays and Saturdays by brunettes and on Sundays only by those whose hair is red.

Seasonal Sales Decline Not Sharp

Slight Slowing Up in Some Sections

Farm Market Shows Life—Strike Likely to Delay Production of Motor Vehicles

By JAMES DALTON

While the entire industry is awaiting the expected mid-summer lull in business and is prepared for it, a decline in sales has become apparent only in spots. There has been a slowing up in New York, Chicago and other big cities, but nothing which can be characterized as a slump.

Factories report, on the other hand, that dealers in agricultural districts who have been more or less quiescent for a long period, are sending in substantial orders. This is a positive indication that the farm market has come to life because these dealers are not taking cars merely on a chance of selling them.

Production schedules have not been curtailed materially and while the output in July will not reach the June record of 271,000, it would not be surprising if it approximated 260,000. Last July, with a production of 176,000 passenger cars and trucks, was the best month of the year with the exception of August.

Parts makers have noted no shrinkage in the volume of their business. All of them assert their July sales will be as large as those for June and a good many say their business will be better this month. Commitments indicate that August will be equally good, but commitments under present conditions do not make a thoroughly reliable barometer. Manufacturers feel little hesitation in canceling or holding up shipments.

Truck production continues to average between 10 per cent and 12 per cent of the total output. Substantial sales of light commercial vehicles are expected in the agricultural districts, but sales of heavy duty trucks still are handicapped by the presence in this country of a considerable number of unabsorbed American-made army trucks sold in Europe after the armistice and reimported. Several thousand more of

(*Continued on page* 141)

Business in Brief

NEW YORK, July 17—For the first time in many weeks there have been reports of a slowing up in business and industry. They are the direct results of the coal and rail strikes and indicate that there will be more serious dislocation unless the labor difficulties are promptly settled.

Labor troubles are to blame for the only notes of hesitation which have become apparent in the business world. Transportation delays are especially exasperating at a time when a special effort is being made to produce and deliver products already ordered.

Apart from the industrial unrest, the situation is full of favorable factors.

Crop prospects are better than a year ago.

Building activities are proceeding at an unprecedented rate with the lumber, cement and brick branches working at full speed.

Unemployment, except that which is voluntary, is practically negligible.

Crop reports are particularly gratifying. It is estimated that the wheat harvest will approximate 817,000,000 bushels, the sixth largest on record, and corn 2,860,000,000 bushels, the seventh largest on record.

Stocks are irregular, bonds firmer, call money easier, sterling steady and other exchanges higher.

Bank clearings for the week ending July 13 aggregated $7,263,105,000, a gain of 6.7 per cent over the previous week and 23.1 per cent over the same week last year.

MOON REELECTS DIRECTORS

ST. LOUIS, MO., July 17—The stockholders of the Moon Motor Car Co. reelected the old directors at their annual meeting. At the subsequent organization meeting of the directors, A. F. Moberly, who had been treasurer and purchasing agent, was elected vice-president. H. W. Klemme was made treasurer. Stanley Moon was elected secretary to succeed George H. Schelp. President McDonald reported to the stockholders that the company's business now is the heaviest in its history, with the production running between forty and fifty cars a day. He said that unfilled orders on hand July 1 were approximately 15 per cent larger than those on hand June 1.

War Trucks Still Threaten Industry

Thousands Ready for Re-Importation—Makers Urge Passage of Graham Resolution

DETROIT, July 17—Development of truck business in the United States by manufacturing companies is being seriously handicapped at this time by the presence of still large stocks of war trucks brought back from Europe by speculating companies. Word has been received in this city of purchases by large fleet owners in recent weeks of war trucks at prices which made competition impossible.

A strong effort is being made by the speculators in war trucks to induce regular dealers in the trucks which they have in stock, to handle these at retail to the trade at such profit as they are able to realize. The dealer trade of the entire country is being steadily canvassed by mail to line up a selling organization, and the belief is shared in the industry that with a sales organization formed, the speculators will undertake to bring in many more trucks from abroad.

Price reductions in 5-ton models of two very prominent makes by the speculators in the past few weeks place these at $1,340 and $1,580 respectively, prices which are about on a par with the usual run of 1-ton models. These price changes were broadcasted throughout the country to dealers. The most serious effect of the canvass is that it discourages dealers and is retarding the development of new truck business.

Demand Graham Act Passage

In the face of competition of this kind, truck makers are turning to Washington to seek the passage by the Senate of the Graham resolution, which would impose a 90 per cent duty on these reshipped vehicles. The harm that is being wrought the industry by the presence in this country of the present war trucks is considered as nothing to the damage that would be wrought if the bars against them are permitted to remain down.

At least five companies are known by truck manufacturers to be prepared to bring in these vehicles at the first indication that the truck market is in satisfactory condition to give them a ready sale.

Truck makers report that they have received information from a reliable source that American trucks are being counterfeited in the Krupp factories in Germany and that these will be shipped back as trucks that were originally made in this country.

Tire Fluctuation Unsettles Market

Demoralization Grows in Rubber Center—Quality and Price Continue Downward

AKRON, OHIO, July 18—Price cuts, price increases and production of cheap tires to meet competition by some of the larger rubber companies have added materially to the demoralization of the automobile tire industry in Akron.

The Mason Tire & Rubber Co. has announced a 28 per cent reduction in its entire line and also a new oversized, nonskid, air bag cured Ford cord tire to sell at $11.80.

At the same time the American Rubber & Tire Co. announced an increase in its entire cord tire line of 5 to 10 per cent.

Mason Tire & Rubber Co. stated in its announcement that the time has come to bring tire prices definitely to rock bottom to prepare for fall business and spring dating orders.

Must Know Prices

"Special discounts by dealers must stop," said D. M. Mason, vice-president and general manager. "Everyone must know the price of tires and they must become stabilized if we are to get any volume of spring dating business this fall. The time has come for a new true value tire list."

The American statement gives evidence in an entirely new direction. H. L. Hauck, general manager, stated:

"We made a thorough canvass of our dealers before making the announcement regarding an increase in tire prices, and we feel that they will support us in this move.

"We placed the proposition of increasing prices and maintaining quality or cutting the price and decreasing quality squarely up to our dealers. We explained the predicament in which we found ourselves, and we have been agreeably surprised in the manner with which the dealers backed us in our suggestion of price raising."

For the present the increase is confined to cord tires, and it is not likely that the increase will be extended to fabrics because of the small number still made, according to company officials.

Official confirmation of the production

(*Continued on page* 138)

FORD MAKING OWN GLASS

DETROIT, June 17—Manufacture of its own plate glass for windshields has been begun by the Ford Motor Co. in a modern plant. Ford production methods have been applied and there is a radical departure from established practice. The Ford continuous conveyor system features the operation so that from the time the glass leaves the furnace until it becomes a polished windshield, it is always in motion.

Trailers Will Serve to Enlarge the Field of Truck Transportation

By JOHN B. MANSFIELD,
President, Detroit Trailer Co.

Detroit, July 17.

RECOGNITION by truck companies of the importance of trailers in developing the greater possibilities of highway transportation promises to bring the trailer manufacturer into a prosperous era.

For a long time the truck and trailer manufacturer traveled individual paths owing to the feeling that the use of trailers reduced the field for truck business. In the recent past, however, this feeling has given way to the extent that two of the largest truck companies are now building tractors designed for use with trailers and at least one other big company is on the point of doing so.

This development is a natural one as by using trailers the surplus power of the truck engine can be employed to the advantage of the truck owner. Legislation against the excessive weights of truck loads made this development certain to come. With trailers the full power of the engine can be used in hauling loads so spread that the weights on tire surface do not exceed the legal limit.

That the trailer provides the means of establishing road transportation as more economic than rail, especially in short haul work, is shown by the results attained by companies operating out of Detroit. Deliveries of material are being made in express time at less than freight rates. Owing to the speed of deliveries, bills for material are sent with loads, and are delivered with them in faster time than they could be delivered through the mails.

Use of trailers permits the loading and unloading of material to be carried on independent of the operation of the tractor, which merely picks up the trailer when it is loaded and leaves it to be unloaded at its destination. Return loads can be made quickly on ordinary length trips and all the delay incident to waiting for the loading and unloading of the operating vehicle is eliminated.

South American business in trailers promises to be large, as the lack of railroad facilities makes highway transportation necessary to the development of inland territory. Brazil is spending $1,000,000 for highway construction on which it will transport material into the interior and bring back the products of the country. They have taken the position that highway building is cheaper than railroad construction and operation. One fleet of trucks and trailers is now furnishing transportation 200 miles into the interior for goods entering and leaving the country.

To permit the operation of trailers in connection with trucks, the truck manufacturers should provide equipment that will enable the two to be employed successfully. There can be no question of the importance of the trailer business to truck makers and the development of highway transportation can be greatly speeded by co-operation between the two forces.

Jewett Adds Coupe and Roadster Models

DETROIT, July 17—The Paige-Detroit Motor Car Co. has added a roadster and coupe to its Jewett line and is now in production on them, rounding out the line to four models, the touring car and sedan having been in production. The roadster is priced at $1,065, same as the touring car, and the coupe at $1,395 is the same as the sedan.

The coupe is a four-passenger vehicle with a large, roomy body, the collapsible seat at the driver's right disappearing completely under the dash. A feature of the collapsible seat is that it has an arm rest which is matched by an arm rest set in the door. The roadster, while nominally a two-passenger vehicle, can accommodate three. Its construction is featured by a maintenance of the high stream line to the rear, permitting of a large deck for the carrying of luggage or sample cases. Both models are mounted on the regular Jewett chassis.

Jewett production is declared by the factory to be running behind orders, and special efforts are being made to meet the demand for closed models. Sales on this line are being pushed somewhat.

Liberty to Add Two New Models to Line

DETROIT, July 17—The Liberty Motor Car Co. is making some changes in the appearance of the cars without changing the mechanical construction to any extent. Steel disk wheels have been made standard equipment on the touring model and they will be finished in deep blue striped in harmony with the body color.

A newly designed filler cap and water indicator have been added and the upholstering is now done in the smooth style, eliminating tufts and pleats. The Cavalier touring models will be furnished in three standard body colors each matched with appropriate upholstery. Two new models, a four-passenger speedster of the Cavalier type, and a two-passenger closed car, to be priced at very little more than the open Cavalier type, will be disclosed soon.

No Cuts Made Yet in Tire Production

Akron Plants Still at Peak—Dealer Sales Running High —Output Past Peak

AKRON, OHIO, July 17—With one or two minor exceptions, the rubber industry continues at the production peak reached late in June. It is reported semi-officially that production has been decreased slightly by the Goodyear Tire and Rubber Co. during the past two weeks, but output has been larger at Goodyear than has been indicated by the official statements, and more than 26,000 tires a day still are being made.

The other factories, while not actually making any decreases, have practically ceased making increases, indicating that the crest of the season's sales has passed and that the next move will be downward, primarily because of the reduced buying of tires for original equipment by automobile manufacturers.

Consumer Sale Maintained

The dealers' sales probably will continue through this and the coming month, according to leading authorities, which means that those factories depending upon the consumer trade will not be compelled to slacken production during the next two months at least.

Tire production thus far this year has been greater in units than ever before in the history of the industry, and it is now estimated that the industry will produce at least 33,000,000 tires in America this year as compared with a previous peak production of 32,400,000.

The monetary return to the rubber companies is greatly reduced, however, because of decreased prices, but it is asserted that the first six months have shown substantial profits for most of the companies here. Even some of the smaller concerns, which suffered during the depression more than the larger manufacturers or which were reorganized completely, now state that production is on a profitable basis.

Tire Fluctuation Unsettles Market

(*Continued from page* 137)

of new brands of tires to meet the keenest possible competition cannot be obtained at the larger factories, but dealers report they are being flooded with announcements regarding the new lines.

Some of the industrial leaders have practically confirmed the report privately, although all hesitate to make any statement for publication permitting the use of the company name. Since its inception, the tire industry has operated on a quality basis and makers are reluctant to admit a change to a purely price basis.

An official of one large company stated privately that the cheap tire business had become necessary because of the large demand for original low cost equipment and to use up some of the high cost raw materials which still remain on hand.

The tendency has been downward in price and quality during the past year. Last year cut followed cut in the tire field. This year special discounts and quiet reductions have replaced the out and out reduction, while the manufacture of low cost cord tires in fabric tire sizes have pointed the way to lower cord prices as well as lowered quality in this field.

Goodyear Will Enter French Tire Market

PARIS, July 10 (*By Mail*)—Goodyear has just come on the French market with a central organization in Paris established by the Goodyear Tire & Rubber Export Co. Charles G. Jerosch, who is in charge of the French organization, has his headquarters in the Rue de Ponthieu.

A French joint stock company has been formed and will take care of all France, Belgium, and some other portions of the Continent of Europe. Goodyear has had under consideration for three or four years the advisability of coming on the French market, and now that a decision in favor of this move has been taken the campaign will be of a competitive nature. It is understood that the French Goodyear company will interest itself in racing and competition work, owing to the high degree of importance attached to speed contests in France. The French market will be supplied from the Canadian factory.

MASON TIRE PRICES DOWN

AKRON, JULY 17—The Mason Tire & Rubber Co. announces price reductions averaging a little more than 25 per cent on all sizes of cord tires. The 30x3½ clincher has been cut from $18.75 to $13.95 and a new straight side 30x3½ line has been added at $15.85. The company also has cut its prices on fabrics in Ford sizes. The 30x3 has been reduced from $11.90 to $9.25 and the 30x3½ from $13.50 to $10.60. These reductions bring the Mason prices into line with those previously established by the other large companies.

GEORGIA FIGHTS TRANSPORT BILL

ATLANTA, July 18—The Georgia Motor Bus & Transportation Association, which includes in its membership not only operators of motor bus and freight lines, but also truck and passenger car dealers, will carry on a campaign of education, in an effort to show the public and the state legislature the advantage of motor transport. The main purpose of the campaign will be to defeat a bill presented to the legislature by railroad interests, under which the bus and freight lines would be made common carriers subject to the same rules and regulations as the railroad and under the jurisdiction of the state railroad commission.

Goodyear to Build Semi-Rigid Dirigible

Government Contract Calls for Biggest Airship Yet Made in America

AKRON, OHIO, July 17—The Goodyear Tire and Rubber Co. during the past week received contracts from the Federal government for one semi-rigid and three non-rigid dirigible airships. The new order follows closely the receipt of a contract of similar size early this summer.

The semi-rigid dirigible ordered will be the first of its kind to be manufactured in the United States and will be the largest ship thus far built by the company.

Displacement of more than 750,000 cubic feet of air is provided for in the specifications, and the speed will be so great that it is expected to reduce the present record from England to Mineola by more than 60 hours.

Helium to Be Used

In the construction of the semi-rigid and the other ships just ordered, all the improvements which have been incorporated in aircraft by the company will be included. Among the improvements are the building of the engines in the cockpits, installation of gears by means of which the propellers can be disconnected and reversed, making for easier handling, radiator cooling devices and innovations looking toward easier escape from the ship in case of accident. The new ships will be built to be inflated with helium, however, which practically insures their inflammability. According to the contract the semi-rigid ship will be completed late in 1923.

FOKKER MAKES PROPOSITION

MILWAUKEE, WIS., July 17.—The board of directors of the Milwaukee Association of Commerce, after a series of conferences with A. H. G. Fokker, the noted European aircraft designer and engineer, intimated that it is likely that Milwaukee will be able to meet conditions imposed by a proposition for the establishment of an American aircraft enterprise. New York, Chicago, Dayton, Columbus, and other cities are also engaged in consideration of the Fokker proposition.

CLOSED CAR SPACE TAKEN

NEW YORK, July 17—Virtually all space available in Grand Central Palace has been sold for the closed car show of the Automobile Merchants Association of New York, which will be held September 23 to 30. This is the first time the Metropolitan dealers have attempted anything so elaborate as a closed car show in the Palace, scene of the midwinter show conducted by the National Automobile Chamber of Commerce.

Metropolitan Sales Record Is Amazing

Registrations Tell Story—Dealers Report Seasonal Decline Under Normal

NEW YORK, July 17—Registrations of new automobiles for ten counties in and around New York City numbered 9,068 in June as compared with 9431 in May and 9290 in April. Registrations for the year up to date are 39,579 as compared with 24,577 for the first six months of 1921.

The June registration report as compiled by Sherlock & Arnold, publishers of the Automobile Sales Analysis, shows that eight cars have what might be termed a considerable lead over their competitors in the high priced class, while in the medium and low priced classes five cars are far ahead of the field and ten others well in the lead of those following.

Seasonal Decline Slight

A summary of registrations for the first six months in the high and medium and low priced classes follows:

	High Price	Medium and Low Price
January	283	2,017
February	273	2,231
March	632	6,354
April	862	8,428
May	961	8,470
June	865	8,203
Total	3,876	35,703
Total (1921)	2,491	22,086

Distributors and dealers in the metropolitan territory have gone almost a week past the middle of July without feeling what might be termed a real slump in passenger car sales. The June selling record, of course, is not being equalled, but orders in the majority of establishments are running above what the trade has expected and the seasonal decline is so slight that it would hardly be termed normal up to this time.

Dealers are beginning to get recapitulations on the first six months' business and in some cases results have been little short of amazing. One distributor handling a car outside of the first 15 had a retail sales record in New York for the first four months of the year which ran far ahead of the entire year 1921, and sales for the first six months were 275 per cent of all of 1921.

Shortage of Closed Cars

More than a dozen distributors and branches could easily be found on Broadway with sales of the first six months running 100 to 150 per cent of the total of 1921. There is still a shortage of cars with several of the dealers in the fastest selling lines. Others are suffering from a shortage of closed cars owing to a demand for these models which is running ahead of factory expectations even for the metropolitan territory.

The low-priced closed jobs, including those with soft tops, have been in heavy demand right along. Such cars as Hudson and Essex coaches, the Nash carriole, Hupmobile coupe-roadster and the Dodge Brothers business coupe have been selling heavily and distributors are far behind on deliveries. The territory is in good shape on used cars, generally speaking.

The used car market has fallen off since the latter part of June, but stocks have not even approached an alarming stage and expected care in trading from now on probably will prevent anything resembling a crisis, provided business holds reasonably good throughout the year.

It is significant that several cars which are not in the first 10 or 15, nationally speaking, have had remarkable sales records in New York this year. Intensive selling methods by the organizations distributing these cars has put them up front. Telephone canvasses, special "closing" men and other aggressive selling features have brought about this result with these organizations.

More State Sales Analyses to Come

NEW YORK, July 19—Publication monthly of new car registrations for the entire State of New Jersey has been undertaken by Sherlock & Arnold of this city, publisher of the *Automobile Sales Analysis*, which covers the same information for ten counties in and around New York City. In New Jersey the publisher will record not only passenger car, but motor truck registrations, and for the convenience of distributors and dealers, some of whom are in the New York territory and others operating in Philadelphia, the report will be published in two sections, one for thirteen counties of north New Jersey and the other for eight counties in south New Jersey. The publisher expects next to undertake a compilation of registration information in Pennsylvania, and eventually hopes to have records for upward of fifteen states which, combined, would give an accurate indication of sales conditions throughout the country.

CANADIAN FORD MELON

DETROIT, July 17—The Ford Motor Co. of Canada has declared a cash dividend of 15 per cent, payable July 20 to stock of record July 15. Stock of the company which sold at 260 in January has passed 440. The company has had cash on hand exceeding $10,000,000 when its current needs were not more than $3,000,000.

DANIELS TO DOUBLE OUTPUT

READING, PA., July 17—The Daniels Motor Co. has made plans to double its production beginning Sept. 1. It is expected that the closed car business will be larger than ever as the fall season approaches. The Daniels company will be in a position to meet this demand, as it builds all its own bodies, and has felt no shortage.

Milwaukee Plants Running Top Speed

Heavy Demand for Parts Keeps Up—Dealer Territories May Be Cut

MILWAUKEE, WIS., July 17—Manufacturers of automotive parts continue to keep busy at the high point of capacity reached recently, the demand from passenger and commercial car builders being well sustained and shipping directions absorbing output from day to day. Greater interest among tractor builders is apparent, and it is felt that present schedules doubtless will be kept in effect for at least three months.

Passenger car manufacturers in this district are working at the heaviest capacity possible, in view of the still existant shortage of bodies, open as well as closed, and the inadequacy of supply of some other important elements.

Automotive equipment is moving so well through jobbers' and dealers' hands that manufacturers are unable to get production to an equality with delivery specifications. This refers both to car manufacturers' equipment and specialties for the owner trade. The call for bumpers is the largest on record, and this piece of equipment is selling more rapidly than it can be produced.

Retail sales in the first half of July again represented a handsome gain over the same period in 1921, although a good many dealers say that volume is not so large as in the same periods of the months of May and June.

Contract Season On

For distributors, this season is an especially busy one because many contracts are pending. This year, it is intimated, the new contract season is accompanied by somewhat larger problems than usual. While none of the distributors are ready to talk, reports are current that car manufacturers are gradually effecting a change in merchandising policies whereby a slicing of territories is involved. In other words, it is said that some of the larger territories are to be split up and some distributors will have to take much more restricted areas on the distribution basis than they have held for many years past.

So far as this territory is concerned, the bulk of distributor contracts are written to embrace the geographical unit of the state of Wisconsin plus the Upper Peninsula of Michigan.

DETROIT WORKERS INCREASE

DETROIT, July 17—Members of the Employers Association report the addition of 200 men to their payrolls last week. The total now is 181,560, compared with 108,000 in the same week of 1921 and a total of 186,000 in the same week of 1920.

Pierce Announces Drastic Reductions

Price Cut on Open Models, $1250 —Closed Cars Dropped $1200 to $1500

BUFFALO, July 17 — The Pierce-Arrow Motor Car Co. announces substantial reductions in the prices of all its passenger cars. The list follows:

	Old Price	New Price
Runabout	$7,000	$5,250
4-pass. Touring	6,500	5,250
7-pass. Touring	6,500	5,250
Brougham	8,000	6,800
Landaulet	8,250	7,000
4-pass. Sedan	8,250	6,900
Coupe	8,000	6,800
7-pass. Sedan	8,500	7,000

The reduction of $1,200 in the price of the coupe and $1,500 in the price of the sedan are significant of the sharp downward trend in closed car prices.

INTERNATIONAL REDUCTIONS

CHICAGO, July 15—Price reductions on three truck models have been announced by the International Harvester Co., effective July 8. The models and prices follow:

	Old Price	New Price
Speed truck (2000-lb. capacity)	$1,500	$1,250
Model 21—1-ton	1,750	1,550
Model 31—1½-ton	1,850	1,650

STANLEY REVISES PRICES

NEWTON, MASS., July 18—The following price changes have been announced by the Stanley Motor Carriage Co., affecting its entire line of models:

	Old Price	New Price
2-pass. roadster	$2,800	$2,700
5-pass. phaeton	2,600	2,700
7-pass. phaeton	2,600	2,700
Sedan	3,850	3,950

MONROE PRICES HIGHER

INDIANAPOLIS, July 18 — An increase in price of the Monroe affecting both the roadster and 5-passenger phaeton has been made by the William Small Co. as follows:

	Old Price	New Price
2-pass. roadster	$875	$950
5-pass. phaeton	875	950

BECK-HAWKEYE REVISION

CEDAR RAPIDS, IOWA, July 17—The Beck-Hawkeye Motor Truck Works has made the following price revisions on three of its models:

Model	Old Price	New Price
1½-ton	$2,050	$1,725
2-ton	2,150	1,810
2½-ton	2,850	2,395

KLINE PRICES DOWN

RICHMOND, VA., July 17—The Kline Car Corp. has cut price of its two, five and seven passenger touring cars from $1,970 to $1,690. The coupé has been reduced from $2,850 to $2,750 but no change has been made in the price of the sedan.

HARDING WANTS UNITED STATES TO LEAD WORLD IN COMMERCIAL AVIATION

NEW YORK, July 17.—The Aeronautical Chamber of Commerce of America has received a letter from President Harding prophesying in the near future amazing development in air travel, both transportation and communication. The Chief Executive believes that each stage of progress demands improved means of transport, and he wants the United States to lead the world in commercial aviation.

His letter follows:

"The White House,
"Washington.

"Gentlemen:

"I find pleasure in adding a word expressive of my interest in aerial transport, and in the presentation of the subject which is being made by the Aeronautical Chamber of Commerce. The history of civilization is largely the history of communication. Each stage of progress seems to demand and develop improved means of transport. The steamship, the railroad and the motor car have been devised and utilized. Now we enter a new phase. It is a real distinction to America to be known as the birthplace of the airplane; it should be our concern that this art shall not languish, but that in its practical application we shall lead the world. An amazing development will take place in the near future in the utilization of the air as a medium of transport and communication. As a government, we are aiming to provide this art with necessary guaranties of law, and with such facilities as may be possible through the encouragement of airways and terminals. But for air transport quickly to achieve the important place it is destined to occupy, it must have public interest and support. I hope your efforts in this behalf may be productive of most gratifying results.

"Very truly yours,
"Warren G. Harding."

"Aeronautical Chamber of Commerce of America, Inc.
"501 Fifth Avenue, New York City."

INCREASE ON DAVIS

RICHMOND, IND., July 15—The Geo. W. Davis Motor Car Co. has announced an increase in price of $100 on its model 71, 5-passenger phaeton, the new price being $1,295.

NEW EARL MODEL

JACKSON, MICH., July 14—Earl Motors, Inc., has announced a new closed job, a four-passenger car, called the Cabriole, the price of which is $1,395.

LAFAYETTE RAISES PRICES

INDIANAPOLIS, July 17—Lafayette Motors Co. announces an increase in the price of its coupe from $5,000 to $5,500 and of its sedan from $5,175 to $5,500.

REVISE TOWER TRUCK PRICES

GREENVILLE, MICH., July 17—Price revisions made by the Tower Motor Truck Co. follow:

Model	Old Price	New Price
1½-ton	$2,900	$2,000
2½-ton	3,200	2,475
3½-ton	4,100	3,475

CUTS TRACTOR PRICES

MANSFIELD, OHIO, July 17—The Aultman & Taylor Machine Co. has cut the price of its 15-30 tractor from $2,200 to $1,900; its 22-45 tractor from $3,400 to $2,800 and the 30-60 from $4,500 to $4,000.

HUBER REDUCES PRICE

MARION, OHIO, July 3—The price of the light 4 tractor manufactured by the Huber Mfg. Co. has been reduced from $1185 to $985.

WATSON TRUCK CUT

CANASTOTA, N. Y., July 14—The Watson Products Corp. announce a price reduction on their 1-ton speed wagon, the price being cut from $1865 to $1465.

BANKRUPTCY FOR RED ARROW

PETERBORO, ONT., July 17—Stockholders of Red Arrow Tires, Ltd., have decided to make an assignment in bankruptcy. Because of the resignation of directors, those remaining on the board were without a quorum, and President Turner said that they were more or less in the dark about the financial situation of the company. The stock was underwritten by the Peterboro Securities Corp. The principal asset is the partly completed plant.

CANADIAN REGISTRATIONS GAIN

WASHINGTON, July 18—Canadian automobile registration in 1921 totaled 463,848 cars, representing an increase of 48,264 cars over the previous year and represents an average of one automobile for every 19 persons. Revenues for registration amounted to $7,669,493, practically all of which was expended for road improvements.

Commission Charges Gasoline Monopoly

Federal Trade Board Would Prohibit Standard Oil Interlocking Stock Ownership

WASHINGTON, July 17—Asserting that a "monopolistic situation" with respect to the gasoline market prevailed over the entire country, due to the fact that an interlocking stock ownership in the several Standard Oil companies "has perpetuated the very monopolistic control which the court sought to terminate," the Federal Trade Commission recommended in a report to Congress to-day the enactment of legislation prohibiting "common stock ownership in corporations which have been members of a combination dissolved under the Sherman law."

Giving the results of an inquiry made on the complaint of the Montana State Railway Commission regarding gasoline prices, the commission reported that although the prices of high-grade crude petroleum were lower in Montana and Wyoming than in any other crude producing states, the refinery prices of gasoline and kerosene were "much higher than at midcontinent refineries."

"The unsatisfactory situation in Montana and adjacent Rocky Mountain states," the report said, "is evidently due to the fact that the oil trade in this region is practically monopolized by Standard Oil interests.

Monopolistic Control

"To-day the entire country is divided into eleven standard gasoline marketing territories in which a standard marketing company is the dominating factor and in which there is no real competition between the various standard units. This monopolistic situation is possible under the terms of the Standard Oil dissolution decree, by which the different Standard companies are, for legal purposes supposed to be strangers to each other, but there is, as is generally known, an interlocking stock ownership in the different organizations, which has perpetuated the very monopolistic control which the court sought to terminate.

"The commission is of the opinion that this situation cannot be effectually remedied by existing law and that adequate relief can only be secured through additional legislation. It recommends, therefore, that Congress pass a law prohibiting common stock ownership in corporations which have been members of a combination dissolved under the Sherman law."

KNOX TIRE SALE APPROVED

MT. VERNON, OHIO, JULY 17—Sale of the Knox Tire & Rubber Co. to stockholders has been approved by Federal Judge Sater. The purchase money has been paid in full, and all objections to the confirmation were overruled.

EARL MOTORS SEEKS MYSTERIOUS AGENT

JACKSON, MICH., July 17—Earl Motors, Inc., has asked the police authorities out of the state for assistance in locating a mysterious stranger giving the name of Branigan who has called on several Detroit concerns and placed fictitious orders for material which Earl Motors does not want and cannot use. For example, he ordered from the Detroit Awning Co. a full set of awnings for Earl Motors' new building, which does not exist, except in his brain. He asked immediate shipment of 900,000 yards of gravel from the United Fuel and Supply Co. He also placed "orders" for advertising and ordered 10,000 menu cards from a printing house. Earl Motors is at a loss to understand the purpose of "Mr. Branigan's" activities.

Slight Slowing Up in Some Sections

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these trucks will be brought into the country unless Congress passes the Graham resolution which would impose a prohibitive re-import duty.

Any forecast of production for the remainder of the year is complicated by the fact that a serious freight blockade on the railroads seems certain to follow the resumption of coal carrying together with the grain harvest which must be moved in a short time. With an unprecedented amount of equipment in bad order because of the shop men's strike, it appears inevitable that the carriers will be unable to handle the volume of miscellaneous freight which will be offered them during the third quarter.

FORD PROPOSAL TO SENATE

WASHINGTON, July 17—The Senate Committee on Agriculture has rejected by vote of 9 to 7 Henry Ford's offer for the purchase and lease of the government projects at Muscle Shoals, Ala. Notwithstanding the adverse vote, the Ford proposals will be presented to the Senate for final decision through minority reports.

NEW N. M. A. HEADQUARTERS

WASHINGTON, D. C., July 18—The National Motorists Association has opened headquarters in this city in the Edmonds Building at 911 Fifteenth St., N.W. A touring and information bureau has been established, the use of which is extended to all tourists.

G. M. Produces Three New Truck Tractors

Company Claims Trailer Combinations Will Comply with Highway Weight Laws

PONTIAC, MICH., July 17—Three new models of truck tractors have been placed on the market by the General Motors Truck Co. The tractors are designed to haul semi and full trailers carrying a load as high as 15 tons. Claims are made for the tractor-trailer combination by the company that there are many instances where transportation costs can be reduced as much as 50 per cent and will enable a concern to transport goods over any state highway with a load as high as 15 tons without violating any state laws governing truck loads. This is accomplished by so designing the tractor and trailer combination that the load is distributed evenly over from six to eight wheels, which will comply with state laws governing pounds per wheel truck load.

The new tractors are to be put out in 5, 10 and 15 ton models. The standard General Motors truck design is the foundation for the tractors, the necessary equipment and departure being made to take care of the trailer and semi-trailer attachment. The company is using the heavy-duty powerplant in the manufacture of these units, and standard equipment will include the convertible cab and odometer.

	Price Complete	Wheel-Base In.	Axle Ratio	Rear Tires In.	Turning Radius Ft. In.	
5-ton	$2,650	127	8.5:1	8	21 23	R. L.
10-ton	3,900	138	10.3:1	12	22 6	R. L.
15-ton	4,250	138	11.6:1	14	22 6	R. L.

Nash Shows Greatly Increased Earnings

KENOSHA, WIS., July 17—Earnings of the Nash Motors Co. from Dec. 1 to April 30 were $2,173,000 as compared with $2,226,000 for the full fiscal year of 1921. The balance sheet of the company as of April 30, last, follows:

Assets: Real estate, plant, equipment, etc., $4,847,828; investments $2,114,112; Liberty bonds $1,200,802; materials and supplies $3,334,388; notes receivable $527,896; accounts receivable $2,129,154; cash $8,204,122; U. S. Treasury certificates and notes, $5,857,588; prepaid expenses $3,888; total $28,219,778.

Liabilities; Preferred stock $4,000,000; common stock, 54,600 shares of no par value, $510,000; accounts payable $2,710,902; reserve for Federal and other taxes $3,285,662; other reserves $2,808,106; surplus $14,905,108; total $28,219,778.

The surplus of $14,905,000 is equivalent to $273 a share on the 54,600 shares of common outstanding.

Business Is Better All Over Country

Packard Gets Optimistic Reports in Response to Questionnaire Asking Conditions

DETROIT, July 15—Five hundred inquiries on business conditions by the Packard Motor Car Co. in as many sections of the country brought back the response that the general outlook is improving all the time. The inquiries were directed to dealers, bankers, state officials and others, and with few exceptions, declared for perceptible gains over former conditions.

In Kansas City and Omaha there was a somewhat pessimistic tone to be observed from the responses, but this was due rather to conditions as they have existed than to prospective conditions. The banking situation there has left a bitter taste with dealers, and the prospects of bumper crops and better prices has not eradicated it.

South Gaining Steadily

J. E. Bouden, Jr., president of the Whitney Central National Bank, New Orleans, said business is improving rapidly. Crops promise to be excellent, he said, were planted at low cost and from present indications will bring good prices.

Robert F. Maddox, president of the Atlanta National Bank, Atlanta, Ga., and former president of the American Bankers' Association, said bank deposits show increases, money is easy and business outlook is cheerful.

Edgar T. Bell, farm statistician, Oklahoma City, Okla., reported Oklahoma farmers will raise $30,000,000 on their wheat alone this year.

"We expect a continued improvement in business," said M. N. Avery, vice-president of the Security Trust and Savings Bank, Los Angeles, Cal. He said labor is well employed at good wages, crops are abundant and there is a gradual increase in bank deposits.

J. W. Spangler, president of the Seattle National Bank, Seattle, Wash., said business conditions throughout the Pacific Northwest are gradually improving in substantially every line, with prospects for a continued betterment.

Prosperity for Farmer

Samuel R. McKelvie, Governor of Nebraska, predicted a big era of prosperity in his State. "I believe," he said in a telegram, "that there lies ahead of the farmer an era of sustained prosperity which, in turn, will insure general prosperity."

T. W. LaQuatte, Des Moines, Iowa, sent word that there is no reduction in acreage, cost of farm production is reduced, surpluses are disappearing and crops and prices point to great prosperity for farmers of the State.

A report from Denver was that conditions are steadily improving, with good mercantile business, good prospects for crops and increasing bank deposits.

Clearing house banks in Boston, the National Shawmut Bank reported, show increased deposits of $50,000,000 in the last three months.

Banks in Philadelphia agreed that business conditions there are improving, with industries, except shipbuilding, making a better showing each day.

The Continental and Commercial Bank of Chicago says a new business cycle has begun with business barometers indicating the beginning of a slow expansion.

Unemployment in New York is steadily decreasing, said a report from New York after interviews had been obtained with heads of a number of banks, business men and manufacturers. Bankers said that generally speaking adjustment of prices among commodities and industries is reaching a more normal relationship. Volume of output in practically all basic industries is showing a steady increase from month to month, they added.

J. D. Ayres, vice-president of the Bank of Pittsburgh, said the steel industry now is operating at about 80 or 85 per cent of normal. There is little unemployment outside of the coal industry and business conditions generally are good and growing better, he said.

STOCK YARD MOTOR TRANSPORT GAINS

OMAHA, July 18 — Statistics from the South Omaha stockyards show that motor transportation of stock to the yards for June, 1922, was the highest of any previous month. Figures are as follows:

	1921	1922	Gain
Cattle	3,272	3,817	545
Hogs	23,676	29,056	5,380
Sheep	5,700	15,713	10,013

Iowa Buying Well; Farmers Pay Cash

DAVENPORT, IOWA, July 18—The Iowa farmer is buying nearly as much machinery now as he did before the war and far more than since the close of the war, according to implement dealers, who report that cash sales are almost universal — greater cash transactions even than were recorded in most prosperous war-times.

International Harvester Co. distributors summarize the trade conditions by stating that the farmer is "buying what he needs and buying it more intelligently by far than during the war period." Emerson-Brantingham Implement Co. representatives claim a 500 per cent increase in business over last year with prospect that the summer months' reports will be even greater. Twin-City Machinery Co. reports "eight to ten times as much business as a year ago. Southwest Iowa, usually lagging behind the state in sales, has been our best territory. We are doing practically 100 per cent cash business, which is another thing that has surprised our force."

DORRIS JUMPS PRODUCTION

ST. LOUIS, July 17—Simultaneously with the reduction of prices the Dorris Motor Car Co. has increased its production schedule and proposes an aggressive selling campaign.

Ford's June Sales Set New High Mark

Total of 148,439 Announced — Report for First Half Year Shows 652,251

DETROIT, July 17—Sales of Ford cars, trucks and tractors established a new record in June with a total of 148,439, an average of 5709 a day. Sales by the Ford company of Canada were 6054 and 9435 were sold by the European and South American branches.

With the closing of business for June, records showed that the total sales for the six months of 1922 were 652,251, which is materially ahead of any previous half-year record.

July Ford sales are expected to equal and probably exceed those of June. Schedules have been fixed at 151,767, although dealer orders call for more than 200,000. The company has been unable to keep pace with the demand for closed models.

Ford truck sales up to this time show an increase of 84 per cent over last year.

Ford now is employing 75,000 men in Detroit.

Prizes for Essays on Highway Safety

NEW YORK, July 17—Prizes aggregating $6,500 for the best essays written by school children and teachers on Safety in Highway Traffic, are announced by E. S. Jordan, chairman of the special committee representing the National Automobile Chamber of Commerce.

There were 500,000 contestants in the contest last year. School teachers will be awarded $1,500 of the prize money and the remainder will go to their pupils. Direction of the contest will be under the direction of the Highway and Highway Transport Education Committee at Washington, which will supply information regarding it.

In a statement regarding the contest, Jordan says that it is not too much to hope that 1922 will see the number of automobile injuries cut in half. While many estimates have been made of the annual total of automobile injuries, he contends that the correct figure is not over 325,000. The number of motor fatalities in 1921 was 12,500.

BUS OWNERS MUST BOND

OMAHA, July 17—The railway commission of Nebraska is endeavoring to get the names of all automobile bus owners in the state, with a view of forcing them to appear before the commission and show cause why they should not put up a bond sufficient in size to guarantee at least $5,000 liability on every passenger carried.

Men of the Industry and What They Are Doing

Wiggins Joins Holt Tractor

E. R. Wiggins, Moline, Ill., has been appointed chief of the sales engineering department for the Holt Tractor Manufacturing Co., East Peoria, Ill. He will investigate Holt tractors in the field and submit a report upon their condition and performance. For many years he was connected with the Deere Plow Company of Moline and became a contributor of technical subjects in relation to power farming to many periodicals. Since 1918 he has been connected with the Chilton publications of Philadelphia.

Willoughby and Taylor on Road

David J. Willoughby, sales manager of the Columbia Motor Co., and Norman I. Taylor, sales manager for the Albee corporation, advertising counsel for the company, are on a business trip through the middle west on which they will hold dealer and distributor meetings in eleven cities.

Changes in Star Rubber

Changes in personnel in the sales department of the Star Rubber Co. have been announced during the past week. Arthur G. Shirk, formerly with the Goodyear Tire & Rubber Co., has been named assistant sales manager. C. E. Armstrong has been given eastern territory. L. I. Ris, formerly with the company, has been placed in charge of sales in New England and eastern states. C. A. Reece has been placed in charge of sales promotion.

McQueen Heads Sales Promotion

B. F. Goodrich Co. announces that L. A. McQueen, formerly assistant to E. D. Gibbs, advertising manager has been placed in charge of a newly created sales promotion department. The vacancy left in the advertising department will not be filled until later in the year according to official announcement.

Griffins to Handle House Organ

Frank Griffins will probably be placed in charge of a new factory paper which is being planned by the Seiberling Rubber Co. The proposed factory paper will bind the employees of the company's plant at Barberton and New Castle more closely together.

Pardee Leaves C. I. T.

The resignation of C. L. Pardee, Jr., who for the past two and a half years has been credit manager of the Commercial Investment Trust of New York became effective July 15. Pardee has been connected with automotive financing since 1916 and prior to his connection with the C. I. T. was assistant credit manager of the Continental Guaranty Corp., New York and the Guaranty Banking Corp., Chicago. It is understood that, after a few months' vacation, he is planning constructive sales-credit work for one of the manufacturers to insure the extension of proper credit facilities to their dealers.

Zumstein Succeeds Cobb

W. E. Cobb has resigned as New York branch manger of Master Trucks, Inc., Chicago, being succeeded by T. B. W. Zumstein, formerly vice-president and sales manager of the Gary Motor Truck Co.

Mitchell Advances Fisken

Clarence P. Fisken of Racine, Wis., has been appointed general manager of the Wisconsin sales division of the Mitchell Motors Co. under the reorganization of the sales department of the factory by A. G. McMillan, general sales director. Mr. Fisken's headquarters will be at the factory in Racine. He was formerly manager of the Wisconsin branch of the Burroughs Adding Machine Co., resigning some time ago to join the Mitchell sales organization. He is a director of the Racine Chamber of Commerce and engaged also in some notable civic projects.

Appoints Assistant Sales Managers

E. L. Smith and C. H. Bliss have been appointed assistant sales managers of the Nash Motors Co. Smith leaves the position of district manager of a large automobile concern having headquarters in St. Louis to join the Nash organization. Bliss has been with the Nash company since its organization.

Odlin Leaves Wickwire-Spencer

John W. Odlin, advertising manager for the Wickwire-Spencer Steel Corp., has resigned to take effect Sept. 1 to become head of the John W. Odlin Co., advertising agents. The headquarters of the new concern will be in Worcester and the New England states will be covered specializing in manufacturers' advertising.

Barker Sails for Europe

Arthur E. Barker, vice-president in charge of sales of the Maxwell Motors Corp., and Chalmers Motor Corp., sailed this week for Europe on a six weeks' vacation trip, on which he is accompanied by Mrs. Barker.

Willard Again Vice-President

Frank H. Willard has been elected vice-president and general manager of the Graton & Knight Mfg. Co. by the directors. Willard has been with the concern for thirty years and was formerly vice-president and a director but resigned from office, remaining connected with the organization, at the time of reorganization a few months ago.

Kemp and Farley Promoted

A. P. Kemp has been appointed president and treasurer and J. I. Farley has been appointed first vice-president of the Auburn Automobile Co., Auburn, Ind. Kemp will continue in the capacity of general manager which he held before his new appointment. Farley will continue as director of sales in addition to his new duties. Kemp succeeds Morris Eckhart.

Walter Retained by King

Maurice Walter has been retained as consulting engineer for the King Motor Car Co. of Detroit. Walter will also continue in his present capacity as chief engineer of the Walter Motor Truck Co., New York City.

Ricker Joins Duesenberg

Chester S. Ricker of Indianapolis has been appointed general manager in charge of plant operation for the Duesenberg Automobile & Motors Co., Inc. This appointment relieves L. M. Rankin, vice-president of the company, from all duties in connection with production. Ricker has been acting as consulting engineer for the organization for some time past and previously in consulting capacity with the Lexington Motor Co., Ansted Engineering Co., Midwest Engine Co. and Nordyke & Marmon.

Landsittel Goes with Fox

C. H. Landsittel has joined the Fox Motor Car Co. of Philadelphia in the capacity of purchasing manager. Landsittel was previously connected with the Haynes and Templar organizations in a similar capacity.

Triphagen to Reo Factory

Clarence E. Triphagen, for the past three years manager of the Detroit branch of the Reo Motor Car Co., has been called to the factory to become identified with the sales division under R. C. Rueschaw, sales manager. Triphagen had been connected with the factory sales force formerly, and before going to Detroit was manager of the Lansing factory branch.

SUDDEN GAIN IN SALES SEEN

KANSAS CITY, July 18—Business in Oklahoma and Kansas City has shown a marked improvement in the past few weeks. Dealers believe that a decided change for the better will come soon and continue until the colder weather arrives. Farmers are investing in cars.

Harvesting of the wheat is almost finished, and the fruit crop is good.

Trucks Will Serve If Strike Compels

N. A. C. C. Gathers Motor Transport Data—Post Office Already Using Trucks

NEW YORK, July 18—The Motor Truck Committee of the National Automobile Chamber of Commerce is gathering data from all parts of the country on the number of trucks available for service in handling food and other essentials if the railroad strike disrupts rail transportation. Statistics on file show that there are in the country 935 organized motor transport companies operating fleets of trucks.

The situation in New York, in case rail deliveries of food stuffs fail, will be in charge of a committee of twenty-four under the leadership of General George W. Goethals, which was appointed when a general railroad strike was threatened last October. All members of this committee are ready for work excepting Health Commissioner Copeland who is in Europe but who will be in direct charge of food distribution if motor truck deliveries become essential.

It is estimated that there are in New York 57,000 motor trucks which could be mobilized and operated under the direction of the Port Authority if the need arises. This huge fleet would be adequate to handle food supplies in the usual quantities for sixty days and could keep the city from starvation indefinitely if it were placed on a siege basis and food rationed to the people.

Mobilize Trucks to Carry Mails

WASHINGTON, July 15—Actual transportation of mail by motor trucks, incident to the railroad strike was begun by Postmaster General Work with the inauguration of service between Bedford and Swiss City, Ind. This is the first line to be installed by the Government because of interrupted railway service.

In the meantime the Department has announced that it is now prepared to keep all first-class and paper mails moving and that it has mobilized a sufficient fleet to handle the situation. From all sources the Department has announced that it has succeeded in securing 23,200 trucks, which are either now actually available for use or will be by the last of this week.

The Department will have available 5000 trucks of its own, arrangements have been made for the use of 15,000 belonging to the Agricultural Department, 200 have been secured from the Navy Department, and by the last of this week 3000 will be turned over by the War Department.

Postmasters throughout the country have been notified to make a survey immediately ascertaining the possibilities of additional trucks from Government agencies in their immediate vicinity other than those owned by the Post Office Department. All postmasters have been instructed to notify the Department in Washington by wire.

The Department reports that already state motor transport associations, automobile clubs and other automotive associations have volunteered the use of private owned trucks.

DATES AND PLACES FOR MAJOR SHOWS

NEW YORK, July 18.

The directors of the National Automobile Chamber of Commerce have decided to use the Grand Central Palace again for the 1923 show, which will be held the week of Jan. 6-13. The Chicago show will be held from Jan. 27 to Feb. 3 in the Coliseum and the First Regiment Armory as usual.

Krebs Will Operate Collier Truck Plant

BELLEVUE, OHIO, July 18—J. C. L. Krebs, who organized the Krebs Motor Truck Co. with a capital of $100,000 to market the product of the Collier Motor Truck Co., has decided to go into the manufacturing branch of the business himself. Because it lacked working capital with which to build the trucks for which Krebs obtained orders, the Collier company has been placed in charge of R. R. Parkhurst, of Bellevue, as receiver.

Krebs has taken a lease on the plant of the Collier company and will acquire its inventory. The capital of the Krebs company will be increased from $100,000 to $300,000. The truck which it will make will be an assembled product.

THOMART TO CUT CAPITAL

AKRON, O., July 17—A special meeting of stockholders of the Thomart Motor Co. has been called for July 24 to approve a reduction in capitalization. The plan submitted by the directors provides for a decrease in preferred stock from $5,000,000 to $2,000,000 and a reduction of no par common stock from 100,000 to 70,000 shares. The decrease is suggested as a means to reduce taxes, according to the letter sent to the stockholders. The company's plant is located at Kent.

CANADA SHIPS TO 41 COUNTRIES

WASHINGTON, D. C., July 14—Passenger cars were shipped during May to 41 countries from Canada, according to the export statistics from that country transmitted to the Automotive Division of the Bureau of Foreign and Domestic Commerce. The Canadian shipments totaled 2562 cars valued at $1,498 276; 251 motor trucks valued at $112,156, and parts valued at $117,870. The overseas shipments of cars and trucks from the United States during the same month were 6798 passenger cars and 1203 motor trucks.

Federal Producing Fast One-Ton Unit

Express Model to Sell for $1,375 —Will Enter Foreign Markets

DETROIT, July 17—A new model, known as the Federal Fast Express, with a nominal capacity of 1-ton, has been brought out by the Federal Motor Truck Co. This new delivery type truck has a chassis weight of 2950 lb., with a body allowance of 900 lb. It is mounted on a 132 in. wheelbase chassis with 56 in. tread and has a loading space back of the seat of 110 in.

The engine is a Continental J-4, which is the same unit used for the past 2 years in the Federal Model S-D.

The truck is distinctive in that, although of small capacity, it is worm drive, employing the Timken units. Other parts used include Eisemann magneto, Zenith carbureter, Oakes fan, Long radiator with the core in a heavy pressed steel shell, Borg & Beck clutch, Detroit Gear and Machine gearset, Peters universal joints, Gemmer steering gear, Stewart-Warner vacuum tank, Disteel wheels, U. S. Royal cord tires, Alemite chassis lubrication, Remy starter and generator and Exide heavy truck service type of battery. Chrome vanadium steel springs have been adopted.

The clutch is a 10 in. type. The gearset is a sliding selective type and in conjunction with the 5.6 to 1 reduction in the rear axle gives a final reduction of respectively: 5.6 to 1 on high, 9.4 to 1 on second, 17.4 to 1 on low and 21 to 1 on reverse.

Will Seek Export Business

The Federal company has made arrangements to furnish any style body mounted and painted ready for work. There are in all thirty-two different combinations of seats, bodies, windshields and cabs which have been worked out to fill practically every need of express or delivery work for which this chassis would be called upon. Many of the combinations are interchangeable on the same body and with the same top. Production on these models started July 5, and it is expected that by Aug. 1 demonstrators will be in the hands of all Federal distributors. Owing to the magneto ignition equipment and the adaptability of the truck for various road conditions, it is expected that considerable export business may be secured with it. The price of the chassis is $1,375, f.o.b. Detroit.

ROLLS-ROYCE MAY EXPAND

MILWAUKEE, July 17—Plans for broadening the distribution of the Rolls-Royce are made evident by a conference held by R. B. Jackson, the western sales manager of the company, with officials of the Milwaukee Chamber of Commerce relative to the establishment of distributing headquarters in this city.

Strive for Better Coordinated Cars

Mechanical and Body Refinements to Appear—Makers Jealous of Prestige

DETROIT, July 17—Many changes in specialized units entering into the construction of cars will become known with the announcement of new models by companies within the next thirty days. Throughout the industry the striving for better coordinated cars is apparent, and is perhaps more marked than at almost any time in the development of motor car transportation. Every effort is being made by manufacturers to correct weaknesses in their products, in many cases weaknesses which might never be known to an owner, but which to a mechanical mind present possibilities of creating disfavor.

Many changes are designed to extend the scope of the car in certain particulars, aims which were impossible in using the former units. Many of these cars which will undergo changes have been enjoying wide popularity and apparently were giving the utmost in owner satisfaction. Refinement of parts, however, which would add to general efficiency, has impelled engineers to make changes which would make certain of the cars retaining their position.

There is no disposition in the industry to take chances on parts merely because they have been satisfactory in the past. Unit makers bringing out more efficient products find the industry wide open to receive them. In this they are particularly benefited by the inventory situation in most factories, which, by reason of the vogue of the short time commitment, leaves factories free to change their units within a very limited time.

In body construction there is a similar striving for greater comfort and convenience. Closed bodies, with the exception of the types designed almost exclusively for business purposes, are becoming more commodious, even in the lower priced models. More attention is being given to the upholstering of interiors and the fittings are more artistic in design.

The development of demand for closed vehicles has brought about a period in which nice coach work on a production basis is all important. The tendency of prices in these will be downward, and the character of the workmanship will be much higher. Cars for the fall business will be the first to indicate the manufacturers' plans along these lines.

NEW PUMP UNIT APPEARS

CHIPPEWA FALLS, WIS., July 17—The North Light & Manufacturing Co., Chippewa Falls, Wis., is bringing out a new unit which is a combination of a gas engine with a Uniflow pump, with automatic control. Water pressure is used to start the engine. The unit is designed for farms and country homes and is expected to take place of the windmill and other devices used to furnish water supply. The Chippewa concern has recently closed a 10-year contract with a large St. Paul jobbing house calling for the delivery of 1000 pumps of various sizes each year. The average price is $200, making the order valued at $2,000,000.

Receivership Asked for Maryland Motors

WASHINGTON, July 18—Receivership for the Maryland Motor Co., Charles H. Kehne, president, of Frederick, Md., a $1,000,000 corporation, has been asked by the company's creditors and stockholders who allege that the company has been mismanaged, and as a consequence is insolvent.

Capital stock of the company was originally $250,000, par value of $50 per share. After selling a large number of shares of stock, Kehne is alleged to have incorporated the company for $1,000,000 under the laws of Delaware and to have paid unearned dividends aggregating $20,000 to effect the sale of stock. In addition to an investigation of the affairs of the company, the court has been asked to set aside alleged fictitious transfers of stock.

Plans of the company contemplated the manufacture and sale of a "medium priced" passenger car. None, however, were ever manufactured.

On July 15 the directors declared a quarterly dividend of 2 per cent on the preferred shares, payable Aug. 15 to holders of record July 31.

"Copper Cooled" Line to Appear in August

DETROIT, July 18—General Motors Corp. has placed commitments for material for 5000 of its new "copper cooled" cars, shipments to begin in August. The corporation is planning to get into production on a small scale in August. The commitments are intended for first work on the new car and will cover production over a period of several months.

The first cars in the "copper cooled" line will be built at the Chevrolet factories in Flint, but no announcement has been made as to whether this car will bear the Chevrolet nameplate. Prices will be higher than the Chevrolet 490 line, but the car will be in the low priced field and is intended to meet the demand for a low priced air-cooled vehicle.

LONGER LINCOLN WHEELBASE

DETROIT, MICH., July 17—The Ford Motor Co. announces that the length of the wheelbase of all Lincoln cars has been increased to 136 in., with the exception of the coupe which is still being built on the 130 in. wheelbase. A price change has been announced both on the 7 passenger and sedan. The seven passenger is raised from $3,300 to $3,800.

Will Take Claims to Federal Court

Overland Files Answer to Willys Corp. Petition—Hearing August 1

TOLEDO, July 17—That the settlement of claims and counterclaims in the dispute between the receivers for the Willys Corp. and the Willys-Overland Co. will have to be threshed out in Federal court here, became apparent this week when the Overland attorneys filed an answer to the intervening petition filed by the Willys Corp. receivers.

The receivers—Francis G. Caffey and Frank Kennison—had asked for claims and damages amounting to an estimated total of between $5,000,000 and $7,000,000 growing out of a sale of common stock of the Overland to the corporation and also out of the contract to manufacture and sell the Chrysler Six.

The Willys-Overland has claims totaling somewhat more than $5,000,000 against the Willys Corp.

In asking the dismissal of the intervening petition of the receivers, Overland also asks that its claims be allowed and that it be protected so as to receive its share in any distribution of the assets of the corporation.

Attorney George Hahn and Receiver Kennison left Saturday for New York to finish up the affairs of the Electric Auto-Lite division recently sold.

The court has set Aug. 1 as the hearing date for the big claims between the two companies.

N. A. C. C. Data Show Good Summer Ahead

NEW YORK, July 18—Retail sales data gathered by the National Automobile Chamber of Commerce for the information of its directors show that prospects for July and August are better than the seasonal outlook for the midsummer months. Cities which state that sales for the next six weeks probably will be "very good" are Denver, Peoria, Des Moines, Cleveland, Sioux Falls, New York, Seattle and Kansas City.

Reports of a slight seasonal decline were made by Indianapolis, Boston and Richmond.

Atlanta reports that the outlook for July and August is not good and there has been a considerable decrease in Detroit.

All these cities without exception report that the prospects are good for closed car business in the fall.

The used car market is good in Denver, Boston, Detroit, Sioux Falls, Richmond, Seattle, Kansas City and Los Angeles. It is slowing up in Peoria, Indianapolis, Fargo, Atlanta and Cleveland.

The reports generally give little encouragement for increased truck sales for the next six months.

Big Earnings Shown By General Motors

Nearly $27,000,000 in First Half for Common Stock—Bank Loans Paid

NEW YORK, July 20—Preliminary estimate of the income account of the General Motors Corp. for the first six months of 1922 shows net earnings of $26,839,391 on the common stock.

Net sales for the half year aggregated $218,490,887, of which $137,800,000 were in the second quarter. Net earnings, before Federal taxes and interest charges, were $35,116,481 with $25,970,000 in the second quarter. Net earnings, after all charges, for the six months were $29,997,391. Dividends on the preferred and debenture stock for the six months required $3,158,000.

In the six months ending June 30 approximately $6,200,000 net was added to reserves for depreciation, and the balance in these reserves now stands at $43,700,000.

All bank loans were paid off by June 30, and except for approximately $5,400,000 of purchase money obligations, General Motors Corp. has no indebtedness underlying its preferred and debenture stock, except ordinary current accounts payable for merchandise, etc. Cash in bank as of June 30 was approximately $35,000,000.

Net working capital as of June 30 was approximately $123,000,000, an increase of $26,000,000 over December 31. Inventories, which were written down to cost or market on December 31, are well balanced and have been reduced to below $98,000,000, a reduction of some $10,000,000.

The preliminary statement demonstrates that there has been sound reason for the recent activity in the General Motors common stock, and that, if earnings continue at anything like the present rate, the corporation soon will be in a position to resume payments on the common.

BOOSTING GOOD ROADS

WASHINGTON, July 18—Federal-aid good roads are being boosted by Thomas H. MacDonald, chief of the Bureau of Public Roads, Department of Agriculture, who is now touring the United States in the interest of better automobile highway transportation. Particular attention to the planning of the Federal aid system of highways, for which meetings will soon be held, is being given.

OVERLAND PROFITS LARGE

TOLEDO, July 19—The position of the Willys-Overland company has been greatly improved in the last three months. May was the first month in a year and a half to return a profit of a definite nature of more than $600,000. June profits are believed to have been between $900,000 and $1,000,000. Inventories have been reduced to $19,000,000 as compared to $35,000,000 at the end of 1920. The company has approximately $10,000,000 in cash. Production for the second quarter was approximately 33,000 compared with 17,000 for the first quarter. The first half year thus exceeded by 2000 the total output for 1921.

Jackson Bondholders Get Associated Stock

NEW YORK, July 19—Holders of the $1,000,000 issue of 7 per cent bonds of the Jackson Motors Corp., which were due July 1, will receive securities of the Associated Motor Industries junior to the bonds of the new company in a ratio of 125 per cent of the par value of the Jackson bonds. It is understood that these securities also can be transferred equally for priority stock of Roland A. Crandall & Co., a Chicago finance corporation associated with the merger.

Jackson Motors was the first of the companies now in Associated Motors to transfer its bonds.

While the Kentucky Wagon Mfg. Co. of Louisville undoubtedly will become a part of the Associated Motor Industries, it has not actually been transferred to the consolidation, and many details in this connection remain to be worked out.

Farming Association Aids Manufacturers

CHICAGO, July 18—The Progressive Farming Committee, which is part of the National Institute of Progressive Farming, met in Chicago and after reviewing the accomplishments of the institute since it was inaugurated this spring adopted a budget providing for the raising of $30,000 beyond what has already been paid in order to cover the expenses of the remainder of this year.

Substantial increases in their appropriations have been made by members of the committee and an effort is being made to obtain additional subscribers among all members of the institute.

Guy H. Hall, director of the institute, made a report showing that in 30 days of active operation the information service sent out by the institution has been published in whole or in part in newspapers and periodicals having approximately 40,000,000 readers.

Following its meeting the committee issued a statement declaring that in its belief the National Institute of Progressive Farming has proved of great value to manufacturers of power farming equipment.

COMPILES GOOD ROAD FUNDS

WASHINGTON, July 17—Compilations of funds now available, made by the Bureau of Public Roads, Department of Agriculture, for automotive highway construction, show that there is approximately $750,000,000, which includes the Federal as well as local funds.

G. M. Develops New Dealers Contract

Uniform Type with Sliding Scale Provision—Can Be Cancelled Only for Cause

DETROIT, MICH., July 18—Following a series of conferences between executives of the several car manufacturing divisions of the General Motors Corp., a contract with dealers has been developed which will embody the best features of former contracts of the several units and make them available to dealers in all cars made by the five divisions of the corporation.

The contract itself is made in perpetuity with the dealer and can only be cancelled for cause. Each division will continue as formerly to enter into contracts with its dealers, and these contracts will be filed with the division headquarters. Complete authority in the merchandising of its products is vested in the producing division.

Under the new form of dealer relationship, there will be no renewing of contracts at stated intervals, but, instead, changes that may be advisable from time to time will be made in the form of appendixes to the contract proper. These will vary according to the needs of the particular manufacturing divisions.

An outstanding feature of the contract is that it provides discounts according to the volume of business done by the dealer. There is a sliding scale which gives every dealer an opportunity to increase his earnings by increasing his business. In providing for this the corporation wishes every man to know the basis upon which he is doing business.

Through the contract it is hoped to establish division control over the freight and handling charges incident to the shipping of cars, so that each division may be in position to know just what its products should retail for in any given section of the country. The fixing of these charges have up to this time rested with the dealer entirely and varied largely. Under the contract these charges will be brought to a more uniform basis.

GEORGES RICHARD KILLED

PARIS, July 11 (*By Mail*)—Georges Richard, founder and president of the Unic Automobile Co., was killed in an automobile accident near Rouen. Richard, who was 59 years of age, had been very closely connected with the French automobile industry from the earliest days. In 1892 he founded the Georges Richard Cycle Co. and entered the automobile field two years later. About 1896 he went into partnership with Brasier and formed the Richard-Brasier Automobile Co., building cars which were very successful in early races. In 1904 Richard dissociated, formed the Unic Automobile Co., which he controlled until the time of his death.

Ford Mexico Plant Depends on Survey

Investigation of Advantages Not Complete—Coahuila Offers Inducements

DETROIT, July 19—The Ford Motor Co. stated to-day that it has not yet definitely decided to erect an assembly plant at Tampico, Mexico, and that no action will be taken for several weeks, pending investigations now being made into Mexican trade conditions. Unless the company is convinced that the potential business warrants the erection of a plant, —it will not be built. This business now is being served by shipments from the plant at Houston, Tex. While shipments are being made steadily, they are not of record proportion, as they were last year.

If it finally is decided to erect a Mexican plant, it will serve most of the territory in that country, and distribution in the United States will be changed somewhat to take care of the surplus production of the Houston plant.

In the course of its investigation, representatives of the Ford company have conferred with the governor of the State of Coahuila, who has assured them that the Ford company will be given all possible facilities, including the donation of land, exemption from taxes, for at least fifteen years, and any other concessions which may be possible.

It is recalled that, when the invasion of Mexico was discussed several years ago, Henry Ford said: "Let me invade Mexico with factories and give the people of that country something to do; then there will be no more war there."

Pierce-Arrow Will Readjust Finances

NEW YORK, July 19—Bankers for the Pierce-Arrow Motor Car Co. are working out a readjustment of the company's financial affairs, but the details have not been divulged. It is stated officially, however, that some new securities will be offered. Bank loans have been reduced another $250,000, which brings them down to $7,900,000.

The company has rearranged its production departments to speed up output and sales are said to be steadily expanding. The high priced inventory has been practically liquidated, and the company now is in position to take advantage of current conditions. The sharp price cut is expected to stimulate sales.

S. A. E. PRODUCTION MEETING

NEW YORK, July 19—A national meeting of the Society of Automotive Engineers will be held in Detroit, October 26 and 27 to discuss problems of automotive production. Papers relating to production problems will be read at the morning sessions each day, and the afternoons will be devoted to factory inspection trips. These inspections will appeal particularly to tool, inspection and production men. A dinner will be held the evening of Oct. 26. K. L. Herrmann is chairman of the committee which is arranging the program.

Durant Production Hits 5886 in June

NEW YORK, July 19—Durant Motors, Inc., turned out 5119 fours and 767 sixes, a total of 5886 cars, in June. July production will somewhat exceed 6500. June output was divided among the different plants as follows: Long Island City, 2587; Lansing, 2191; Leaside (Toronto), 341; Muncie, 767.

A total of 24,456 Durant cars now has been produced.

The first of the new Stars will be delivered from the Long Island City plant Saturday. The company took formal possession of the Willys Corp. Elizabeth plant on Tuesday of this week. Large quantities of parts for the Star were on the sidetracks adjoining the factory, ready to be unloaded, and it now will be possible to get into production within a very short time.

Associations Draft Code for Air Safety

WASHINGTON, July 17—Low flying over crowds or trick flying over any densely populated area will be prohibited by the aeronautic safety code which is being drafted by the Bureau of Standards, the National Aeronautic Association and the Society of Automotive Engineers.

The draft of the safety code is tentative, but its principal provisions will include:

Inspection of aviators and aircraft in connection with the granting of licenses to pilots and air transportation companies.

Prohibition of dangerous proximity of aircraft in flight; rules governing personnel and equipment of airdromes, including medical and signal equipment; aircraft radio regulations; rules for landing fields; lighthouses for night flying and landing.

Bellanger to Show Big Loss for Year

PARIS, July 8 (*By Mail*)—A loss on the year's working of more than 15,000,000 francs will be shown on the balance sheet of the Bellanger Automobile Co. This loss has to be added to a deficit of 4,342,506 francs for the preceding year.

In addition to a couple of very high-grade automobiles of its own construction, the Bellanger company is marketing a low-priced car assembled in Paris with parts imported from Detroit. Benjamin Briscoe was responsible for the introduction of this plan and for the shipment of the American parts. In addition to its automobile branch, Bellanger is building Diesel engines and has aviation contracts in hand.

All-Japanese Car Now in Production

Los Angeles Designed Vehicle—50 Per Month Made at Osaka

LOS ANGELES, July 18—A Los Angeles engineer, William R. Gorham, has designed and developed the first automobile to be successfully manufactured and marketed in Japan. He is the sponsor of the Jitsuyo, which is now being turned out at the rate of fifty per month in the factory of the Jitsuyo Jidosha Seizo Co. of Osaka. It is reported that there will be an early increase in production to 100 cars monthly.

Advices from Japan state that the Jitsuyo will probably cut considerably into the sale of the lower-priced American cars in the Japanese market.

The outstanding features of the Jitsuyo are its small size and extremely simple control. In designing the car, Gorham had in mind a vehicle that should supplant, at least in part, the ricksha for passenger transportation, and the control adopted is so simple that it can be readily mastered by a ricksha coolie. There is no steering wheel, its place being taken by a simple handle held in the left hand. The clutch and brake pedals, and the gear shift lever, are eliminated, and the entire control is accomplished by one lever situated on the right side of the machine. Pushing forward this handle engages the friction transmission. When it is pulled back it disengages the friction wheels, and if pulled further back applies the brakes. The extreme outer side of the rear position engages the reverse.

This is probably the simplest form of control ever incorporated in a gasoline automobile.

No Garage Needed

The wheelbase is 72 in. and the tread 38 in. The makers point out that no garage is necessary, as the Jitsuyo can be parked in a doorway, or in the ordinary ricksha house.

The engine is a two-cylinder air cooled type, similar to those found on the larger motorcycles, with a 3-in. bore and a 4-in. stroke. The construction is F-head, the inlet valves being in the head, operated by rocker arms, and the exhaust valves in the side.

The flywheel performs a triple function. In addition to serving as a balance for the engine, it is provided with vanes, and acts as a blower in pulling hot air away from the engine, greatly facilitating the cooling. It serves also as one of the two friction discs of the friction transmission. This is one of the most original features of the car.

The frame is ¼ in. by 2 in. angle iron, wheel braced, and inswept at the front.

The machine was originally produced as a three-wheeler, but a four-wheel model has been developed and is now in production.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

On July 14 call money was obtainable at 2¾ per cent, the lowest official quotation since 1918. The range for the week was 2¾ per cent to 4½ per cent, as compared with 4 per cent to 5 per cent in the previous week. General ease was noted in the time money market. Sixty and ninety days' and four months' maturities covered a range of 4 per cent to 4½ per cent, and five and six months' were quoted at 4¼ per cent. Although quotations remained at the levels ruling a week ago, offerings were in larger supply, and a considerable amount of business was transacted for the longer maturities. The prime commercial rate remained unchanged at 4 per cent.

Federal Reserve

The Federal Reserve Bank of Dallas announced on July 12 a reduction from 5 per cent to 4½ per cent in the rediscount rate on all classes of paper. Only two institutions, Minneapolis and Kansas City, now maintain a 5 per cent rate.

The Bank of England, on July 13, announced another cut of ½ of 1 per cent in its minimum discount rate, bringing it down to 3 per cent, the lowest rate since January 29, 1914. The high record of 10 per cent was reached on August 1, 1914. The 3½ per cent rate had been in effect since June 15 last. This action on the part of the Bank of England is taken in some quarters as an indication of a possible lower range of our own reserve bank rates in the near future. Earlier in the week the Bank of Italy reduced its rate from 6 per cent to 5½ per cent. In this case the 6 per cent rate had been in effect since May 11, 1920.

Crop Reports

The Government crop report for July 1 shows in general a good average. The condition for corn is reported at 85.1 per cent of normal, as compared with 91.1 per cent last year. This would indicate a crop of 2,860,000,000 bushels against an estimated final yield of 3,081,251,000 bushels from the crop of 1921. The July 1 condition of winter wheat showed a reduction of 39,000,000 bushels, as compared with the amount indicated by the Department of Agriculture's estimate of June 1. This reduction is primarily due to the heat and drought. The estimated yield of spring and winter wheat combined, however, is 817,000,000 bushels, as compared with a final yield of 794,893,000 bushels from the crop of 1921. This year's estimate is the sixth largest crop on record.

The Federal Reserve statement as of July 12 showed an increase of $15,156,000 in gold reserves and $23,111,000 in total reserves. Bills on hand decreased $66,320,000 and total earning assets $60,051,000. Deposits showed an increase of $40,235,000 while Federal Reserve notes in circulation declined $36,201,000. As a result, the reserve ratio increased from 76.8 per cent to 77.3 per cent.

Native Production of Alcohol Urged

Movement in India to Utilize Waste Matter in Motor Fuel Production

LOS ANGELES, July 18—An unusual movement has been launched in India which has for its purpose the encouragement of the native agriculturists to utilize the waste vegetable resources of the country in the manufacture of fuel alcohol for use in motor cars, as an alternative for gasoline.

Temperance reformers in India are especially interested in the movement. Promoters of the idea expect that if the people will distill alcohol commercially for fuel, the drink problem will be solved.

One of the most difficult problems in India at the present time is that the agricultural classes have cut down their food crop areas in order to give more room to so-called "money crops"—cotton, oil seeds and so on. It is now being urged that they be led similarly to distill alcohol for sale and profit rather than for getting drunk.

In most districts in India, where the mowhra trees are plentiful, it has been said that it is impossible to keep the people from getting drunk. They have always distilled the mowhra for drink. "But would they continue to do so if they could make it into a saleable article like fuel alcohol, and would they not in that case distill for money rather than for drinking?" asks a Bombay leader of the movement. "The temperance reformers might consider whether there could not be organized a scheme whereby the people could be induced to bring distilled spirits to a collecting center or centers where it could be refined and whence it could be distributed for motor car use. It ought to be possible to market the product for considerably less than current gasoline prices.

HAS CALIFORNIA SUBSIDIARY

NIAGARA FALLS, N. Y., July 18—U. S. Light & Heat Corp. of California has been organized as a subsidiary of U. S. Light & Heat Corp., manufacturer of USL storage batteries, railroad car lighting devices and electric arc welders. A site has been leased and construction started on a new plant at Oakland, Cal. The purpose is to enable the corporation to handle more efficiently its growing business on the Pacific Coast. It is anticipated that production will start in the new factory about Oct. 1.

EMPLOYMENT NEAR WAR FIGURES

KOKOMO, July 17—Kokomo's ninety-seven factories are now employing within 10 per cent of the maximum number at work during the war, according to O. C. Phillips, examiner of free employment for the government. The Haynes plant has 1800 people as against 1600, the high mark of normal times.

FINANCIAL NOTES

Witwer Battery Co. of East Chicago, formerly known as the O. K. Giant Battery Corp. has begun work on a modern factory at Danville, Ill., the Chicago plant ultimately to be closed. Capitalization has been set at $500,000 of which $50,000 will be invested in buildings. It is stated that 100 men will be employed at the start. The plant will manufacture a storage battery with a non-liquid electrolyte and will begin with a production of 500 daily.

Yellow Cab Co., Chicago, has decalred three regular monthly dividends of 33⅓ cents, payable Aug. 1, Sept. 1, and Oct. 2 to stock of record July 20, Aug. 21 and Sept. 20 respectively. The **Yellow Cab Mfg. Co.** has declared three monthly dividends of 50 cents, payable the same dates. The previous monthly dividends were 60 cents.

Ohio Motor Vehicle Co.'s, Cleveland, Ohio, plant and assets are being advertised for disposal in accordance with a court order in a receiver's auction sale on Aug. 1. The company manufactures Ferris cars and Ohio trailers. The receivers are William E. Ferris and Norton McGiffin.

King Motor Co. will soon pay creditors a 29 per cent dividend according to a statement made by Robert D. Brownson, receiver for the company, who has filed a preliminary report showing that preferred claims of $350,000 have been paid in full or compromised.

Russell Motor Car Co., Toronto has declared a dividend of 1¼ per cent on the common stock as well as the regular quarterly dividend of 1¾ per cent on the preferred, both payable Aug. 1 to stockholders of record July 20.

Durant Motor Co. of New Jersey has filed certificate of incorporation with a capital of $80,000 in shares without nominal or par value. The incorporators are John P. Schermerhorn, Randolph Payton and William B. Daley.

H. H. Franklin Mfg. Co., Syracuse has declared a regular quarterly dividend of 1¾ per cent on its 7 per cent cumulative preferred stock, payable Aug. 1 to stockholders of record July 20.

Tonneau Shield Co., Inc., New York City has opened a branch at 1828 Van Ness Ave., San Francisco to care for the Pacific Coast. Charles Emanuel is in charge.

The Van Keuren Co., Boston 34, Mass. has ready for distribution a catalog of modern measuring tools.

WORKERS IN DEMAND

MILWAUKEE, WIS., July 17—Analysis made by a Milwaukee daily newspaper of the increase in its classified advertisements indicate that the automotive industries are responsible for a considerable part of an increase of 500 per cent in the call for workers during the first half of July, compared with the corresponding period of 1921. The increase over the first half of June, 1922, is 100 per cent. The A. O. Smith Corp., pressed steel frames, drop forgings, stampings, etc., is daily advertising for 300 to 400 men for permanent positions to recruit forces of all departments to full strength, despite the fact that a 24-hour schedule is now in effect.

INDUSTRIAL NOTES

Waukesha Foundry Co., Waukesha, Wis., manufacturer of brass castings, is planning to start work immediately on the erection of additions to increase at least 100 per cent of the shop built a little over two years. The plant has been in continuous operation since that time and is now badly handicapped in filling orders by lack of production space and facilities. Originally it served largely the manufacturing plants in Waukesha, but the trade territory has expanded to embrace Milwaukee, Chicago, Detroit, Cleveland and Indianapolis.

Falor Manufacturing Co., Akron, organized a year ago by Aaron Falor, formerly with the Goodyear Tire & Rubber Co. for the manufacturing of inner tubes is making preparations to move into the former B. & W. Rubber Co. plant at Betts Corners, the new industrial suburb of Akron. The company leased the new plant several months ago and purchased the old machinery and additional new equipment. Present small plant on Sweitzer avenue has been operated 24 hours a day during the larger part of the first six months of the year.

Standard Auto Parts Co., Pontiac plant, occupied chiefly at present with Ford spring contracts, is maintaining production during July on a basis about equal to that of June, according to factory officials.

The expected lull in business, which had been taken into account in earlier statements of this company, has not been experienced and indications are that it will not be immediately felt.

Hess-Bright Co., reports an increasing demand for ball bearings, with orders and inquiries being received daily. A shortage in some lines of skilled labor is mentioned by an officer of the company.

The first three months of the year resulted in the production of the Standard Steel & Bearings, Inc., being more than doubled, although there is a slight let-up at present.

Edward G. Budd Manufacturing Co., Philadelphia and its affiliated company, the Budd Wheel Corp., are employing 4,200 men and women, at full capacity, with prospects for good future business. Edward G. Budd, president, says that business is much better than it was six months ago and that he looks for steady improvement. A night shift has been put on at the former plant.

Bellstrom Motors Co., St. Louis, Mich., plant and equipment has been bought from the receiver by the Par-Kar Coach Co., Detroit, which will make a special line of buses, complete with bodies. C. O. Westfall, president of the Par-Kar company, is well known as a transportation expert, having operated fleets of buses and trucks in many sections of the middle west.

Motor Wheel Co., Columbus, Miss., automobile spoke manufacturer, has closed a deal for a building there, where it will engage in the manufacture of spokes on a large scale as soon as the machinery can be installed. The plant is expected to be in operation by Sept. 1, and will employ about fifty people, it is stated.

Douglas Motors Corp., manufacturer of the Douglas truck, has started the production of trucks after a shutdown. The corporation has a good stock of raw material and motors on hand, and new trucks are turned out now only as ordered.

Campbell - Ewald Co., Detroit, is now located in the General Motors Building, occupying a suite of offices on the thirteenth floor adjoining the advisory staff offices of the General Motors Corp.

Messenger Manufacturing Co., Des Moines, has taken over the manufacture and sale of all the products formerly produced by the Auto Metal Parts Co. of this city.

Brooke, Smith & French, Inc., Detroit, are now located in new offices at John R and Eliot Streets, where they have taken over a former residence property.

MOTOR PERAMBULATOR APPEARS IN LONDON

WASHINGTON, July 18—"Autolets" are the latest thing in London for the smart set, says a cable to the Bureau of Foreign and Domestic Commerce. An "autolet," it is explained, is really an electrically driven perambulator, designed with noiseless motors, which propels the baby "trucks" along at a four mile clip, while nurse stands behind on a kind of raised platform, like a scooter, at the back of the vehicle.

Want Parenti Plant Sale Declared Void

BUFFALO, N. Y., July 18 — About 1000 stockholders of the defunct Parenti Motor Co., Inc., living at Farrell, Sharon and New Castle, Pa., filed papers in the Federal Clerk's office here yesterday through an attorney, asking that the sale of the company, by the Marine Trust Co. as trustee, to the Hanover Motor Car Co. of Hanover, Pa., be declared null and void.

The out-of-town stockholders claim that the option given to them at the time the firm went into bankruptcy did not cover a long enough period, and it is now understood they are ready to buy the factory. The property is appraised at $328,000.

Federal Judge Hazel appointed William C. Reilley temporary receiver of the property until the decision is made.

STANDARD MOVES OFFICES

PITTSBURGH, July 17—The Standard Motor Car Co. will move its general offices from the engine manufacturing plant in this city to its main plant at Butler, Pa. The plans were decided upon to expedite general business and promote economies impossible with the executive, engineering, sales and service departments so far removed from the factory. The new concrete and steel assembly building in which the general offices are located is of two-story construction, 800 feet long and 200 feet wide.

COLUMBIA TIRE STARTS PLANT

PORTLAND, ORE., July 18—Construction of the Columbia Tire Co. plant, Portland's newest industry, is now well under way, and the company expects to be in production by fall.

METAL MARKETS

Activity in the steel mills is one thing and activity in the steel market quite another. Present orders on steel mills' books suffice to carry most of them comfortably through the third quarter, especially so when the possibility of curtailment in production as the result of fuel shortage and other industrial complications must be taken into consideration. The kind of market activity that steel producers would like to see at this time is that which would show that consumers are giving some thought to the covering of their late September and early October requirements. There is precious little of that sort of market interest in evidence.

A few of the independent sheet mills are reported to have booked some business at the price levels of the Corporation, shipments to be made at sellers' convenience. That is the kind of business which, if it were sufficiently large in volume, would make the outlook for producers far more reassuring than it is. True it is that independent sheet rollers are working on a handsome budget of orders at satisfactory premiums over the price levels of the leading interest, but, somehow or other, the trade's thought centers on the outlook for business following the feverish activity of the present. The bulk of the business now on sheet mills' order books carries actual shipping orders, so that there is very little apprehension of cancellations. To that extent at least the situation appears to be thoroughly healthy. It is the lack of interest on the part of consumers, especially of those in the automotive industries, in other than spot or virtually spot shipments that is the fly in the ointment.

The leading sheet interest, the American Sheet & Tin Plate Co., which has sold practically all of its output until the end of September, is naturally in the best position in so far as concerns future business. The Corporation's conservative price policy is bound to attract consumers who want to safeguard themselves against future contingencies. On the whole, however, buyers' appetite is confined to material that can be shipped the same week in which it is ordered. In the pig iron market a somewhat peculiar situation prevails. Development within the last week seemed to indicate a weakening of prices. In thoughtful trade circles, however, the opinion prevails that beneath the surface a much stronger market is in formation. This opinion is based on the relatively low output of foundry and malleable iron and the impossibility of increasing it percentibly within the immediate future. Those who profess to see the coming of rising pig iron prices also point out that the actual bare cost of production is far above the present market and that coke supplies are running lower and lower.

Pig Iron.—The market is a mighty tame affair, automotive foundries continuing to buy largely from hand to mouth.

Steel.—Cold-finished steel bars display an upward tendency, most producers seeking to establish the market on a $3 per ton higher level than the 2.10c. quotation heretofore prevalent. Hot-rolled bars, the raw material for the cold-finished product, are not only rising in price but some sizes are difficult to obtain. Sheets are easier at $55. Strip steel continues in excellent demand from automotive consumers. Alloy steel interests report satisfactory orders from the automotive industries, price levels remaining unchanged. Demand for automotive bolts and nuts continues good.

Aluminum.—A fair demand for aluminum body sheets is noted. Importers complain that some of the sheets arriving from Germany are filled with waves, blisters and buckles and that these imperfections are becoming much more numerous than formerly. Some importer claims to have inquiries and orders for 250,000 pounds of body sheets. Ingot aluminum is moving slowing. Price levels are unchanged.

Copper.—Rolling mill copper and brass products have been advanced ½ cent per pound by the leading interest and independent producers have followed suit. Consumers are apparently covered and there is little fresh buying.

Tin.—The market is exceedingly quiet.

Lead.—Storage battery makers are buying moderate tonnages. The market is fairly steady.

Zinc.—Consuming demand has died down and the market is extremely dull.

Calendar

SHOWS

Aug. 4-13—Chicago, Aircraft Exhibition and Aeronautical Congress.

Aug. 26-Sept. 1—Toronto, Ont., National Automobile Show held in conjunction with the Canadian National Exhibition.

Sept. 4-9—Indianapolis, Automobile and Accessory Show in conjunction with the Indiana State Fair, Auto Show Building, under the auspices of the Indianapolis Automobile Trade Association, J. B. Orman, manager.

Sept. 23-30—New York, Closed Car Show, Grand Central Palace.

Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon, Coliseum and First Regiment Armory.

FOREIGN SHOWS

March 10-July 31—Tokio, Japan, Peace Exhibition.

July 1-24—London (Olympia), Aircraft Exhibition.

Sept. 1922 — Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Associação Automobilista Brazileria.

Sept. 15-20—The Hague, Automobile Show.

Sept. 25-Oct. 3—Berlin, Automobile Show at the Kaiser-Damm Hall under the auspices of the German Automobile Manufacturers Association.

September — Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.

Oct. 4-15 — Paris, Automobile Show, Grand Palais.

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 10 - Dec. 19 — Brussels, Automobile Show, Palais de la Cinquantenaire.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

CONVENTIONS

August 28-Sept. 2 — Detroit National Safety Congress.

Sept. 18-23, 1922 — Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

Sept. 13, 14, 15—Buffalo, Lafayette Hotel, Annual credit meeting, Motor and Accessory Manufacturers Ass'n.

U. S. Glider Tests Prove Successful

American Students Enter French International Contest—New Phase in Aviation

NEW YORK, July 17—The Aeronautical Chamber of Commerce announces what it describes as the first successful gliding tests in the United States since the Wright Brothers' experiments which ended in 1903. The latest experiments were made at Ipswich, Mass., by three students of aeronautics at the Massachusetts Institute of Technology who will participate in the first international gliding contests to be held Aug. 6-22 at Clermont-Ferrand, France.

The students are Edmund T. Allen, 26, of Chicago; Harry C. Karcher, 20, of Mansfield, Ohio, and Otto C. Koppen, 22, of Mamaroneck, N. Y. Allen formerly was a test pilot for the army air service.

The entrance of the United States into the international competition in France marks a new phase in the development of American aeronautics, according to officials of the Aeronautical Chamber of Commerce. Germany, deprived of the privilege of orthodox engineering, after the armistice, turned to motorless airplanes, and at a competition last fall, distances as great as 15 miles were traversed by gliders. France was quick to arrange for a general contest and experimentation has been going on ever since in most of the large nations of the world. There probably will be three score entrants in the French affair.

Allen, Karcher and Koppen constructed a glider at the M. I. T. laboratories and took it to a 50-ft. elevation at Ipswich. It rose in a 15 mile head wind. Altogether five successful flights were made. The velocity of the wind was such that the machine hovered practically the entire time. It reached a maximum elevation of 20 feet and advanced a maximum distance in one flight of 200 feet.

As the result of these trials, the young men, with the assistance of other aeronautical students at Cambridge, redesigned the glider into what they believe is the most efficient type yet produced anywhere in the world. The frail little aircraft has a span of 24 feet, a chord (or width of wing) of 4 feet 9 inches, and measures 16 feet overall. It is of spruce and fabric construction and weighs but 80 lb. The most successful of the famous German gliders weighs 149 lb. Yet the Cambridge craft has a factor of safety of four. It is asserted by the builders that the craft has greater ease of control than the ordinary type of plane, having ailerons, rudder and flaps, the full length of the monoplane wing.

New Earl Cabriole to Sell for $1395

JACKSON, MICH., July 18—Earl Motors, Inc., has completed plans for a cabriole which will augment its line of closed cars, and which will sell at $1395, f.o.b. factory. Production on the new car will be started at once, and deliveries will be ready in time for the opening of the fall business. The car is designed to meet the rapidly increasing demand for low priced closed models.

The chassis will be of standard Earl type, having 56 in. rear springs. The overall length will be 167 in. and the height 74 in. The top and sides of the rear tonneau are covered with black Duratex fabric, and the body panels will be finished in blue. The fenders and chassis are black enameled.

The upholstery of the car is gray Spanish leather. Door and rear quarter windows are lowerable, and the one-piece windshield swings either in or out. A rain and sun visor is standard equipment, as are also dome light and windshield wiper. At the rear is a trunk platform protected with maple slats in natural color. The rear body panel is protected by nickel slat irons.

New Open Body to Oldsmobile Line

Touring Model Priced at $1,595—Mounted on Light-Eight Chassis

LANSING, July 18.—A new five-passenger open body is now being mounted on the light eight Oldsmobile chassis. This body has very similar lines to the four-passenger light eight which has been on the market for some time, and has been brought out to meet the demand for a body of greater capacity, the company states.

The fittings as well as the lines of this car are quite similar to the four-passenger model. The car is finished in a wine color known as Oriford Lake, and the side rails are of Circassian walnut. The instrument board, horn button, steering wheel and spokes and ball on top of the gear shifting lever are also of walnut. The upholstery is hand buffed brown leather. A new point is the flaring nickel-plated radiator shell and a black cowl ventilator.

The rear seat is 45 in. wide; front seat, 41 in. wide; doors, 21¼ in. wide; leg room in rear seat, 29 in.; wheelbase, 115 in.

Equipment Modified

The top and side curtains are new design, the top being what is called the clear vision type; that is, free from side bows, permitting full view for rear seat as well as front seat. The new two-piece windshield is adjustable from the inside and is equipped with a weather strip. Standard equipment includes windshield wiper, rear vision mirror, tubular robe rail, and snubbers on the rear. Cord tires are provided as standard equipment and a single tire carrier, with spare rim, is mounted at the rear. The car is priced at $1,595 f. o. b. Lansing.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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10,608,127 Cars and Trucks Registered on July 1, 1922

Gain of 1,350,552 over 1921 mid-year figures. Increase is 14.6 per cent. Fees collected jump $27,390,364. One car for every 10.16 persons. New York has highest total, but California records greatest numerical gain. Motorcycle registrations drop.

ON July 1, 1922, there were 1,350,552 more cars and trucks in the United States than on July 1, 1921. This is a gain of 14.6 per cent over the mid-year figure of 1921 and indicates that the final 1922 statistics will record another marked increase in motor vehicle registrations. Already the Dec. 31, 1921, total of 10,505,660 has been exceeded by 102,467. Thus, all the registrations made during the last six months of this year will represent an increase over the 1921 total.

Ten million six hundred and eight thousand one hundred and twenty-seven cars and trucks were registered in the United States on July 1, 1922. Fees collected have totaled $125,052,346, an increase of $27,390,364 over July 1, 1921. There is now one motor vehicle for every 10.16 persons in the United States, using July 1, 1921, population estimates as a basis.

New York maintains its place at the top of the list with 812,138 cars and trucks, while Ohio is found as usual in second place with 760,000.

The largest gain over July 1, 1921, is recorded by New York, which shows an increase of 161,608. The largest percentage gain for the same period has been made by the District of Columbia, which jumped up 48 per cent. Tennessee follows with an increase of 35 per cent.

Six states show a smaller registration than last year at this time. Those which dropped were New Mexico, Wyoming, West Virginia, South Dakota, Utah and South Carolina. The total registration loss in these states, however, is only 13,093, so that the net gain over last July is not materially affected.

A very large number of states, however, have failed to reach a point as high as that of the final Dec. 31 registrations of 1921. More than half of the states, in fact, are still below the 1921 total. This has not usually been the case, although a similar situation prevailed last year in July. Despite that fact all but four states recorded gains before the final count in December.

The first six months of 1922 have witnessed a remarkable industrial comeback from one of the worst

1922 HAS been a remarkable production year for the automobile industry. Some people have even been asking, "Where are all the cars going?"

* * *

This article gives the answer to that question. It contains the results of mid-year survey of registrations which has just been completed by AUTOMOTIVE INDUSTRIES.

* * *

The results are gratifying to the automotive industry. They indicate marked progress over last July.

depressions the country has ever had. Farmers have been doing better this year, but have had many debts to liquidate. For this reason it is probable that registration officials have been more ready than usual to allow the farmer considerable leeway.

In some states the practice has always been to refrain from enforcing the registration law in agricultural districts until late in the year when the crops have been harvested. This year, because of the unusual economic conditions, it is logical to assume that this practice has been more widespread.

Since nearly all of the state registration years run from January to January, however, the only figures with which the July 1, 1922 figures can be properly compared are the July 1, 1921 figures. On this basis, a gain of nearly a million and a half vehicles is recorded and marked progress is shown in all parts of the country.

A study of the table showing percentage gains and losses in registration gives some interesting facts in answer to the perennial "saturation point" arguments.

The largest percentage of gain in registration has been made in those states which already had the largest number of vehicles. New York, Ohio, California, Pennsylvania, Indiana, New Jersey—all high registration states—each show an increase of more than 15 per cent over last July. In fact, New York, which has more cars than any other state, gained more than any of the others mentioned, having an increase of 24.8 per cent.

Iowa, which had the greatest number of cars per person in 1921, shows a gain of 8.2 per cent over last July.

No radical changes have taken place in the relative position of the states as regards total registrations. The rise of California from fifth to second place in the list is the most prominent. Last year at this time, Pennsylvania occupied second place, but now drops to third through the large gains made by the Golden Gate State.

At the other end of the list, Delaware has moved up a peg from next to last place, putting New Mexico next to the bottom. Nevada, of course, still has the lowest registration.

The Southern states made distinct gains during the last year. The first four states in the list of percentage

Registration of Motor Vehicles

State	Total Net Registration	Non-Resident Registrations and Transfers	Passenger Cars	Commercial Cars	Motorcycles	Total Fees
Alabama	87,129	727	77,509	9,620	598	$1,215,414
Arizona	32,847	2,018	.....	.....	185	202,544
Arkansas	74,947	.....	67,900	7,047	192	900,000
California	722,853	.....	689,163	33,690	14,299	7,219,160
Colorado	145,000	.....	136,000	9,000	2,100	900,000
Connecticut	127,773	10,810	105,560	22,213	2,144	3,155,701
Delaware	21,800	.....	.....	.....	338	384,727
District of Columbia	78,055	.....	69,496	8,559	2,357	347,153
Florida	105,029	2,470	87,838	17,191	1,287	1,400,000
Georgia	126,500	1,071	112,000	14,500	877	1,702,797
Idaho	47,094	524	.....	.....	601	725,000
Illinois	676,748	.....	591,437	85,311	6,063	7,193,861
Indiana	425,000	.....	380,000	45,000	5,152	2,734,403
Iowa	460,069	.....	431,798	28,271	3,089	7,315,221
Kansas	288,742	4,937	269,065	19,677	1,714	146,128
Kentucky	129,100	.....	114,307	14,793	841	1,952,422
Louisiana	83,624	.....	70,940	12,684	395	1,609,850
Maine	77,419	.....	66,307	11,112	1,073	1,184,390
Maryland	130,631	6,802	120,776	9,855	3,752	2,338,765
Massachusetts	367,706	30,370	310,003	57,703	9,064	4,588,038
Michigan	493,246	41,696	442,055	51,191	4,199	6,825,118
Minnesota	336,000	17,576	304,000	32,000	2,500	6,013,275
Mississippi	63,420	12,300	58,420	5,000	135	1,494,990
Missouri	338,426	.....	303,756	34,670	.....	3,039,317
Montana	55,700	313	49,850	5,850	251	540,133
Nebraska	216,902	7,408	198,717	18,185	1,101	2,670,827
Nevada	10,544	.....	.....	.....	80	97,114
New Hampshire	42,608	.....	.....	.....	1,493	823,165
New Jersey	287,859	24,876	216,418	71,441	7,364	5,457,151
New Mexico	20,207	.....	18,457	1,750	107	180,000
New York	812,138	.....	630,883	181,255	27,000	9,124,024
North Carolina	162,942	.....	147,488	15,454	.....	.....
North Dakota	88,719	3,800	86,354	2,365	584	613,990
Ohio	760,000	38,200	650,000	110,000	17,000	6,342,628
Oklahoma	187,000	.....	.....	.....	504	2,143,705
Oregon	108,779	8,169	96,465	12,314	2,424	2,973,378
Pennsylvania	716,644	49,728	660,262	56,382	15,704	11,046,479
Rhode Island	51,406	4,768	41,510	9,896	1,337	510,000
South Carolina	84,449	.....	77,833	6,616	497	.....
South Dakota	111,447	.....	103,731	7,716	485	672,152
Tennessee	117,000	6,300	103,000	14,000	1,000	1,386,000
Texas	449,436	58,954	.....	.....	2,833	3,630,840
Utah	40,700	.....	34,800	5,900	565	645,815
Vermont	37,452	1,727	35,276	2,176	669	680,741
Virginia	150,000	.....	130,000	20,000	1,500	2,000,000
Washington	181,762	9,706	154,340	27,422	2,788	2,980,017
West Virginia	90,250	3,758	86,200	4,050	950	1,832,267
Wisconsin	357,968	.....	333,754	24,214	4,813	3,821,512
Wyoming	27,057	.....	24,223	2,834	253	292,134
TOTALS	10,608,127	349,008	8,687,891	1,128,907	154,257	$125,052,346

CAR AND TRUCK REGISTRATIONS

New York	812,138
Ohio	760,000
California	722,853
Pennsylvania	716,644
Illinois	676,748
Michigan	493,246
Iowa	460,069
Texas	449,436
Indiana	425,000
Massachusetts	367,706
Wisconsin	357,968
Missouri	338,426
Minnesota	336,000
Kansas	288,742
New Jersey	287,859
Nebraska	216,902
Oklahoma	187,000
Wtshington	181,762
North Carolina	162,942
Virginia	150,000
Colorado	145,000
Maryland	130,631
Kentucky	129,100
Connecticut	127,773
Georgia	126,500
Tennessee	117,000
South Dakota	111,447
Oregon	108,779
Florida	105,029
West Virginia	90,250
North Dakota	88,719
Alabama	87,129
South Carolina	84,449
Louisiana	83,624
District of Columbia	78,055
Maine	77,419
Arkansas	74,947
Mississippi	63,420
Montana	55,700
Rhode Island	51,406
Idaho	47,094
New Hampshire	42,608
Utah	40,700
Vermont	37,452
Arizona	32,847
Wyoming	27,057
Delaware	21,800
New Mexico	20,207
Nevada	10,544
	10,608,127

gains are all located below the Mason-Dixon line, while six out of the first dozen are in this group.

There is a marked absence of agricultural states near the top of the list either in percentage of gain or actual gain in registration. In both of these lists, Minnesota is the first agricultural state to appear. It is 16th in the list of percentage gains and 11th in the list of actual registration increases.

With increased registration has come an increase in the amount of fees paid by motorists. Up to July 1, 1922, car and truck operators had paid into the state treasuries a total of $125,052,346, an increase of $27,390,364 over the sum collected during the first half of 1921. Thus, while motor vehicle registrations increased about 15 per cent, the registration fees collected increased about 28 per cent.

This analysis shows that motorists are paying more per car in registration fees than in previous years. The increased total revenue thus collected by the states can properly be used for highway maintenance, so that motor vehicle traffic can operate efficiently and economically throughout the country.

Motorcycle registrations are less than on July 1, 1921, by some 8000. Motorcycle registrations have increased in only eight states, losses being shown in every other case. Ohio has registered the largest gain with 5339, while Pennsylvania shows the greatest loss with 2470. New York is the only state except Ohio to register any material gain in motorcycle registration, the other gains being very small.

January 1-July 1 Comparisons

An examination of the July 1, 1922, figures in relation to the Dec. 31, 1921, totals is of limited value, since the figures are not properly comparable. The Dec. 31 figures represent a high total for the year, while the July 1 figures merely tell how many cars have been registered in half a year.

The fact that the July 1 total in a given state is less than the total for the same state on the previous Dec. 31 is no indication whatever that the number of cars in that state has actually fallen off. This condition of registration figures may prevail when there are actually more cars operating in the state on July 1 than at the end of the previous year. The difference in registration in such a case may indicate simply the degree of law enforcement in the particular state during early months of year.

When a state on July 1 has passed the total of the previous December, however, there is certain to be an increase for the year in that state. These facts should be clearly understood in comparing the July 1 figures with the totals for the previous year.

As an indication of how lax law enforcement affects registration figures, the following paragraph from a letter just received from the research bureau of the Oklahoma City *Times* is of interest:

"In Oklahoma the motor vehicle register law is not rigidly enforced and for this reason it is practically impossible to tell exactly at this time the number of cars in the state."

Twenty-three states have already registered more cars than were registered on Dec. 31, 1921. California has passed last year's total by 49,023, while eight other states have ex-

PERCENTAGE GAINS AND LOSSES IN REGISTRATION

July 1, 1921—June 30, 1922

Gains:	
District of Columbia	48.8
Tennessee	35.1
Arkansas	28.5
Virginia	25.0
New York	24.8
Indiana	23.2
California	22.7
Massachusetts	22.6
Ohio	21.9
New Jersey	21.3
Kentucky	20.1
Louisiana	17.8
Pennsylvania	17.6
Alabama	17.6
Maine	17.3
Florida	17.1
Delaware	15.9
Maryland	15.7
New Hampshire	14.8
Vermont	14.3
Minnesota	14.0
Washington	13.9
Wisconsin	13.4
Michigan	13.3
Mississippi	13.0
Illinois	12.6
Missouri	10.7
Rhode Island	10.4
North Carolina	10.2
Colorado	9.4
Nevada	9.0
Connecticut	8.2
Iowa	8.2
Montana	8.2
Texas	7.5
Georgia	6.6
Oregon	6.4
Arizona	5.4
North Dakota	2.8
Oklahoma	2.2
Idaho	2.1
Kansas	.47
Nebraska	.46
Losses:	
New Mexico	15.3
Wyoming	9.8
West Virginia	4.5
South Dakota	1.5
Utah	1.1
South Carolina	.22
Average Gain for U. S.	14.8 per cent

GAINS AND LOSSES IN REGISTRATION

July 1st, 1921-June 30, 1922

Gains:	
New York	161,608
Ohio	136,684
California	133,990
Pennsylvania	107,376
Indiana	80,110
Illinois	75,766
Massachusetts	67,679
Michigan	57,738
New Jersey	50,520
Wisconsin	42,194
Minnesota	41,295
Iowa	34,713
Missouri	32,624
Texas	31,310
Tennessee	30,390
Virginia	30,000
Distrcit of Columbia	25,671
Washington	22,183
Kentucky	21,607
Maryland	17,726
Arkansas	16,666
Florida	15,331
North Carolina	15,032
Alabama	13,053
Louisina	12,624
Colorado	12,500
Maine	11,429
Connecticut	9,663
Georgia	7,848
Mississippi	7,306
Oregon	6,505
New Hampshire	5,517
Rhode Island	4,832
Vermont	4,694
Montana	4,200
Oklahoma	4,000
Delaware	3,000
North Dakota	2,409
Arizona	1,672
Kansas	1,351
Nebraska	993
Idaho	964
Nevada	872
	1,363,645
Losses:	
West Virginia	4,200
New Mexico	3,658
Wyoming	2,943
South Dakota	1,671
Utah	436
South Carolina	183
	13,093
Net gain	1,350,552

ceeded the 1921 mark by more than 10,000.

Only three states show a decrease of more than 10,000, these heavy losses being in Oklahoma, Nebraska and Texas, as follows:

Oklahoma	34,300
Nebraska	21,802
Texas	18,180

The unreliable character of the mid-year figures in Oklahoma has already been indicated. In the remaining twenty-three states which have not yet reached the 1921 total, the decreases are so small as to be negligible in relation to the total registration for the state. It is safe to predict that at least twenty-three, and probably the entire twenty-six, states, will surpass the 1921 total before Dec. 31, 1922.

Fifty-three thousand six hundred and seventy-three motorcycles will have to be registered during the last half of 1922 if the total registrations for this year are to finally equal those of 1922. The 1921 total was 207,930, which was a decrease of about 24,000 from 1920.

The automobile industry needs better registration figures, if the data gathered are to be of maximum value. A uniformity of state laws is highly desirable, and the industry should take an active part in a movement to obtain the necessary improvements in present methods.

The possibilities along this line are well illustrated by the type of registration data available in New York, Connecticut, Massachusetts and several other states where the figures are segregated sufficiently to provide useful material for sales analysis.

Uniform Registration Needed

Even those states which have well worked out registrations systems, however, have different systems in each case, so that a correlation of the figures for the various states is impossible in any detailed form.

General improvement has been steady, though slight, during the last few years. In Minnesota, for example, it is now possible to get annual registration figures which give with a reasonable degree of accuracy the number of cars and trucks operating in the state.

Passenger car and truck figures are now segregated in all but seven states, so that some general idea as to the number of commercial vehicles can be obtained. In this connection, however, it should be pointed out that the definition of "truck" or "commercial vehicle" differs in almost every state, so that the segregated figures are useful only in a very general way.

The registration records in all the states are not so arranged that exact totals can be given at any time. In some states, such totals are not available even for the half year period.

Consequently, some of the figures included in the accompanying tables are not altogether exact. The mid-year figures are never quite so accurate as the year end figures, because at the end of the year practically every state compiles totals for its own purposes.

Tractors and trailers are registered in some states, but the data available on these vehicles is still too meager to make it worth including in a semi-annual summary of this character. Moreover, in certain instances, tractors and trailers are included in the truck or commercial vehicle registrations.

PERCENTAGE GAINS AND LOSSES IN REGISTRATION

January 1, 1922—June 30, 1922

Gains:	
District of Columbia	26.4
Arkansas	11.1
North Carolina	9.6
Florida	7.4
California	7.3
Virginia	6.4
Indiana	6.2
Alabama	5.6
Ohio	5.5
New Jersey	5.4
Wisconsin	4.7
Pennsylvania	3.9
Louisiana	3.8
Michigan	3.4
Minnesota	2.2
Kentucky	2.2
Massachusetts	1.9
Delaware	1.8
Wyoming	1.6
New Hampshire	1.4
Vermont	1.3
Illinois	.94
New York	.01
Losses:	
New Mexico	18.2
Oklahoma	15.5
Utah	14.4
Nebraska	9.1
Idaho	8.2
Oregon	8.1
Connecticut	7.1
Maryland	7.1
South Carolina	6.7
South Dakota	6.6
Rhode Island	6.5
Arizona	6.3
Montana	5.2
North Dakota	4.2
Georgia	4.2
West Virginia	3.9
Texas	3.9
Nevada	3.5
Mississippi	2.6
Missouri	2.3
Washington	2.0
Kansas	.88
Colorado	.50
Maine	.13
Iowa	.10
Tennessee	.02
Average Gain for U. S.	per cent

GAINS AND LOSSES IN REGISTRATION

January 1 to June 30, 1922

Gains:	
California	49,023
Ohio	39,368
Pennsylvania	27,055
Indiana	24,658
District of Columbia	16,310
Michigan	16,209
Wisconsin	16,127
New Jersey	14,865
North Carolina	14,258
Virginia	9,000
Arkansas	7,501
Minnesota	7,300
Florida	7,192
Massachusetts	6,974
Illinois	6,314
Alabama	4,786
Louisiana	3,124
Kentucky	2,729
New Hampshire	569
Vermont	487
Wyoming	438
Delaware	387
New York	107
	274,781
Losses:	
Oklahoma	34,300
Nebraska	21,802
Texas	18,180
Maryland	9,941
Connecticut	9,753
Oregon	9,546
Missouri	8,011
South Dakota	7,827
Utah	6,823
South Carolina	6,097
Georgia	5,442
New Mexico	4,496
Idaho	4,200
North Dakota	3,925
West Virginia	3,644
Washington	3,597
Rhode Island	3,551
Montana	3,085
Kansas	2,567
Arizona	2,202
Mississippi	1,719
Colorado	739
Iowa	459
Nevada	275
Maine	108
Tennessee	25
	172,314
Net gain	102,467

MOTORCYCLES

Gains and Losses, July 1, 1921 to June 30, 1922

Gains:	
Ohio	5,339
New York	4,420
Minnesota	500
District of Columbia	389
Tennessee	155
Florida	134
Arkansas	60
Mississippi	13
	11,010
Losses:	
Pennsylvania	2,470
Connecticut	2,441
Kansas	1,684
Illinois	1,551
Michigan	1,053
Massachusetts	949
New Jersey	931
California	862
Oklahoma	696
Wisconsin	692
Indiana	587
Texas	454
New Hampshire	401
Iowa	377
Nebraska	314
Maryland	310
Virginia	300
West Virginia	300
Utah	227
Kentucky	193
Arizona	191
Rhode Island	187
South Carolina	187
Georgia	179
Vermont	174
Delaware	162
South Dakota	140
Washington	136
Idaho	133
Montana	119
Louisiana	95
Maine	95
North Dakota	92
Oregon	62
New Mexico	47
Nevada	45
Colorado	40
Wyoming	29
Alabama	23
	18,928
Net loss	7,918

Numerous Changes in 1923 Buick Chassis and Body Models

Engine partially redesigned to make it quieter and more durable. Aluminum and steel combined in push rods to reduce clearance at high temperatures. Two touring-sedans are added to present line. All bodies are lower than formerly. Prices not yet announced.

By J. Edward Schipper

FOR 1923 the Buick line will consist of fourteen passenger car models, on the six and four-cylinder chassis, and the four-cylinder special delivery truck. Two of the passenger car bodies are new. These are touring-sedans, one being mounted on the six-cylinder chassis and the other on the four.

While fundamentally this is the same line which was on the market in 1922, there are a great many changes of major as well as of minor importance in both the chassis and bodies. Material changes have been made throughout the entire line from an appearance standpoint, and mechanically, although there have been no radical changes, there have been a remarkable number of detail refinements to promote durability, silence and absence of minor mechanical difficulties. With the sport and touring-sedan bodies, which have been added recently, the Buick line now offers a choice of nine bodies on the six-cylinder chassis, which is made in two wheelbases to accommodate the different body styles, five bodies on the standard four-cylinder chassis, which is made in one wheelbase and six body choices on the special delivery truck models mounted on the four-cylinder chassis.

The Buick six-cylinder models have been greatly improved from the standpoint of appearance, riding qualities and durability. All of the models on this chassis have been lowered approximately three inches. The lowering has been accomplished by a modification of the spring suspension by which the offset of the cantilever spring has been increased 4 in., making the forward end of the spring 14 in. longer than the rear. This has resulted not only in lowering the car, but also in reducing rebound and eliminating side sway. An important series of changes which has resulted in the underwriters' insurance rating of Class A, has been obtained by fitting a transmission lock, providing a drip bowl under carbureter, extra clips on the gasoline feed line and tail lamp wires and flexible steel covers for the three wires leading from the generator to the switch and the rounding of corners on all covers for wires.

Improvements have been made in the six-cylinder engine by lengthening the pistons one-half inch above the wrist pin, lengthening the connecting rod 1 3 16 in. and raising the entire block by the amount corresponding to the sum of these two, or 1 11 16 in. so that the compression remains the same with the longer piston and connecting rod. This has been done to eliminate piston slap and to minimize wear on piston walls. To further increase the life of the cylinder bore, the new pistons are machined with a tapered relief. There is no longer a guide ring at the bottom of the piston, the skirt being plain at this point. The pistons no longer over-run the bottom of the cylinder.

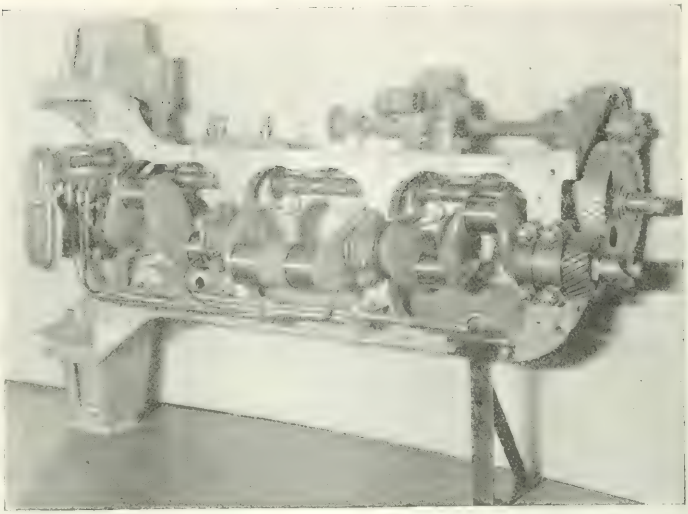
The chilling of the cylinder bores is something new in foundry practice so far as cylinders are concerned. It is done to neutralize the natural annealing process which takes place in the part of the casting surrounded by water jackets. Cooling at this part of the cylinder is much slower, with the result that the castings are generally softer at this portion of the bore. As this is the portion subjected to the greatest wear by the pistons, softness is an objectionable feature. By the chilling process, which will be described in detail in the near future, this part of the casting is cooled just as quickly as the remainder. The result is a harder casting, although one which is readily machined since the hard spots are not localized. The bores are finally finished by honing. The honing tool, which finally finishes these bores, is similar to a



One of the two new Buick five-passenger touring-sedan models. The trunk is included as standard equipment

reamer, except that it has honing stones in place of the reaming cutters.

The crankshaft is now 2¼ in. in diameter and harder babbitt is used in both the connecting rods and main bearings. Individual pressure feed-pipes are now brought from the oiling system to the center main bearing and the main bearing caps are drop forged with the babbitt tinned directly to the caps. To render lubrication of the pistons more certain at high speed, the oil troughs are covered to retain a supply of lubricant.



Under side of the crankcase of the new Buick six, showing piping for supplying oil under pressure to the center main bearings

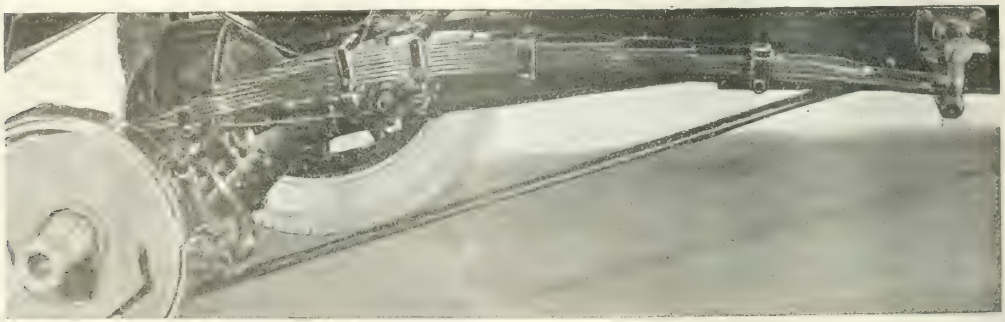
Other bearings throughout the powerplant have also been given attention with a view to increasing their life. The fan bracket bearing has been increased in length and diameter. The hole in the gearcase cover for the fan bracket now has a bronze bushing and holes have been placed in the rocker arm covers so that the rocker arms can be oiled without moving the large cover. These holes are provided with a sliding cover to close them against dust.

A careful study of the valve system has been completed with the idea of making its operation more quiet. In order to eliminate the varying clearance, due to expansion, a combination push rod of aluminum and steel is now being used, so that the valve will have about the same clearance from 0 deg. to 212 deg., Fahr. The lower portion of the push rod is aluminum and the upper portion is steel. The aluminum, on account of its greater coefficient of expansion, is employed to give a more rapid expansion to the push rods so that the expansion of the parts of the motor which tend to lift the rocker arms away from the push rod and to increase the clearance will be equalized by the expansion in the push rod itself. This permits the tappets to be adjusted several thousandths closer than formerly, and thus minimize rod noises. Felt has been placed around the valve stems inside the valve springs to carry oil for the valve stems and guides. This provides enough lubrication to prevent sticking and squeaking valve stems. More positive lubrication is also assured for the front camshaft bearings by providing an oil well at this point.

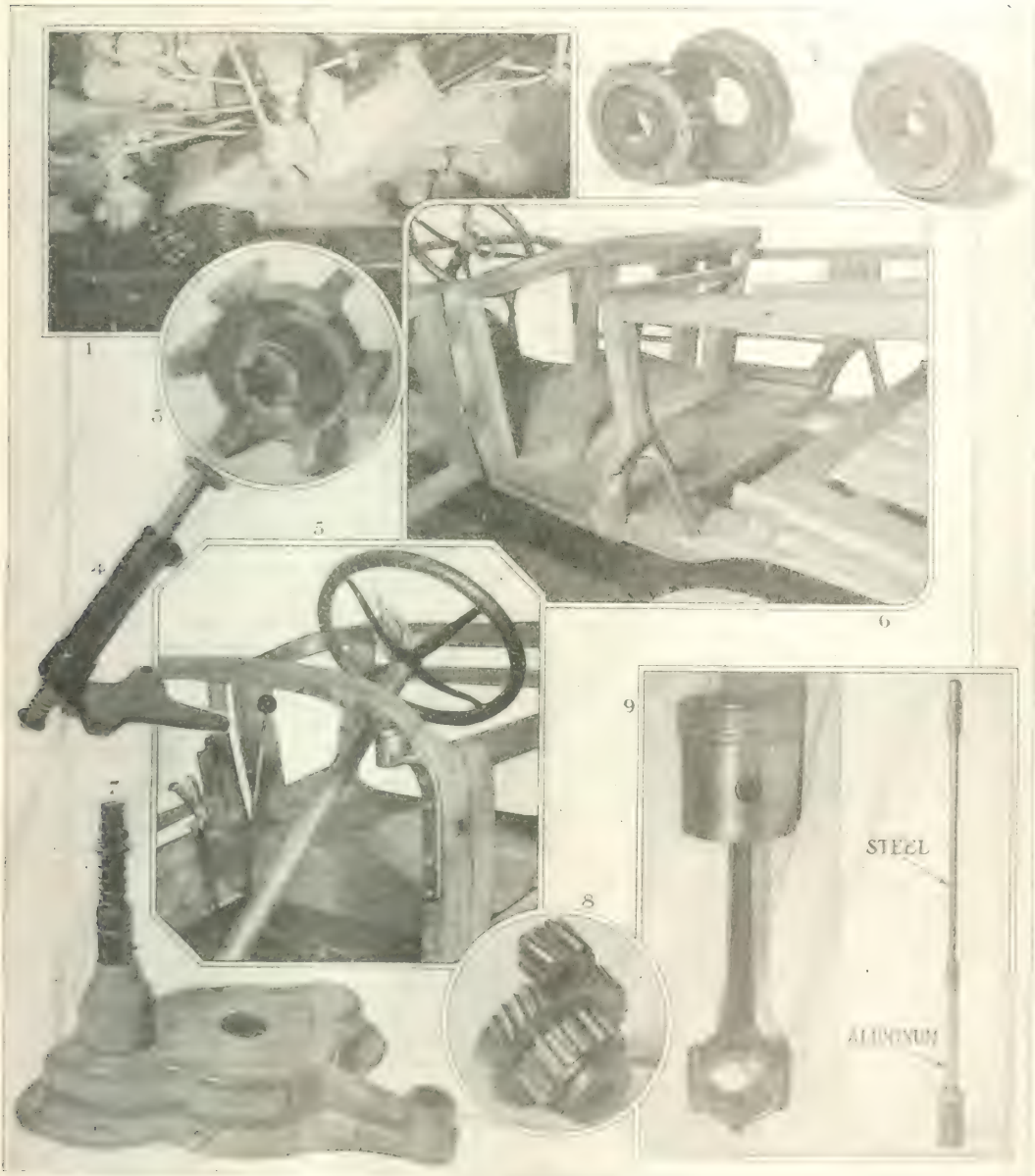
Better construction is also employed for some of the auxiliary units. For instance, the means for driving the fan pulley has been revised so as to eliminate the possibility of the key dropping into the timing gears. New water pump packing which eliminates cutting of the pump shaft has been employed and the pump shaft diameter is now stepped to insure proper assembly of the impeller. The location of the taper pin has also been changed to prevent damage to the water pump body in case the taper pin should back out.

Greater durability has been secured in the clutch by changing some of the material. The clutch hub, for instance, is now drop-forged steel instead of malleable iron. The splines are now case hardened and ground and the clutch plates are fitted to closer limits on the splines and pins. This will decrease wear and obviate rattles.

The electrical equipment has also been refined in many particulars. The motor generator has been redesigned in regard to its electrical characteristics to give it a higher charging rate. The brushes and brush holders have also been altered to eliminate squeak and more accessible oilers are provided for the bearings.



Rearranged rear cantilever spring with long forward end. New position of anchorage is said to prevent side sway



Some of the changes in the new Buicks: 1—Inverted steering gear housing. 2—New silent type of overrunning clutch used on motor generator. 3—Clutch hub is now a steel forging instead of a malleable casting formerly used. 4—Starter switch showing spring used to prevent rattle. 5 and 6—Views of body framing, showing substantial irons used to strengthen the body. 7—New timing gear housing with larger bearing holes. 8—Helical gears employed to insure quieter cranking. 9—Connecting rod and piston with lower ring eliminated. The piston has been lengthened above the piston pin boss. The composite pushrod is intended to enable the use of less clearance at the tappet than was formerly required and thus insure quieter operation

The brush holder is now a die casting with a bronze spring member which has sufficient give to eliminate the chatter found to be the basic cause of squeaking. This new brush holder was worked out at the General Motors Laboratory in Dayton and is now standard equipment on this type of generator. A new type of silent over-running generator clutch is employed and spiral teeth are now used on the starting gears to prevent excessive noise when cranking the engine. A spring has been added to the starter pedal to prevent rattle.

The rear axles have been modified in some respects. On models 44 and 45, the three-passenger roadster and the five-passenger phaeton, the brake-drum diameter has been increased from 12 in. to 14 in., which now gives the same size brakes on all six-cylinder models. On the front axle, new style bushings of hard burnished bronze, said to give three times the life of the present bushing, are used in the steering knuckles and arms.

New Departure ball bearings are now used on the differential in place of the roller type formerly employed. The rear axle gear ratios are now 4.4 to 1 on all of the open cars and on the five-passenger sedan and 4.7 to 1 on the remaining models on the six-cylinder chassis. This is in combination with 32 x 4 in. cord tires on the three-passenger roadster and five-passenger phaeton, 33 x 4½ in. cords on the five-passenger touring sedan, the five-passenger sedan, the four-passenger coupe, seven-passenger phaeton and seven-passenger sedan. The tire size on the sport model is 32 x 4½ in. The strut rod diameter on model 45 has been increased from ⅝ in. to 11/16 in. and on the model 45 from ½ to 9/16 in. These are now of better steel and are heat treated. The frame has been stiffened considerably by increasing the thickness of the stock in the side members from 5/32 to 3/16 in.

The spring suspension has been altered, as mentioned, and in addition to the change in location of the spring hanger, the main plate and all the front springs of the six-cylinder model have been changed from carbon steel to vanadium steel. The steering gear housing has been changed to bring the clamp boss on top, which also brings the slots on top and prevents leakage of grease.

The radiator shell has been reinforced on the inside and the radiator core support angles have been increased in thickness and the bolts made larger.

Four-Cylinder Chassis Changes

The changes in the four-cylinder chassis parallel almost exactly the changes in the six. In general, the appearance of the entire four-cylinder line has been improved by redesigning the bodies and tops. The radiator has been raised 1¼ in., the cowl lengthened 3 in. and the hood line from the radiator to the windshield has been straightened. The top has been lowered 2½ in. and a kick-up has been placed in the frame over the rear axle which permits the rear end of the car to be lowered. The new model 35 car, which is the standard phaeton design, is 5 in. lower than its predecessors and the complete line of cars is lowered.

Throughout the Buick body lines, there are certain changes which are common to all bodies and a few detail changes on each particular body model which apply to that body alone. On all of the six-cylinder models, nickel beading has been put on the cowl at the rear end of the hood not only for the sake of appearance, but also to prevent wear on the cowl. Nickel beading is also used around the radiator cores on all models except the sport. The sun shade design has been revised to give better appearance. It is of solid sheet metal panel with diecast ends and is covered with imitation leather. The back lights in the bodies have been reduced in size and the rear quarter light frames have rounded corners. All of the molding is oval instead of sharp cornered. In the open bodies, the cushions have been lowered and the seats made more comfortable.

In the four-cylinder line, the body changes quite closely follow the changes in the six-cylinder line. An interesting series of improvements amounting in effect to an entirely new design has been made in the four-cylinder phaeton body. Besides lowering the seats and rearranging the steering gear and control levers, as in the six-cylinder model, the body is much more rigid in construction. The front pillar brace irons are heavier, as are also the rear tonneau brace irons. The windshield bracket and top seat rail have also been made heavier. The door locks are stronger and the entire body is tied to the chassis better by using ten body bolts instead of eight. All of the closed bodies have been entirely redesigned for greater rigidity and have been brought thoroughly up-to-date in appearance and trim.

Detail Refinements in Bodies

Probably the most impressive thing about the Buick body line is the great attention which has been given to detail and the number of small refinements which have been made in each of the bodies for sake of appearance and comfort. The painting on the three-passenger roadster is now blue with gold stripes. A flush rear deck door with an improved lock is fitted, a tire carrier tilted toward the deck, is used. The trimming at the sides of the seat is now piped.

On the six-cylinder, five-passenger phaeton deep black with gold stripe painting has been adopted. The tops have been redesigned and lowered, seats lowered and steering gear location changed to provide greater ease in driving. The trimming of the back of the front seat has been changed and a roll added around the top to improve appearance. There is now a large compartment for curtains in the back of the front seat.

On the six-cylinder, seven-passenger car, a rear vision mirror, sun shade on the windshield and gasoline gage on the instrument board are included as standard equipment. More room has been given the body by widening the rear seat one inch. The back of the front seat has been entirely redesigned and a roll added around the top for appearance. The trimming of the auxiliary seats has also been improved and the front seat frame is now trimmed.

The model 41 touring-sedan, which has been put on the six-cylinder chassis, is an entirely new body. It is a five-passenger car with special touring equipment including a trunk rack in the rear. The lower part of the body is maroon with a black top and the wheels are also maroon but several shades lighter than the body. Nickeled guard rails are placed on the rear of the body. As a touring convenience on this model, the gasoline tank is increased to 22 gallons capacity. Extra wide doors are provided and ventilating windows are placed in the doors and side windows. The car has a heater as standard equipment. A trunk is also included as standard equipment.

With all of these changes in detail, the fundamental specifications of the Buick chassis remain the same. The wheelbase of the four remains as it was, 109 in., and the six-cylinder chassis is put out on two wheelbase lengths, 118 in. and 124 in. On the 118 in. wheelbase are the five-passenger touring-sedan, two-passenger roadster, five-passenger phaeton and five-passenger sedan. On the 124 in. wheelbase are the four-passenger coupe, seven-passenger phaeton and seven-passenger sedan, three-passenger sport roadster and four-passenger sport phaeton.

Liberty Builds Business Type Coupe

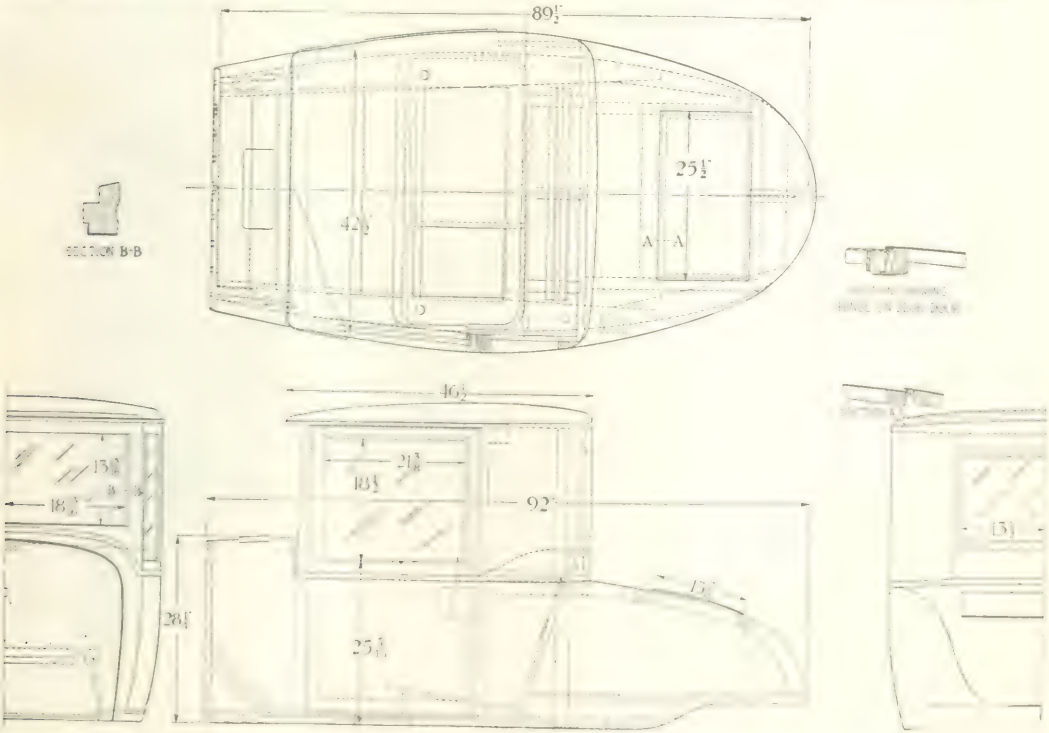
Is arranged for two passengers only. Upper portion of body is steel covered as are also the door pillars. Soft type of top employed. Aluminum steps and fender supports replace running boards. Equipment includes Tuare wheels, windshield visor, Eagle locks.

A NEW coupe of the type designed particularly for business and professional men, is being manufactured by the Liberty Motor Car Company. The body is a distinctly two-passenger design, the seating arrangement being side by side. The lines of the under part of the body are identical with the Liberty roadster while the upper part is a substantially constructed steel covered unit, which provides exceptional rigidity for this type of body. The method of framing and the major dimension are shown in the cut below.

There are two doors, the width of which is 22 in. and the height 45½ in. The door pillars are of wood covered with steel. One of the features of the body is the large glass rear light. This is bevel glass 13 in. in height by 26 in. in width. It is provided with a silk curtain. The body is fitted with a step instead of a running board and there is an aluminum casting at the base of the rear fender which carries out the step idea and, at the same time, provides a rigid support for the rear fender. The top is a soft type over wood framing and in this as well as in the construction throughout, the design has been arranged so as to eliminate drumming.

The windshield is a one-piece type and the car is provided with a cowl ventilator. Tuare wheels are standard equipment as are also the nickel trimmed head and parking lights. The car is equipped with a water indicator and special radiator filler cap. The one-piece windshield is provided with a visor.

The doors are fitted with Eagle locks, with an inside lock on the left door and an outside lock on the right door. In addition to the usual dash equipment, there is also a clock and cigar lighter. The price is $1,695.



Details of roadster coupe body put on the market by the Liberty Motor Car Co. This is a straight two-passenger type with steel paneled body and soft top

A Continental Six for $1,000 Cars

Has displacement of only 195.6 cu. in. but develops 50 hp. at 2600 r.p.m. Camshaft and lighting generator are driven by Morse chain in triangular layout. Crankshaft is drilled. Oil fed under pressure to all bearings. Weight without accessories 470 lb.

By J. Edward Schipper

At the time of the Chicago show last February, considerable comment was heard through the trade concerning new cars which classified as $1,000 sixes about to enter the market on a large scale. Three of these cars, Columbia, Davis and Moon, all priced close to $1,000, were shown at that time. All three of them were equipped with a new type of Continental engine known as Model 6-Y, especially designed for this type of vehicle. While the major specifications of this engine were given at that time, this is the first detail description to be published.

The field for which this engine is designed necessarily demands a light weight, economical six-cylinder engine which is designed from the standpoint of low production cost as well as to give performance from moderate dimensions. With a bore and stroke of 3⅛ by 4¼ in., giving 195.6 cu. in. piston displacement, the engine peaks at 2600 r.p.m., at which point it develops slightly over 50 hp., as will be noted from the curves shown herewith prepared by the laboratory of the Continental Motors Corp. The engine develops between 115 and 118 lb.-ft. torque from 400 to 2200 r.p.m. Forty-five hp. is developed at 2160 r.p.m. Experimental cars equipped with this engine have shown a speed range from 3 to over 60 miles per hour on high gear.

The engine is an L-head type with the cylinders cast in a unit with the crankcase. One of the features of the cylinder casting is the layout of the water spaces, which are designed to maintain the proper operating temperature around all points in the combustion chamber. The cooling water surrounds every valve seat and valve stem. The removable cylinder head is attached to the cylinder casting by twenty-one studs. Four lifting lugs are supplied to simplify the removal of the head and to prevent damage to the copper asbestos gasket.

The cast iron pistons are 3⅛ in. long. They are provided with three rings of the one-piece, diagonally split type. The rings are hand fitted, first to the cylinder bore and then to the grooves of the piston. The piston pin is clamped in the connecting rod, the clamp bolt passing through the connecting rod just below the piston pin, which is grooved to fit the bolt. The connecting rods are 8¼ in. long from center to center.

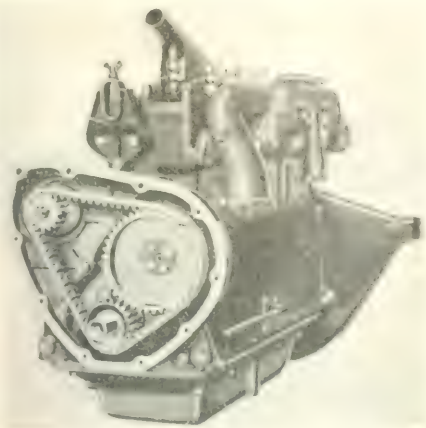
The usual Continental practice in the assembling and fitting of the connecting rods is employed. The work of fitting the connecting rod lower end bearings to the crankshaft is done before the shaft is assembled in the crankcase. The piston pin is fitted in the piston before assembly and then the piston assembly is fitted to the connecting rod. Each of these operations is checked in manufacture on special fixtures to insure alignment. The crankshaft is carried on four bearings, each of which is 2 in. in diameter. The lengths, from front to rear, are respectively, 1 7/16, 1⅜, 1⅜, 2 11/32. The crank bearings are also 2 in. in diameter and 1⅜ in. in length.

The camshaft and lighting generator are driven by a triangular Morse silent chain layout. An eccentric adjustment on the generator provides a take-up for the chain. The valve mechanism is particularly simple, the push rods riding directly on the cams. The push rods are fitted with an adjusting screw and locking device in the usual manner and the valve guides are removable. The guides are 3 9/16 in. long and are reamed to fit the 5/16 in. valve stem. Three cover plates are employed to protect the valve mechanism and retain the oil mist in which it operates. The push rod guides are removable and are made in three groups of four each and arranged in such a manner that they form a sub-assembly which can be removed as a unit without disturbing the cylinder block.

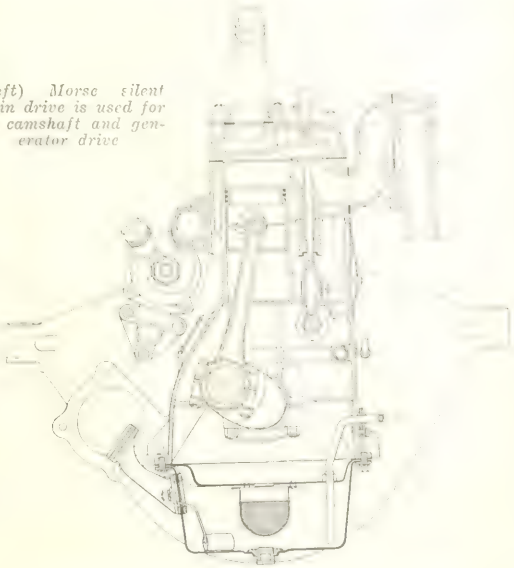
Lubrication is by pressure feed with a gear type oil pump. The pump is located in the chain case. The oil is drawn through a copper tube leading from the oil reservoir to the pump, from which it is forced to the main distributing line which has branches running to each of the four main bearings. The oil enters the drilled crankshaft at these points and is distributed under pressure to the connecting rod bearings. Other points are lubricated by the oil which is thrown from the connecting rod lower end bearing. As an added protection to each of the four camshaft bearings, a catch basin from which oil flows through drilled ducts is provided.

Cooling is by centrifugal water pump bolted to the flywheel housing and driven by an extension shaft from the electric generator. The inlet system is arranged to provide an adequate amount of heat to assist in the vaporization of present-day gasoline. The intake and exhaust manifolds are separate castings, but are so arranged that the heat of the exhaust is utilized to assist in vaporizing the fuel.

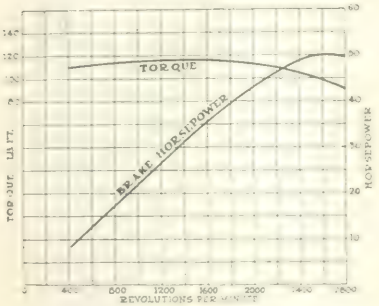
The engine is designed to be installed with a three-point suspension. The third point of support measures 1½ in. by 1⅝ in. and is integral with the chain case cover. The rear supporting arms are cast integrally with the flywheel housing. This housing is a separate unit which bolts to the crankcase. The crankcase is machined to accommodate a gearset with a No. 4 S. A. E. bolting flange. Provision is made for carrying an electric starting motor by means of a No. 1 S. A. E. flange mounting. Teeth are cut directly into the rim of the semi-steel flywheel to mesh with the starting motor pinion. The weight of this engine, without accessories, is given as 470 lb.



(Left) Morse silent chain drive is used for the camshaft and generator drive

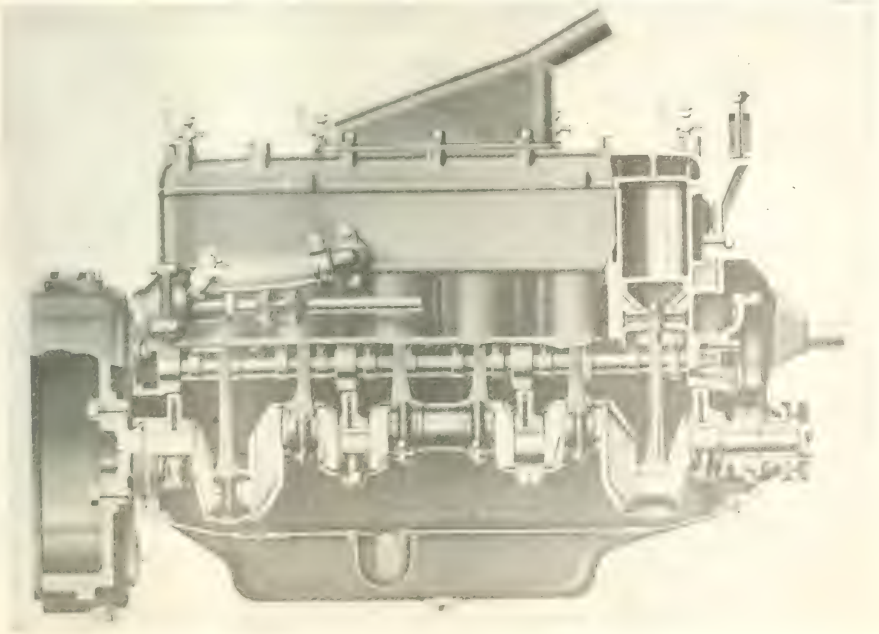


(Above) Transverse section of the engine, showing shape of combustion chamber and the manifold arrangement

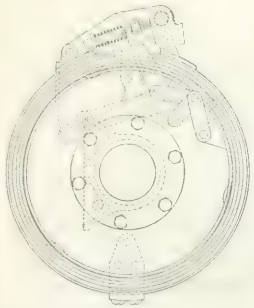


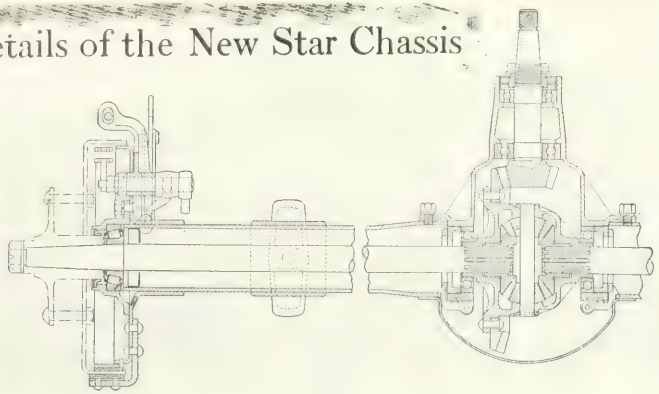
(Left) Horsepower and torque curve of Continental 6-Y engine, 3⅛ in. stroke, 4¼ in. bore, 195.6 cu. in. piston displacement

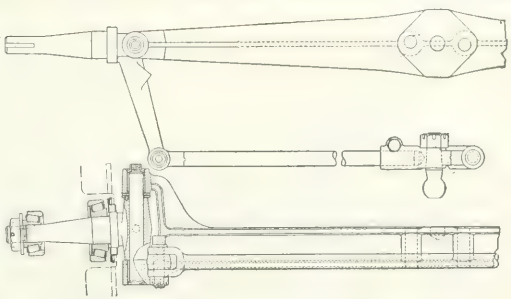
(Below) Part sectional view through Continental 6-Y engine designed for use in $1,000 six-cylinder type of car



Engineering Details of the New Star Chassis

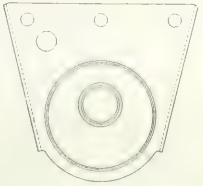




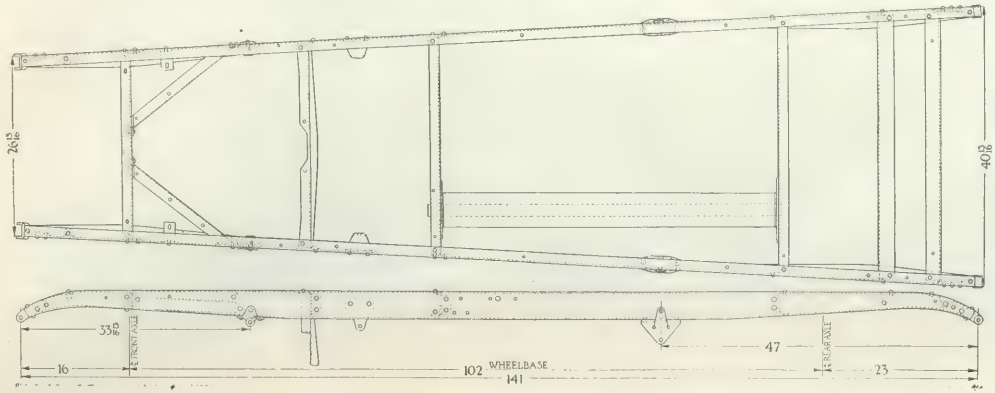


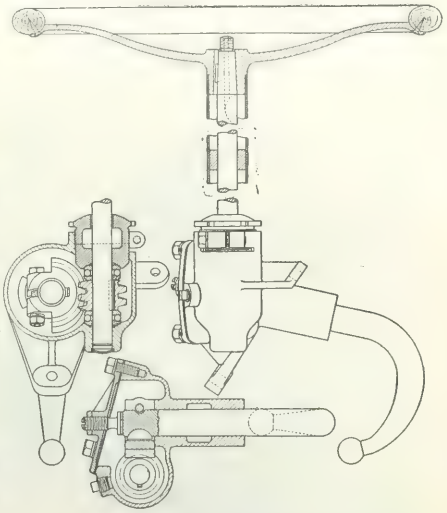
The Star-Timken front axle, one end of which is shown above, is a conventional type equipped with Timken bearings

Above—Sectional view of Timken semi-floating rear axle to be used in Star car. At right—Detail of muffler which is also designed to give the frame, shown below, an unusual degree of torsional strength. Note diagonal bracing of frame

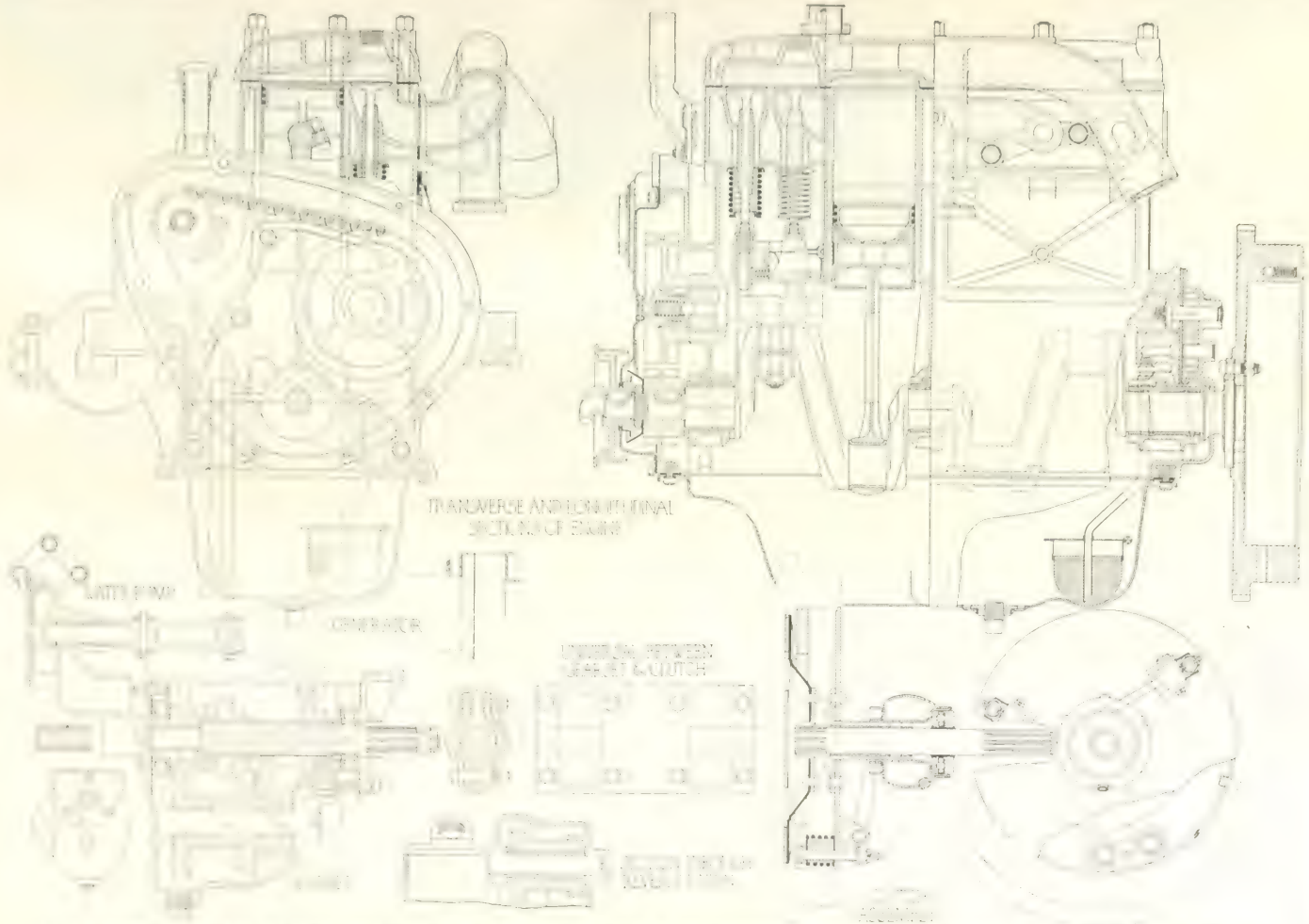








Star worm and worm wheel sector type steering gear



First sectional drawings of the Continental engine, used in the Star chassis, to be published. Note triangular chain layout. Sectional views of three-speed gearset and clutch are also given. The universal joint is a novel type employing fabric for cushioning and positioning the splined blocks

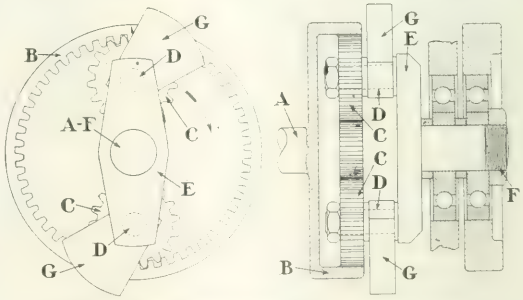
Practical Difficulties in Automatic Transmission Gear Design

Andreau gear the latest device to produce an automatic, continuously variable gear. An internal type planetary gear with operation controlled by a pair of centrifugal weights. A gearset substitute must be capable of increasing engine torque.

By P. M. Heldt

SINCE the days of the early belt-and-stepped-pulley drive automobile, many attempts have been made to produce a transmission which, though positive in action, would permit of varying the gear ratio by imperceptible gradations, and some of the inventors have even tried to incorporate an automatic feature in the gear, so that as the traction resistance increased the available rear axle torque would increase correspondingly.

Such an automatic, continuously variable gear would certainly be a great boon to the motor industry, provided it was efficient and reliable and could be produced at moderate cost. Up to the present all of these attempts have failed of commercial success, but inventors naturally are a persevering class, and in spite of a record of numerous failures they have not despaired of solving the problem.



End view and cross section of Andreau automatic variable gear

One of the latest devices of this type proposed, known as the Andreau gear, has been described in British publications. It consists essentially of an internal type of planetary gear whose operation is controlled by a pair of centrifugal weights instead of by a friction band.

An end view and a cross section of the device in diagram are shown herewith. A regular friction clutch is used in connection with this gear, but is not shown in the drawing. The driving shaft from the clutch, shown at A, carries an internally toothed drum B. The driven shaft to the rear axle is shown at F, and carries a cross-plate or spider, E, which is provided at each end with crosspins D, on each side of which are carried gearwheels C, and weights G, which are free to revolve on these pins but are solid with one another.

The operation of the gear is as follows: With the car, and, therefore, the shaft F stationary, the clutch is engaged and the gear drum B then revolves with the engine, with the result that the pinions C revolve in their own pins, each with its attached weight. This gives the lowest possible gear ratio between the gears, sufficiently low to start the car, it is claimed.

As soon as the car starts, the spider E revolves and in revolving causes the weights G to tend to fly outwards and remain there. Therefore, as the speed of the car and that of the shaft F increases, the centrifugal action of the weights gradually gains an ascendency over the effort of the pinions C to revolve them, until a point is reached when the centrifugal action due to the high speed of the shaft F and spider E is sufficient to hold the pinions C stationary on their spindles, at which stage the two shafts A and F are revolving at the same speed, thus amounting to a direct drive, the power passing from the gear drum B to the stationary pinions C merely by the interlocking of their teeth.

Reading the above description in a British contemporary, the writer became interested on account of the simplicity of the device and the claims made for it. It seemed too good to be true that it was possible to get a continuous variation in speed from one extreme to the other and to be able to do so automatically without necessity for touching the clutch pedal or shifting gears, and he therefore set out to find out what was wrong with the gear.

The first thing which looks somewhat questionable is that with the driven shaft stationary, the planetary pinions with their weights revolving the device should be capable of giving the torque necessary for starting the car. An inspection of the diagram makes it hard to see how any torque is obtained under this condition except the small amount due to the friction of the planetary pinions on their studs. This friction, of course, results in a certain pressure between the teeth of the pinions and the ring gear, and the reaction to this pressure or force appears in the form of a pressure of the pinions on their studs normal to the plane of tooth contact. One would expect the bearing and tooth friction of the gears to be very low and the available torque, therefore, to be very small. However, there is one other factor to be considered and that is the inertia of the revolving weights. If the clutch is let in suddenly, the gear ring will speed up very rapidly and as

with a stationary driven shaft the planetary pinions with their revolving weights would have to gain speed about three times as fast, it is evident that the inertia of the weights causes a heavy drag or resistance to the speeding up of the planetary pinions, which in turn may result in insufficient torque on the driven shaft to start the car, especially on a grade.

However, the torque which can be exerted on the driven shaft is in no case greater than the motor torque, and this is the real weakness of the device. With the same torque on the driven as on the driving shaft, if the speed is reduced, say in the ratio of 4:1, the efficiency of transmission is only 25 per cent. The loss of 75 per cent goes partly to overcoming bearing and tooth friction but mainly to increasing the kinetic energy of the revolving centrifugal weight. Therefore, such large reductions can be obtained only momentarily, unless the device is purposely built with high friction in the pinion bearings, in which case we approach the so-called slip device—an ordinary friction clutch or a magnetic or hydraulic drag device which is allowed to slip sufficiently to give the desired speed reduction. However, the chief object of the gearset on an automobile is to permit of multiplying the engine torque, for accelerating and hill climbing, and any device which is incapable of increasing the engine torque is entirely unsuitable as a substitute.

German Motor Vehicle Taxes Have Been Revised

OWING to the depreciation of the mark the German Government has recently revised its motor vehicle registration fee or tax law which had been in force since 1906. One objection to the old registration fees was that they varied in classes, so that designers often chose certain engine dimensions in order to bring the car just within a certain tax class, without regard to technical and other economic requirements.

According to the new law, bicycles with auxiliary engines, motor scooters, etc., are tax-free. Other motorcycles with engines of up to 1.5 hp. pay 100 marks per year; over 1.5 and up to 3 hp., 150 marks; over 3 and up to 3.5 hp., 200 marks; over 3.5 and up to 4 hp., 275 marks; over 4 hp., 350 marks.

The tax on passenger cars is to be calculated as follows under the new law: For each of the first six rated horse power or fraction thereof, 100 marks; for each of the next 4 hp., 200 marks; for each of the following four rated hp., 300 marks; for each additional hp., 400 marks. The formula for determining horse power remains the same.

Taxes on motor trucks and omnibuses under the new law are not based on the horse power rating, because this would have encouraged the use of high speed engines, which is thought undesirable for commercial vehicles, and would have discouraged the use of so-called over-dimensioned engines which are coming into use because of their higher fuel economy. The tax is based on the weight of the empty vehicle ready for the road and is determined from the following table:

Annual Tax for Gasoline Trucks

Weight of Vehicle Empty, in Kg.	Tax in Marks
Up to 500	300
Over 500 up to 1000	600
Over 1000 up to 1500	900
Over 1500 up to 2000	1,200
Over 2000 up to 2500	1,400
Over 2500 up to 3000	1,600
Over 3000 up to 3500	1,800
Over 3500 up to 4000	1,900
Over 4000	2,000

Electric trucks of a certain weight usually carry only about one-half the useful load as gasoline trucks of the same weight, and therefore the former are accorded a lower tax rate than the latter. Road tractors with internal combustion engines and steam trucks pay the same tax as electric trucks, which is determined from the table.

Motor trucks using the public highways in Germany are limited to a maximum total weight, loaded, of 9000 kg. and the largest vehicles in use have a load capacity of 5000 kg. and weigh about 4000 lb. empty.

Registrations for shorter periods than one year are accepted, down to 2 months. The tax for a half year is two-thirds that for the full year, and for two months, one-quarter that for the full year. A certain amount of the income from the motor vehicle tax will be distributed by the Federal Government among the Governments of individual states, to be used for road maintenance. The provision in the former law for the issuance of temporary licenses to non-residents at very low rates has been withdrawn. It is expected that the new tax will yield 125,000,000 marks, but the cost of collection will probably not be much less, as many new officials will be required.

Annual Tax for Electric and Steam Trucks and Gasoline Tractors

Weight of Vehicle Empty, in Kg.	Tax in Marks
Over 500 up to 1000	300
Over 1000 up to 1500	450
Over 1500 up to 2000	600
Over 2000 up to 2500	700
Over 2500 up to 3000	800
Over 3000 up to 3500	900
Over 3500 up to 4000	950
Over 4000	1,000

In addition to the registration tax referred to above there are two other taxes on motor vehicles in Germany, the sales tax of 2½ per cent applying to all merchandise and the luxury tax of 15 per cent.

In recent years local taxes have been levied on motor vehicles in many places, but with the coming into force of the new law these taxes are rescinded. Cars of physicians with a tax rating of less than 8 hp. in towns of less than 20,000 inhabitants are exempt from taxation, as are vehicles used exclusively for the transportation of tools and utensils or for operating machinery.

EVERY motor vehicle in Poland confronts the problem of securing suitable gasoline and oil. The crude petroleum found in Poland is of very low gasoline content, about 6 per cent, compared with 12 and 15 per cent in the United States. In addition, the gasoline produced locally is of very poor quality, sometimes having a specific gravity as low as 590. The oil also is usually of poor quality and heavy grade unsuitable for use in smaller engines.

Notwithstanding its poor quality as fuel, gasoline sells for 550 marks per gallon (about 35 cents) and is difficult to obtain even at that price. This fact coupled with poor service facilities, has been an important factor in keeping the use of motor cars at a low point: it is estimated that there are not more than 6000 gasoline motor vehicles in Poland to-day.

How to Build Battery Ignition Condensers Commercially

Destructive arcing at contact points eliminated. Most important condenser duty is to bring about high induced secondary voltage. Condenser action in hurrying collapse of magnetic field described.

By R. E. Marbury*

THE function of a static condenser in an ignition set is often misunderstood, and its effect cannot easily be studied except by means of oscillographs or similar laboratory devices. However, it performs a very important duty, and the long life of contacts and general operation of the engine is very dependent on the condenser.

Considering Fig. 1, voltage is induced in the high voltage or secondary coil and hence across the spark plugs by the collapse or subsiding of a magnetic field in the iron core X around which the low voltage and the high voltage coils are wound. The magnitude of this secondary voltage or its ability to produce a "fat" and "hot" spark depends on how fast this magnetic field collapses. This effect is assisted by the action of the condenser, shown at C. in Fig. 1, which is connected across or in parallel with the interrupter points P. So connected, its function is to reduce the arc formed when the interrupter is opened by the cam, which results in two beneficial effects. The first of these prevents the burning of the points themselves, and the second hastens the collapse of the magnetic field which, as stated above, improves the quality of the ignition itself.

*Engineering Department, Westinghouse Electric & Manufacturing Co.

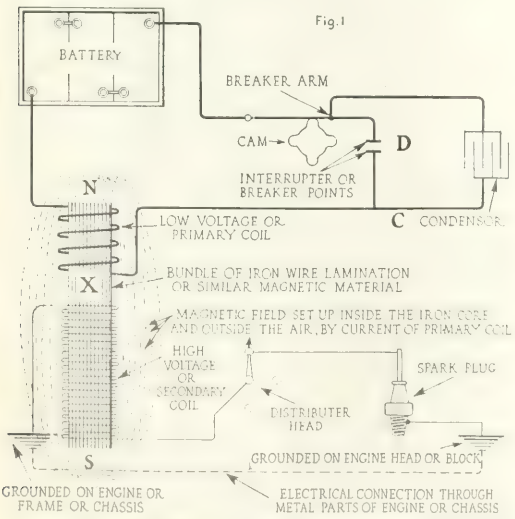


Fig. 1—Schematic diagram of ignition coil of usual standard construction

Assuming for the moment that the condenser is omitted from Fig. 1, and that the interrupter points are closed, let us consider briefly the cycle of operations in the ignition system. A current then flows from the battery through the low voltage coil and sets up a magnetic field in the iron core, making a north pole at one end and a south pole at the other, as shown. The next instant the cam moves and opens the interrupter circuit through the low voltage coil and the battery current ceases. When the battery current stops, the magnetic field dies down, and since it is interlinked with the high voltage coil, it sets up a voltage in that coil by an effect known as induction. Since there are many more turns of wire on the high voltage coil than on the primary, the original six volts from the battery is magnified up to several thousand until it is enough to jump across the spark plug. The faster the battery current in the low voltage coil and the magnetic field die down, the higher will be the voltage produced or "induced" in the secondary coil.

THE action of the condenser in hurrying the collapse of the magnetic field is this: When the interrupter contacts first begin to open and have attained a very small spacing, the voltage per unit of space is beyond the insulating or dielectric strength of the air, and an arc is established. This arc is maintained because the voltage is built up by the inductive action of the primary faster than the spacing is increased, but it finally goes out when the inductance voltage falls below the voltage required to maintain ionization. Ionization is the charging of minute particles of air in such a manner that they form a conducting path for the current through the air.

The rate of decrease in primary current and consequent collapse in field are reduced by the arcing at the contacts, because if no arc existed and the primary current could change from a definite value to zero instantly, this would give the fastest collapse in the field and the maximum secondary voltage.

Because of the arc, this instantaneous reduction cannot be obtained even with very high speed mechanical opening, and the condenser is used and its charging characteristic is made use of to accomplish this purpose.

When a completely discharged condenser is connected across a d.c. voltage, the current rises momentarily to a maximum value limited only by the resistance of the leads and the foil in the condenser, and as the condenser becomes charged, the charging current falls along a very steep curve approaching zero when the condenser is completely charged. The length of time required for this

current to fall from a maximum value to zero with a constant voltage applied depends upon the size of the condenser and the resistance through which it is being charged. This time is very short in any event, being on the order of one thousandth of a second or even less.

Therefore, if this condenser is connected in parallel with the contacts of a breaker or interrupter, when the contacts open, the current in the condenser lead starts at zero and increases very quickly to the normal current that was passing through the contacts. It then drops on a very sharp curve toward zero again as the condenser becomes charged. By the time the condenser becomes partially charged and the current begins to drop on this sharp curve, the contacts have already attained a definite separation and the condenser serves the purpose of bringing about a steep depreciation in primary current giving a high induced secondary voltage by the rapid collapse of the primary field.

CONTINUED oscillatory currents (see below) follow with most ignition sets, which have the effect of increasing the duration of the secondary spark.

The condenser action just described can be shown graphically by a reference to Figs. 2, 3, and 4. In Fig. 2 the interrupter contacts are closed and a current flows from the battery through the primary coil in the direction shown by the arrows. In Fig. 3 the contacts have started to open and there is a charging current flowing into the condenser. This may be thought of as similar to compressing a spring mechanically. An instant later the "spring" rebounds as shown in Fig. 4. That is to say, the condenser has become charged and immediately discharges itself, causing the current to flow in the direction shown by the arrows or opposite to the normal direction due to battery voltage. This "rebound" results in killing the current in the primary coil very much more rapidly than it would die down if there were no condenser, and thus increases the voltage in the secondary available to "shoot" the spark plugs. After this "rebound" has spent itself, the battery again charges the condenser in the other direction and the cycle is repeated, but it does not attain quite the same intensity the second time. It is this reversal of current between battery and condenser that is referred to as "oscillatory currents" above, and as each reversal changes the magnetic field in the iron core, this action prolongs the duration of the secondary spark, which is of advantage in firing slow burning mixtures.

If the condenser were of too large capacity, it would be similar to the action of too large a spring which would absorb the energy instead of "bouncing it off" as just described. This means there would be no reversal of current and hence no help in increasing the secondary voltage. Also, when the contacts touched again this energy would be released at the instant of contact, producing burning and incipient welding. This is saying, in another way, that too much capacity in the condenser is as bad as too little, and the correct balance between the two for a given set of conditions is one of the nice problems of the ignition engineer.

In order that a condenser may function properly in this service, it is obvious that its inductance and metallic resistance should be kept small, and its dielectric or breakdown voltage sufficiently high to withstand the inductive voltage kicks that may be impressed upon it at the completion of its charge.

The capacity of the condenser in micro-farads depends on the form of primary coil, its inductance, and the amount of current broken.

If the capacity is too large, as stated above, its discharge at the reclosing of the contacts may have a destructive effect similar to percussive welding, and if the condenser

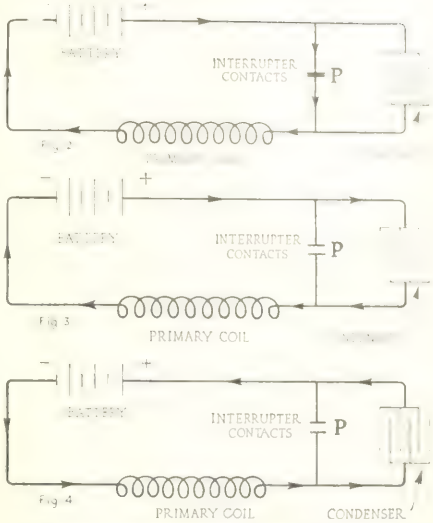


Fig. 2—Interrupter contacts closed. No action in condenser. Fig. 3—Interrupter contacts opening and condenser charging. Fig. 4—Interrupter contacts still open and condenser discharging. Note reversal of direction of current through primary coil

is very small, its resistance and inductance will predominate and it will not perform properly unless theoretically perfect.

A condenser consists fundamentally of metal conductors having insulation interposed. The capacity varies directly with a certain quality of the insulating material and the projected area of the plates, and inversely with the square of the insulation thickness. The constants of the materials are measured relative to air, which has a constant of unity value, and most waxes run between 2½ and 4, while mica and glass run as high as 6 and 9 respectively.

IGNITION condensers have been made commercially with paper impregnated with various waxes and with thin sheets of mica. Some manufacturers find it more economical to use mica, while others use impregnated paper. This is largely a matter of cost and manufacturing methods, there being very little to be gained by the use of mica except where service is very hard and where the condenser is subjected to extremely high temperatures and voltage. The impregnated paper condenser lends itself to an infinite variety of shapes, such as flat, round, curved, etc., and is more generally used.

Much difficulty is experienced in the manufacture of mica condensers with thin sheets due to metallic veins, and successful manufacture of wax condensers depends on the degree of impregnation and standards of material. Condensers when heated often expand, with consequent change in capacity. This is guarded against by enclosing them in moulded cases or tightly assembled tin boxes.

Condensers generally fail in but one way, namely, puncture or breakdown. However, a poorly assembled condenser might expand when heated and fall off in capacity due to increased dimension between plates, or it may become open-circuited.

When the condenser punctures, the ignition unit is inoperative, and this condition may be checked by disconnecting one lead of the condenser and observing the nature of

the spark. The engine will generally run but very unsatisfactorily, with excessive sparking at the contacts, and continued operation without the condenser will soon destroy the points.

Should the condenser become open-circuited, the engine would, of course, behave the same as above, but a decrease in capacity would result in poor performance, depending upon the degree of change, and can only be determined by one familiar with the ignition outfit in question.

As outlined above, the most important electrical duty of the condenser is to bring about a high induced secondary voltage by its charging characteristics, but incidentally this reduces the amount of sparking at the contacts and consequently increases their life.

Tests of Aluminum Solders

ONE of the handicaps to the more extensive use of aluminum in the industries is the difficulty with which it can be soldered. This is due to the fact that a freshly cleaned surface of aluminum in contact with the atmosphere oxidizes immediately, and no flux seems to be known which will dissolve this oxide and at the same time protect the metallic surface beneath it.

A series of tests on soldered joints have been made recently at McCook Field, Dayton, Ohio, and the results are published in Air Service Information Circular No. 298. Fifteen solders were tested, of which fourteen were alloyed by the metallurgical branch of the Air Service and the remaining one was the commercial preparation known as Allen's soldering flux. Compositions of all fifteen alloys are given in the table below. The only composition which was actually determined chemically was that of No. 15, Allen's soldering flux, the other compositions being known from the proportions of the metals alloyed.

Solder No.	Sn.	Zn.	Al.	Cu.	Mg.	Pb.	Fe.
1....	60.00	40.0	.....	.....	.....	.....	.....
2....	58.20	38.8	3	.....	.....	.....	.....
3....	57.00	38.0	5	.....	.....	.....	.....
4....	54.00	36.0	10	.....	.....	.....	.....
5....	57.40	38.6	3	1	.....	.....	.....
6....	56.40	37.6	3	3	.....	.....	.....
7....	56.40	37.6	5	1	.....	.....	.....
8....	55.20	36.8	5	3	.....	.....	.....
9....	52.40	36.6	10	1	.....	.....	.....
10....	52.20	34.8	10	3	.....	.....	.....
11....	59.40	39.6	.....	1	.....	.....	.....
12....	58.20	38.8	.....	3	.....	.....	.....
13....	59.10	39.4	.....	1	0.5	.....	.....
14....	57.90	38.6	.....	3	.5	.....	.....
15....	47.86	52.2	Trace.	Nil.	Nil.	Nil.	Trace.

Soldering was done by means of a small oxy-acetylene torch, the flame being kept neutral as nearly as possible. Specimens for soldering were prepared from aluminum sheet ⅛ in. thick, a central member 4 5/16 by 1⅛ in. being soldered to two outer members or lap caps 1 in. square. The soldering was accomplished in the following manner:

A spot ½ in. deep on the ends of the central member and on each of the caps was tinned with the same solder as was used for the joint. The solder was rubbed in with the end of a hack saw blade. On each of the superficially coated ends of the central member a small lump of solder was melted. The lap caps were then successively soldered on by placing them on top of the layer of solder on the ends of the control member and by applying the heat to the uncoated top of the caps. A slight pressure was maintained on the caps while the solder was melted down. The projecting ends of the caps were supported to keep the caps horizontal. The assembled specimens were then turned over so that they were supported by the caps. Heat was then reapplied to level the specimens and to finish up the joints. Sufficient time was allowed after finishing one end of the specimen so that the joint there would not become hot enough to melt when the other end was being bonded.

The excess solder was filed off, and the edges of support and load in shear were filed parallel. The ends of each assembled specimen were cut off and comprised the specimens for actual shear testing. These shear specimens thus consisted of two lapped pieces of aluminum sheet, each 1 in. long, and possessed a soldered area 1 in. wide by approximately 4 in. deep.

The following conclusions are drawn from the results:

Additions of aluminum to solders of tin-zinc base tend to increase the strength of the joint as immediately tested and after aging. The strongest solder of the group is the 10 per cent alloy, but it is of high melting point and sluggish in flow.

THE effect of additions of copper to the aluminum-tin-zinc-alloys is appreciable only in the 3 per cent copper alloys. The best solder of the group from the standpoint of both strength and fusibility is the 3 per cent copper and 3 per cent aluminum alloy.

The addition of 3 per cent of copper to the tin-zinc base produces the more favorable solder in this ternary group. It is as good as the solder containing 3 per cent copper and 3 per cent aluminum and is much superior to the 3 per cent aluminum alloy. The fusibility of this alloy is quite good and its strength is higher than the run of commercial preparations.

Magnesium additions to cupriferous solders produce negative results.

Aged soldering joints tend in general to be of lower strength than joints tested immediately after soldering.

It is probable that cupriferous solders are higher in strength after aging than those of the same approximate analysis which do not contain copper.

THE increasing cost of railway traction in France has opened up a serious problem for the local lines, on which it is impossible to make up for the growing deficit by any further augmentation of rates, and the companies have, therefore, no alternative but to reduce the number of trains, with the result that the public is put to considerable inconvenience. The only solution for the moment appears to be the running of motor rail cars, with one or two trailing vehicles. The trials that have been carried out for some months past near Mantes, with motor rail cars, have proved so far satisfactory that the Minister of Public Works has circularized the prefects in all the departments, suggesting that they should go into the question of replacing steam locomotives with motor rail cars on the local lines. The experiments on the Ouest-Etat railways, with cars propelled by 60-hp. engines, show that the running costs per kilometer are reduced by one-half. The motor rail car weighs 14 tons in running order, and it will draw two trailers of 10 tons each.

Accelerated Aging Tests for Rubber Goods

Method developed by Goodyear engineer is described and results outlined. Samples are heated in air at a temperature of 160 deg. Fahr. Test is useful only in comparing compounds of same general type. Rapid deterioration usually due to over or under cure.

A METHOD for determining the probable life of rubber goods within a period of a few days was described in a paper presented before the American Society for Testing Materials at Atlantic City by W. W. Evans, development manager of the B. F. Goodrich Co. Work, looking toward the development of such a method, was started in the laboratories of the B. F. Goodrich Co. in 1907 by Dr. W. C. Geer. After carrying on numerous experiments at different temperatures and after varying the periods of time, Geer found that 160 deg. Fahr. gave the most satisfactory results. Upon the basis of this work, the following procedure has been adopted and used in carrying out several thousands of such tests.

How Tests Are Conducted

Into an oven heated air was blown at a temperature of 160 deg. Fahr., care being taken to see that a continuous supply of hot fresh air was added during the entire aging period. A number of samples, 3/32 in. in thickness, were previously cut in the form of the standard test strip and placed in this air bath. The test strips were suspended by punching a hole in the enlarged end, passing a wire through and separating adjacent strips by a rubber disk which is of about the same thickness as the test pieces. This separator allows free circulation of air, so that the entire surface of the test pieces is exposed.

The air was then started circulating and the test continued for a period of two weeks, taking out three samples each day. These were allowed to stand for 24 hrs. at room temperature, until they reached a state of equilibrium, after which they were tested for tensile strength and elongation.

Where a lesser number of tests are to be made and where a standard type of electric drying oven is available, this can be adapted to such work, provided a mechanical agitator is placed inside the oven, to insure an even temperature throughout, and a constant supply of fresh air heated to 160 deg. Fahr. is maintained throughout the test. As an example of one of these electric ovens, the type known as the Freas, with an electric agitator inside, has proven most satisfactory.

The curves herewith show the time-decay relation of the compounds. For a long time tests were always run in comparison with a standard compound, that is, at least two sets of samples were tested at the same time. Thus by comparing with the curve of a compound the age of which was known, the curve of a compound whose life was not known, a reliable indication of the service to be expected from the unknown compound was obtained. Experience based on many thousands of these curves indicates that this method of determining the approximate aging of a commercial rubber product is reliable, and is of great aid to a compounder in a manufacturing plant, since it permits him to study the aging of various compositions.

No attempt was made until recently to determine the probable chemical reactions involved. It seems reasonable to assume, however, that at the temperature employed and with a current of fresh air passing over the samples, oxidation occurs, forming one of the unstable peroxides and at the same time causing an increase in the co-efficient of vulcanization, similar to that resulting from the aging of rubber under normal conditions.

A few of the curves, taken from the records of the laboratory, have been selected which illustrate certain typical characteristics and of which natural aging data were available. The compound used in Fig. 1 is one of the older types so common in rubber thread. This curve shows the change in the elongation and in the tensile strength over a period of seven days. The curves are sharp and the deterioration was rapid. Fig. 2 shows the decay of the same compound, but of different cure. The heavy line is the curve plotted from the data taken from the strips that had been exposed in the aging cabinet. The broken line is the plot from data obtained from strips that had been filed away in a dark room kept at ordinary temperatures and in the dark, and test strips removed at intervals over a period of a little more than five years. From these curves, it is to be seen that the accelerated life test is somewhat more severe than the natural life test, although there is some degree of similarity in the general shape of the curves.

Conclusions

The results of several thousand tests show that the accelerated test has proved to be a valuable means of approximately predicting the relative rate of deterioration of rubber compounds. In a general way the following conclusions were drawn:

1. We consider it more reliable to plot curves and compare them than to consider the percentage deterioration from the original tensile strength.

2. The samples in the accelerated aging test are not hardened as in actual aging, but are definitely weakened.

3. Sulphur changes are noticeable, but not important.

4. Despite the fact that the curves of accelerated and natural life tests are not exactly parallel, the accelerated life test is somewhat more severe in general than the natural life.

5. In the vast majority of cases, too rapid deterioration of rubber compounds is due to over or under cure, and

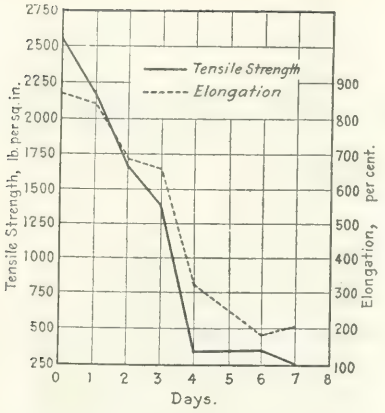


Fig. 1

Fig. 1 — Change in tensile strength and elongation over period of seven days.

Fig. 2 — Comparative results of natural life on accelerated aging tests

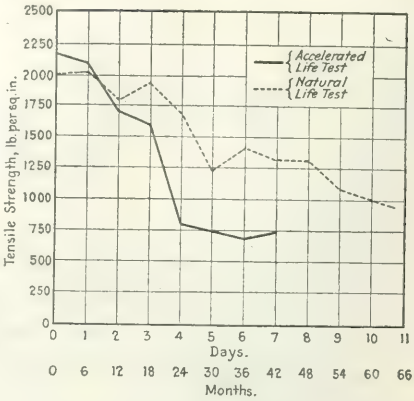


Fig. 2

chiefly over cure, and not to any one or more compounding ingredients. The test has been of utmost value in indicating the proper cure. Troubles with organic accelerators, various grades of unfamiliar crude rubber, mineral fillers of various kinds, and so on, have been due chiefly to attempts to graft a new material upon an old practice and often with fatal results.

6. This test is a comparative and not an absolute one and should never be used to compare compounds of different type.

7. When used properly, there has been found to be an approximate correspondence between accelerated life and natural life tests after four days in the oven, of one day equalling six months.

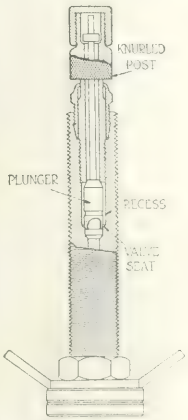
Positive Locking All Metal Tire Valve

AN all metal pneumatic tire valve designed to retain high air pressure, and for which is claimed positive closing and indefinite retention of any degree of air pressure that may be desired, is being manufactured under Holt patent by the All Metal Valve Co. of Detroit.

The construction of the valve is such that there are no springs or rubber employed. It differs from the usual type of automatic valve in that it does not depend on back pressure from within the tube for the maintenance of its air control seat, but is operated mechanically.

A positive, hand-operated screw force is applied to a recessed, non-rigid, metal valve plunger, which force gives a straight ahead, non-rotating plunger to seat metal wedge air seal. There is a recess in the lower end of the plunger to make that part sufficiently elastic to provide a seal without grinding in the seat. It is upon this recess in the plunger that the patents are largely based.

The valve is opened by turning the knurled post, shown in the illustration herewith, one and one-half turns to the left, in which position the plunger under back pressure acts as a check, preventing the escape of the air while the tires are being inflated. When the required degree of air pressure has been obtained, it is closed by turning the knurled post to the right until the plunger is seated.



Cut-away view of all metal tire valve showing construction. The valve is the same overall dimension as type now in use

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IN the course of a lecture to the Association of Drop Forgers and Stampers in Birmingham, Mr. Harry Brearley asked, "Have you ever considered why we use so much 3½ per cent nickel steel? Why the odd ½ per cent? Why not 2 or 3 or 4 per cent? And why does the mention of 3½ per cent nickel steel always suggest a material containing 0.30/0.35 per cent carbon? A reliable answer to these questions would be interesting. So far as my knowledge goes, nickel steel was first used on a large scale for the manufacture of guns, the amount of nickel specified being between 3 and 4 per cent. Such wide limits were necessary because at the time—about 1890—there were no means such as are now available of making rapid and accurate determinations of the amount of nickel in the bath of molten steel due to scrap. Three and one-half per cent nickel was, therefore, a mean figure which allowed the greatest variation on either side. The carbon was 0.30/0.35 per cent because the early carbon steel gun tubes had contained about that amount of carbon."

THE State College of Washington is carring on research along three lines of interest to the automotive industry. These activities are as follows:

1. Growth of cast iron from heat treatment, relative to the treating of pistons to compensate for wear.
2. Power measuring indicator for determining the condition of an engine, relative to wear and adjustment.
3. Correct design for shock absorbers, relative to the value of checking the rebound and the comparative damping necessary on compression and rebound.

A New Instrument for Checking Gear Tooth Profiles and Spacing

Is designed for use in comparing the uniformity or determining the interchangeability of gears. Is applicable to gears of any pressure angle and can be applied while gear is still in the machine.

A NEW instrument, known as an Odontometer, and designed for checking the accuracy and uniformity of gear teeth profiles and spacing has recently been added to the line of precision instruments manufactured by the Pratt & Whitney Co. It is intended for application in production work and in some forms can be applied to a gear while it is still in the machine.

The instrument is, in effect, composed of a section of a straight-sided rack with two parallel effective faces, one fixed and the other movable. A third face, set at an angle to the two working faces, is used to hold the fixed working face in contact with the flank of the gear tooth. The fixed registering surface is at A, Fig. 1, the movable indicating surface at B. The third surface C holds surface A in contact with the involute surface of the gear tooth. The surfaces B and C are adjustable so that gears of various pitches can be tested with the same instrument.

The indicating surface B is mounted on two thin flat springs D, which act as pivots free from backlash. The dial indicator E is actuated by the lever F, which has a ratio of 5 to 1, so that each division on the dial represents a movement of 0.0002 in. of the indicating surface B.

In general the instrument is used as a comparator to test the uniformity of interchangeable and mating gears. If actual measurements are required, the distance between the two parallel working faces of the instrument can be measured.

Stands are also made to hold the two smaller sizes of Odontometers when gears or pinion shaped cutters are being tested. In this case the gear is placed on a surface plate and rolled by the instrument. The actual cutting edge of cutters is tested, so that the errors, of whatever nature, are detected.

These gages are made to check gears in the following range of sizes—¾ to 4 pitch, 3 to 10 pitch and 10 to 24 pitch.

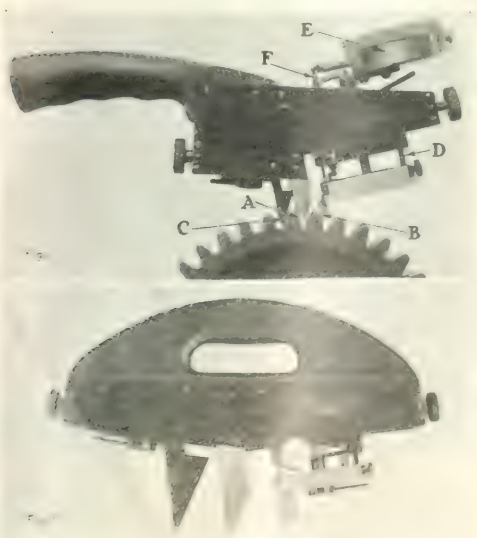




Fig. 1—Odontometer applied to a spur gear to check tooth profile and spacing. Fig. 2—Same type of instrument in a different form. Fig. 3—10 to 24 pitch Odontometer testing gear on stand

Machining Twenty Flywheels an Hour

Methods followed in the production of this part in the Hupmobile plant involve cutting off over one and one-half tons of metal per day. Operations described include cutting of teeth which mesh with starter pinion and balancing by a rapid and simple method.

By J. Edward Schipper

THE manufacture of flywheels for automobile engines involves the use of machines which are adapted for heavy cutting and yet which must give accurate results in the finished product, so that an inaccurate or unbalanced flywheel does not offset all of the good that a very carefully balanced crankshaft secures. It is, of course, just as essential that the flywheel be in balance as the crankshaft, as the two together may be considered a revolving unit and are only made separately because of convenience and economy in manufacture. One is just as important as the other from a balance standpoint.

In the flywheel department of the Hupp Motor Car Co. it is possible to put through 180 flywheels in a 9-hr. day. The finished flywheels weigh 54 lb. and the rough castings 72 lb., so that 18 lb. of metal is removed from each flywheel, or, if the plant is working at capacity, 3240 lb. of metal are removed in a working day. A department which cuts more than 1½ tons of metal per day is of necessity one which is adapted to high cutting speeds. For the heavy work, the Hupp company has chosen the Bullard vertical turret lathe. There is a battery of these machines which roughs out and finishes the various diameters. The first operation is that of turning the inside diameter, outside diameter and facing the crankshaft flange. These are all roughing operations which the machine handles very rapidly.

The second operation on the same type of machine is that of roughing and finish turning the gear diameter, the inside of the clearance, the web of the wheel and finish turning the crankshaft flange. This same machine also bores and reams the crankshaft center hole, which is 3 in. in diameter.

Following this operation, all of the turning operations previously described are finished. The finish turning work is illustrated in Fig. 1, where the machine can be seen taking the final cut on the inside and outside diameters of the flywheel. The mounting for this operation is clearly shown. One of the outstanding features of this type of vertical machine is its great rigidity, which tends to eliminate tool chatter, which is apt to occur whenever heavy cuts are taken in cast iron.

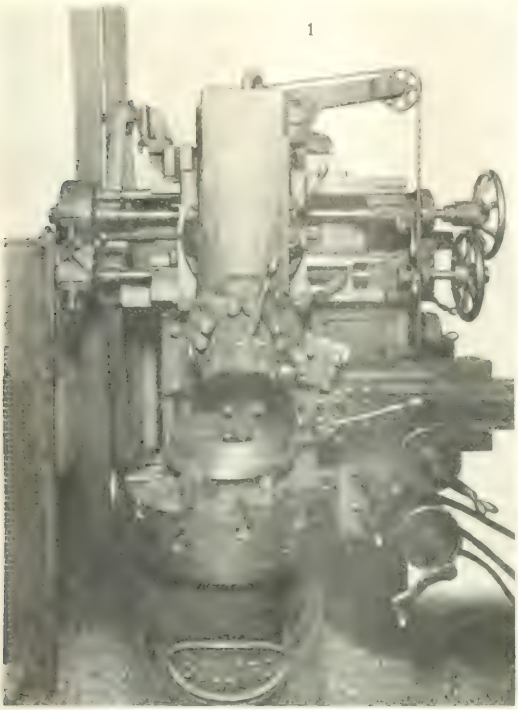
AFTER the flywheel has been shaped out and the turning work completed, a very careful inspection is made for concentricity and to check dimensions which are of necessity held to close limits. The inspector employs two amplifying gages as shown in Fig. 2. The flywheel is centered on a rotating fixture and is held within the limit of 0.005 in. on the amplifying gages. The flywheel is clamped in place at the center and bolted firmly so that it must rotate exactly on the axis.

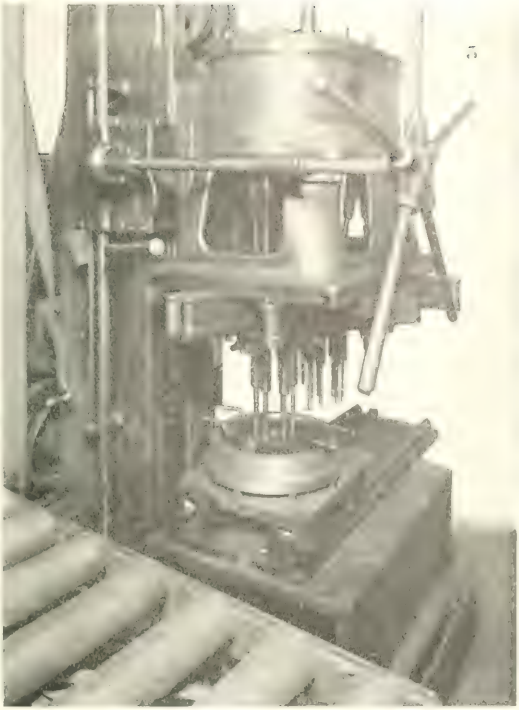
The crankshaft bolt circle and the three clutch stud holes are drilled on a Natco multiple spindle drill, the flywheel being located on a mandrel through the crankshaft center hole. The same operator also drills the three clutch stud holes, as well as reams and spot faces them. The change-over in the cutters is made by means of Magic chuck. The layout for the Natco drill is shown in Fig. 3. As will be noted, the jig employed is a railway type operating on knife edge rails beneath the two heads of the machine. For convenient handling of the piece, two handles form part of the upper section of the fixture. The fixture goes against stops which bring the flywheel into proper position for the different operations. The flywheel casting rests on raised plugs or dowels on the fixture, providing ample clearance for the drill chips between the face of the flywheel and the top of the jig.

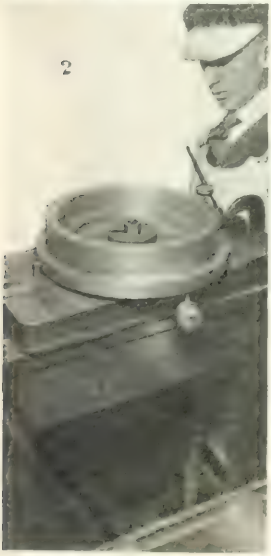
FOLLOWING the drilling of the flywheel, the teeth for the flywheel gear are cut on a Fellows gear shaper. Three of these machines are in use and, as will be noted in Fig. 4, two flywheels are placed back to back and the gears cut at the same time. It takes about 16 min. to cut the teeth on two of the flywheels, so that each machine handles approximately eight flywheels per hr., giving the department a capacity with the three machines of 24 flywheels an hour, which is ample for production needs.

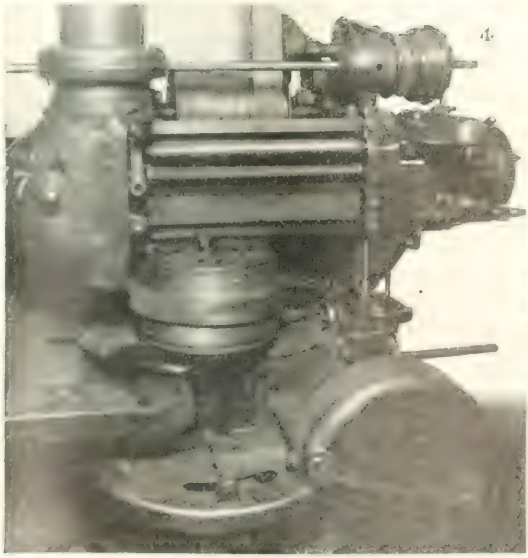
Following the cutting of the teeth in the flywheel, there is a thorough inspection operation. The three stud holes, for instance, are inspected with a triangular fixture which does not pass the flywheel until it fits over three check studs. The gear wheel is also run against a dummy starter pinion to test the teeth.

The final operation on the flywheel is to put it in running and static balance. The wheel is put on a center point balance, allowing it freedom in every direction and is spun around for a dynamic balancing test. A piece of soapstone is held lightly against the wheel and allowed to trace lines at several different distances from the center. It is possible by examining these lines to see if there is any waviness in them, thus to detect an out-of-balance condition. The width of the line also is used as a guide, for, if it is heavier at one point on the periphery than another, it is an indication that the wheel is bearing more heavily against the soapstone at that point. For static balance it is, of course, possible to detect the heavy point at once by the inclination of the wheel on the center point balance. The balancing stand is unique and provides a very quick and easy method for putting the heavy flywheel into balance. A drill placed nearby offers the means for taking out any weight necessary to accomplish the balancing.











1—Finish turning inside and outside diameter of Hupp flywheel on Bullard vertical turret lathe. 2—Primary inspection after turning of Hupp flywheel. This determines whether the wheel is out-of-round, out-of-true or eccentric. 3—Drilling bolt circle and three clutch stud holes in Hupp flywheel on Natco multiple spindle drill. 4—Fellows gear shaper putting teeth on two Hupp flywheels at one time. 5—Putting the Hupp flywheel in balance on special center point balancing stand. This is for both static and dynamic balance

How General Motors Is Planning to Give Ideal Service

Three-quarters of a million dollars to be invested in new service station designed especially for benefit of Buick and Oakland owners in the Metropolitan district. Every convenience for customers and for promptly and efficiently handling repairs.

By J. Howard Pile

GIVE the service customer prompt, courteous attention, repair or adjust his car quickly and efficiently, work as hard for his good will after he has bought his car as when he is thinking of buying it; in short, make service a real partner of sales—this is the idea behind the building in New York of a huge service station with the most modern layout and equipment to care for the needs of Buick and Oakland owners. It will really be two service stations in one. There will be but one roof, but otherwise the big building, already in course of construction, will have all the facilities of two separate service stations, each serving its own class of owners.

It goes without saying that the equipment will be thoroughly up to date. Beyond that, the plans provide for waiting rooms, numerous parts windows, inspection service and special car elevators, along with other features, which will speed up attention to the customer and make his visits to the service station convenient and pleasant.

PROGRESSIVE automotive manufacturers are becoming more and more convinced of the importance of giving prompt and efficient service to users of their equipment. Readers of Automotive Industries will therefore be interested in this description of service facilities which are being provided one of the largest manufacturers in this country.

* * * * *

When one concern makes an investment of $750,000 in a single service station designed exclusively for handling only two of the several makes of cars which it markets, there can be no doubt as to the fact that service plays a leading part in automotive merchandising.

The two service stations will translate into action in New York the ambition of General Motors executives to raise service to owners of General Motors cars to a high plane—all this in keeping with the conviction of these executives that owner satisfaction is the basis of a stable, growing automobile business.

The building is located on the east side of Eleventh Avenue, occupying the block between Fifty-fifth and Fifty-sixth Streets. This gives a floor plan of 200 ft. x 100 ft. The building will be of reinforced concrete, six stories high and the total floor space for the present will be 123,000 sq. ft. Provision is made for the future erection of another mezzanine of 3000 sq. ft., and if desired another floor can be added in the future, which would bring the total floor space to 146,000 sq. ft.

The first floor of the building is from 2 to 3 ft. below grade, and there is no basement, except on the Fifty-sixth Street side, where the boiler room, coal storage room, etc., are located. Both the first and the second floors are divided by a wall, exactly in the center of the building, extending at right angles to Eleventh Avenue. Buick will occupy the first and second floors on the Fifty-sixth Street side and Oakland the first and second floors on the Fifty-fifth Street side. The entire third and fourth floors will be devoted to Buick service and the entire fifth and sixth floors to Oakland service. Thus, the whole building is divided equally between the two organizations, which will have separate employees, machinery, etc.

In the center of the building, on the Eleventh Avenue side, there are four elevators, two small elevators for parts and two large elevators for cars. The large elevators are for freight and are entered directly from the sidewalk. The parts elevators are set back so that a truck can be backed up beyond the building line for unloading or loading at the elevator platforms.

Ramps are used on the first and second floors. Owing to a natural grade in the street, it is possible to use a ramp from and to the second floor on the Buick side. On this side of the building there are two large doors, one of them admitting to the ramp to the second floor, and the other admitting to the ramp to the first floor, which, as before stated, is slightly below grade. On the Oakland side the natural grade of the street does not admit of a ramp to the second floor, and two ramps, one on each corner of the building, both run to the first floor. Owing to the boiler rooms occupying a portion of the space on the Buick side, the Buick service offices are located on the second floor, there being only an entrance lobby, stairway and passenger elevator, in the central part of the Fifty-sixth Street side. On the Oakland side there is a waiting room, inspector's room, check room, wash rack, women's rest room, entrance lobby, stairway

and passenger elevator, in the corresponding locations.

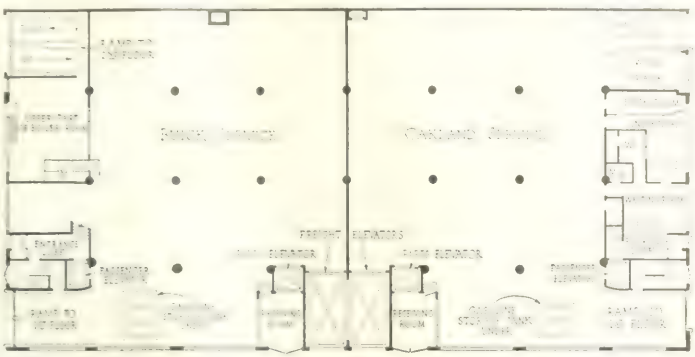
The second floor on the Oakland side has a parts office, service office and private office, and a large lobby with parts counter, with eight windows to the parts room. It is here that Oakland customers will go to purchase parts over the counter. On the Buick side, a portion of the wall space is occupied by the ramp from the street to the second floor, and the balance is occupied by an inspection room, check-room, women's room, cashier and waiting room. Owing to the fact that a portion of the first floor on the Buick side is taken up with the boiler room, it has been necessary to give further space to Buick and a mezzanine to the second floor has been built, containing the technical office, storage room, private office, stationery room, repair office, etc.

The third floor, which is devoted entirely to Buick repairs, has a large open bay, extending clear through from Fifty-sixth Street, nearly to Fifty-fifth Street. There are a number of smaller shops partitioned off with wire screens around the side, these being carpenter and coach tool room, electrical department, locker, lunch and rest room, engine department, etc. The third and fifth floors are practically duplicates, both being fitted up with a large central bay, and smaller shops around the outside. Both are equipped with a system of overhead tracks and trolleys for conveying heavy parts from one portion of the floor to another. There are over 1000 ft. of trackage on each of these two floors, with numerous switches and crosses so that the overhead trolley is available at practically any point in the shop. Switches go into the engine department, machine shop and cover practically every point in the bay.

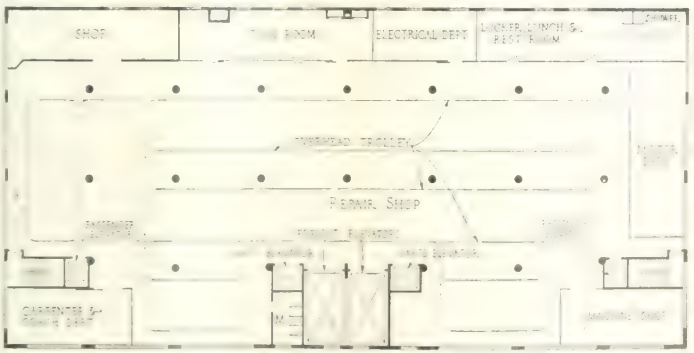
The Buick parts storage occupies the fourth floor, and at one end of the floor is the parts office and files, coat room, claims office, etc., together with a lobby and eight windows to the office and eleven windows to the parts room.

The plans call for installation of storage tanks of 550 gal. capacity buried underneath the first floor, and an oil separator pit, which is also below the first floor level. This is for the purpose of complying with local regulations regarding the separation of oil and gasoline from water before it enters the sewer.

In the planning of this new building every facility is given to both the Buick and Oakland companies to quickly and economically serve their customers and special pains have been taken in the design to prevent delays, due to lack of accommodations counter space or anything of that sort. The first floor will be devoted to quick service.



FIRST FLOOR PLAN



THIRD & FIFTH FLOOR PLANS

Floor plans of new General Motors service station

New Motor Taxation System in England

A NEW system of motor taxation has been adopted in England whereby the owner of a motor vehicle may purchase a license for either an entire year or for three months only. Cost of licenses will drop in accordance with the time of the year in which they are purchased. For instance, a license that would cost £20 in January would cost but £12 in June. The latter would, of course, expire at the same time as the former.

All vehicles are to be taxed at the rate of £1 per horse power per year. The following table shows the rate at which the cost of both the yearly and quarterly licenses for a 20-hp. machine will drop with the progress of the year or quarter:

Month of application for license	License expiring Dec. 31		License expiring end of quarter	
	Per cent of yearly rate	Amount	Per cent of yearly rate	Amount
January	100	£20	30	£6
February	100			
March	90	18	10	2
April	80	16	30	6
May				
June	60	12	10	2
July	50	10	30	6
August	50	10	20	
September				
October	30	6	30	6
November	20	4	20	4
December	10	2	10	2

Local Assembly Plants Will Help Secure Argentine Market

Sales will expand as drawbacks are removed. Lack of good roads can be overcome. Local assembly plants will aid to reduce high tariff. Exorbitant license tax can be reduced by proving that the automotive vehicle is an essential unit of transportation.

By M. T. Meadows

TO those interested in the Argentine market for motor vehicles a cursory examination of the world statistics relative to the ownership of automobiles and trucks compiled by Mr. David Beecroft and printed in the Feb. 16 and June 20 editions of AUTOMOTIVE INDUSTRIES reveals much data of real significance.

In the first place it is highly gratifying to note that, given the remarkable progress made by popular-priced American cars in changing the automobile in Argentina from a luxury of the classes to a necessity of the masses, this republic now occupies the sixth place among the nations of the world as regards the number of motor vehicles in daily use—being surpassed in this respect by the United States with 10,500,000, Great Britain with 500,000, Canada with 465,000, France with 240,000, and Germany with 90,000 vehicles.

From the above figures it will be observed that Argentina ranks third among the nations of the New World in ownership of motor vehicles. This is all the more gratifying when it is remembered that owing to the general business depression prevailing since the middle of 1920 the importation of automobiles has been reduced to very limited proportions. For example, only 400 passenger cars and 60 trucks entered the country in 1921 as compared with 4,281 cars in 1912, 5,115 in 1913, 11,031 in 1917 and 7,284 passenger cars and 102 trucks in 1920.

Generally speaking, there is no pride like that of family or race. For this reason perhaps Argentines themselves feel a keener satisfaction upon finding themselves placed at the head of Spanish-speaking countries in the employment of motor driven vehicles, having just double as many cars and trucks (75,000) as her nearest rival, Spain (37,500). That Argentina will continue to hold this enviable place in the Spanish world there can be but little doubt.

Upon examination of the figures covering the importation of automobiles into Argentina from 1900 to 1921 we find that although steady progress has been made over the entire period nevertheless quantities have not always increased year by year but have varied in accordance with the degrees of prosperity or hard times through which the country has gone. From 1900 to 1905 each successive year saw an increase in cars imported. However, in 1907 and 1908, a falling off in imports was noted. From 1909 to 1913 steady yearly increases were registered until in the latter year 5,115 cars entered the country.

The first and second years of the war brought down imports to low levels. This was in part due to inability of European manufacturers to supply the machines—it will be remembered that prior to these years American manufacturers had not yet become strongly entrenched in the Argentine market—but the principal reason, however, for this temporary lull in imports must be sought for in the bursting of the land speculation bubble which ran bankruptcies up to unheard of figures. During this crisis, whose effects would have been severer and more prolonged had it not been for the insistent demand at high prices for Argentina ranch and farm produce on the part of European armies, automobile imports fell off considerably.

The period of prosperity ushered in as a result of high prices received for meat, wool, hides and cereals early in 1916 caused the demand for automobiles to grow by leaps and bounds. During this year 5,929 cars were imported almost exclusively from the United States. In 1917 this figure went up to 11,031, but dropped in 1918 to 5,926 and 4,594 in 1919.

From the above figures it will be noted that the importation of motor vehicles into Argentina has forged ahead steadily in response to the demand for all types of passenger cars and motor trucks. It is to be hoped that, in view of the great services already rendered the country by motor vehicles and also the urgent need for amplifying the existing transportation facilities of the republic, many of whose unlimited resources are not in active exploitation for lack of better transportation means, the importation of automotive products will not only keep pace with past progress but will expand to ever increasing proportions.

UNDOUBTEDLY Argentina is on the threshold of the greatest era of commercial, industrial and mining development in its history. At the same time the swelling tide of immigration now pouring thousands of new settlers upon the shores of the River Plate should mean a great speeding up of production on farms and ranches. New districts will of necessity be opened up; new resources tapped and the purchasing power of the republic reinforced. All of these developments should mean an increased demand for motor vehicles and beyond a doubt American manufacturers will obtain the lion's share of this desirable trade if proper efforts are put forth.

To-day there are many factors which seriously handicap the more universal employment of automobiles, trucks and tractors in Argentina. Some of these are merely temporary; to wit, the present depression through which general business is still going, premium on dollar exchange

resulting in high costs of cars and supplies, etc. With the gradual improvement already being noted this obstacle should soon be a thing of the past. Other drawbacks are of a more permanent character: lack of good roads, high tariffs and heavy licenses.

However, it is only a question of time until Argentina, in common with all other civilized countries, will build modern highways. The evil effects of high tariffs can in part be done away with through the erection of local assembly plants where component parts, which pay lower duties, are put together. Comparatively cheap and relatively efficient labor is available for such enterprises. From the local assembly of cars to the local manufacture, from native materials, of bodies and other parts requiring simple processes seems to be a logical development. Likewise the growing pressure of organizations representing the large body of actual and prospective automobile and truck owners should at last bring the authorities to realize the unwisdom of placing an unnecessarily high license on the use of motor vehicles.

The great advantages which are to be had by American automobile manufacturers through the erection of local assembly plants are worthy of serious consideration, for besides the saving in payments of customs duties, labor costs in the mechanical trades here are about one-half of those in the United States. Labor is abundant and the relations between employer and workmen here are highly satisfactory. Mechanics in the Ford assembly plant in Buenos Aires are paid $8 Argentine paper per day, or at a normal rate of exchange $3.40 United States currency. However, due to the depreciation in the Argentine peso this wage is near $2.75 United States money. From a comparison of the records of the local plant with similar plants at home it is discovered that local labor per man here is just as efficient as the trained men in the Ford assembly plants throughout the United States. In fact as far back as 1919 the local plant here had broken all Ford records in the painting of bodies.

It is generally conceded in Argentine automobile circles that much of the credit for the splendid Ford organization which covers every nook and corner of the Argentine Republic is due to the foresight on the part of this company in seizing the opportunity to take advantage of the conditions which made advisable the erection of a local assembly plant. It is hoped that other manufacturers will follow in the footsteps of these pioneers.

In order that the great popularity already attained by motor vehicles in Argentina may continue to grow there are three serious handicaps which must be eliminated. The most important of these is the lack of good roads in rural districts, for those in the immediate surroundings of our larger cities and towns, though far from being perfect, are at least passable throughout the year.

The construction of good country roads which will permit of the use of trucks and automobiles throughout all seasons of the year constitutes, in Argentina, a very serious problem due to soil conditions. Indeed the fact that Argentina has more miles of railways than modern public roads is explained by the softness of the soil and the lack of road building materials conveniently distributed throughout the different sections of the country.

The more densely populated regions of Argentine territory are made up almost exclusively of open plains devoid of rock, shale or gravel and consequently railroad construction has met with fewer obstacles than the building of highways for auto traffic. Notwithstanding these serious drawbacks there is no reason why the road construction in Argentina cannot be successfully undertaken. In many different regions of the republic stone quarries are to be found from which road building material can be extracted. It is unfortunate that up to the present time no conveniently situated gravel pits have been discovered and consequently the use of crushing machines at the quarries is necessary in order to obtain required materials. Likewise there are a number of State and Federal penitentiaries in the country whose inmates could be employed in this class of work. From the various Argentine universities a group of engineers are graduated each year and some of these could certainly be employed in the direction of road construction.

The Argentine Government is by no means so heavily indebted that it could not easily finance good roads in accordance with carefully drawn plans. From all indications it would seem that the time is ripe for beginning road construction in Argentina since there appears to be nothing lacking except the determination.

Another handicap to more universal use of automobiles and trucks in Argentina are high Custom House duties. There is no just reason why popular-priced automobiles brought into Argentina should pay almost one-half of their factory cost in duties. As the automobile business is carried on at present the Argentine buyers, because of exchange, freight, insurance, custom house duties, importers' and agents' commissions, must pay about twice what the same machine costs American purchasers. Of this additional sum duties make up the larger portion. To the impartial observer it seems that, in fixing such a high duty on automobiles, Argentine legislators consider motor vehicles as undesirable imports. Motor vehicle importers and owners have taken a decided stand in securing reductions in present tariff and it is to be hoped that their combined efforts will sooner or later meet with success.

Readers of *El Automovil Americano* have already had their attention called to the high cost of annual licenses in the city of Buenos Aires. That municipal licenses throughout Argentina are exorbitantly high is generally conceded. Up to the present the central thought of the authorities seems to have been that automobiles are articles of luxury and consequently must be taxed heavily. With the change now taking place in recognizing that motor vehicles are a necessity rather than a luxury it is hoped that such an arbitrary position will be abandoned and a scaling of licenses be undertaken.

No set policy has ever been permanently adopted by the city of Buenos Aires relative to the classification of cars as regards annual licenses. These licenses have at different times been collected according to the horsepower of the machine, weight of the equipped car, number of passengers, etc. In practically every case these classifications have been arbitrary. The proof of this statement is amply borne out by the fact that such changes have been found necessary, for in each alteration an attempt was made to correct past errors.

Despite all of these handicaps there is no doubt but that Argentina will continue to increase its purchases of automobiles and use them on an ever increasing scale.

M. T. MEADOWS is Secretary of the American Chamber of Commerce in the Argentine. He has been a close student of automotive conditions in South America for many years.

In this article he tells how American selling policies and methods look from the standpoint of an Argentine observer.

Politics Prevents Use of Automotive Equipment for Rural Mail Delivery

Trial by Post Office Department in 1915 proved value of automobile in reducing the number of employees and saving of time. Congress passed law in 1916 prohibiting use of motor vehicles because it reduced amount of patronage to be granted "back home."

WITH a total of 44,181 United States rural mail routes in operation, of which but 852 are motorized, the possibilities of a wide use of automotive transportation in carrying of the mails, would, at first glance, seem to be a fertile field for the automobile industry.

The facts show, however, that despite the fact that the Government now has in operation 43,329 horse-drawn rural mail routes, contrasted to the 852 automobile routes, that under the existing law, the wider and more general use of automobiles in transportation of the mails is prohibited by law.

On July 28, 1916, Congress passed a law prohibiting the use of automobiles on mail routes, unless requested by a petition signed by a majority "of heads of families of five or more, who shall in writing request the Post Office Department to permit the use of automobiles for the carrier of their mail." This statute is still in force, and despite the desire of the post office officials to speed up the delivery of rural mails, the department is unable to permit the use of automobiles which would effect a saving of from three to four hours per day of the time of the carrier and enable the mail route patrons to get their mail that much earlier.

Congress Opposes Use of Trucks

To a representative of AUTOMOTIVE INDUSTRIES the story of how Congress had killed the use of automobiles for use in delivery of the mails was told to-day by one of the high officials of that department.

The whole thing in a nutshell, this official declared, was tied up in the evils of patronage. More automobiles, used in the transportation of mail, means the employment of a smaller number of carriers. This means less patronage for the Congressman, and meaning less for him, a majority number of them voted the bill on July 28, 1916, which prevents any mail carrier from using an automobile, unless a majority number of that carriers' patrons on his route petition the department in writing for a special permit to allow the carrier to use an automobile.

The law of July, 1916, was passed after a trial of one year of motorized routes. On March 4, 1915, the Government initiated a movement to effect economy in the administration of the Government. In the Post Office Department it was determined that a saving could be made by using automobiles on rural routes, where the roads permitted, in the transportation of the mails.

It was found that one automobile could handle two horse-drawn mail routes. Operators of automobiles received $1,800 compensation. Horse-drawn route drivers received $1,200—each to furnish their own transportation. By the use of automobiles at $1,800, who handled two routes, each of 25 miles in length, a saving of $600 over the horse-drawn route was made, or approximately 25 per cent.

Inauguration of the motorized routes resulted in the dismissal of a large number of rural mail carriers, with the reaction that Congress the following year repealed the act of March 4, 1915, and passed the law of July 28, 1916, prohibiting the use of automobiles on rural mail lines, except by petition as stated.

In discussing the handicap under which the department is now laboring, the department official declared that despite the fact that the department had sought a repeal of the law in order to permit the use of automobiles in handling rural mails, that Congress had turned a deaf ear to their plea because of the patronage for "back-home" political supporters.

"The department could save a great deal of money in the general use of automobiles on routes where good roads are available, if permitted to use automotive transportation," he said. "The situation, however, is not really as bad as our figures show.

"As a matter of fact, there is no doubt but that a large part of our carriers—possibly half—are now using automobiles in the handling of their routes. Because of the law, however, it is necessary for them to 'cover up' this fact, and our records must necessarily show that the routes are served by horse-drawn mail carriers."

Records of the department show that they have a total of 4306 mail trucks in operation for which there was appropriated last year a total of $15,000,000 for automotive transportation of the mails. This sum of money, however, includes the salaries of mail-truck drivers and mail handlers who go with the trucks, and does not represent monies spent for purchase and maintenance of trucks.

Nearly All Trucks Used in Cities

Practically all of the 4306 trucks owned by the department are in operation in the larger cities, being used for transportation of mail between post offices and depots, and for the collection of city box mail.

Based on the actual showing made by the department in the latter part of 1915 and the first half of 1916, which showed that the rural mails could be delivered by automobiles for approximately 25 per cent cheaper than horse-drawn equipment, it is estimated that the Government could save annually at least 20 per cent of its rural delivery costs.

Some idea of what this would mean to the Government in the way of economy can easily be determined when viewed in the light of the actual facts. While some mail routes cost the Government less than $1,200 per year, others cost more, and it is estimated that the average is $1,200. This figure multiplied by the 44,181 rural mail routes shows that it is costing the Government $53,017,200

annually to transport the rural mails. Based on a 20 per cent saving, which the department estimates could be made, this would show a tidy profit of $10,603,440 annually to the Government if the almost absurd law were repealed.

Stated another way, it would seem, based on the department's own figures, that the evils of patronage for Congressmen is costing the Government, in the Post Office Department alone, ten and a half million dollars a year. This excess cost, however, is lost sight of in view of the fact that it means roughly between 15,000 and 20,000 more rural routes. Accepting the smaller figure as the more accurate estimate, this divided between some 500 members of Congress shows that on an average it affords each one of them about 30 additional "plums" to pass around.

Present Law Absurd

The purpose of this article, however, is not to criticise Congress for its patronage system, which is as old as Congress itself, but to call to the attention of the industry the absurd and totally uneconomical law prohibiting the use of automobiles on rural mail routes unless it was the will of a majority of the patrons on that particular route.

The arguments made against the use of automobiles at the time of the adoption of the law show, as might be expected, that there was no hint as to the patronage question. The argument used was that by extending a 24-mile route to a 48-mile route that it would force the patrons on the route, say from 24 miles on along the route, to wait longer for their morning mail.

For example, patrons who lived along the first part would get their mail early in the morning, to which, of course, there was no objection. Other patrons, however, who lived along the route, say 27, 28, 32, 35 and 40 miles from its beginning, didn't get their mail until around noon, while with a horse-drawn rural carrier it was declared that on the standard 24-mile route the patron who was on the 27th or 28th mile of the motor route would be on the second or third mile of the horse-drawn route, and thus get his mail earlier.

Using this as a fulcrum, the economical program inaugurated by the passage of the law of March, 1915, authorizing motorized routes, was repealed by the law of July, 1916, to the end that to-day the department must perforce maintain more than 40,000 routes, employing as many drivers, which could be handled by approximately 20 to 25 per cent less number of routes and men, and effect a saving estimated at ten and a half million dollars a year.

Another factor in the passage of the "anti-automobile rural mail law" was the active support by the mail carriers' union, augmented by city carriers and collectors, who, according to post office officials conversant with the fight, used their influence with their patrons in bringing sufficient pressure to bear upon members of Congress to enact the absurd measure which is still in force.

Figures of the department show that the total mileage of the 44,181 rural routes is 1,152,000 miles, or an average length of 26.3 miles. It is estimated by the department officials that by using automobiles these routes could be doubled. The department has no accurate data as to what percentage of the rural routes have roads adaptable for automobiles, although it is estimated that fully 85 per cent of the routes have roads on which automobiles could be used the year around.

The department estimates that about 30,000,000 people are served by the rural carriers. In its annual statement it is stated that the rural routes served last year 6,570,867 families. Since March 4 last 282 new routes have been established and 970 routes extended.

In discussing the motor transport service of the department the annual report states: "This service is being reorganized with a view of making it a very potent transportation arm of the postal service, similar to that of the railway mail service. Its growth has been under abnormal conditions, and during the war period, when little attention could be given to uniformity of operation. A fleet of 4000 trucks is used in the delivery and collection of mail in cities and about 5000 persons are employed in this work.

To Standardize 8 Types of Trucks

"It is planned to reduce the types of machines, all of which were received from the War Department, from thirty-odd to eight standard types.

"By air mail, the department has made greater strides than it has in improving the service of the rural motor routes. The air mail service last year covered 1,500,000 miles and carried 50,000,000 letters. Recently the type of plane used by the department has been remodeled, with the result that the department can now carry with the same man-power and fuel twice as much mail as heretofore, which is about 800 pounds, or 32,000 letters."

Mail is not carried by the department across the country by air. It is transported from one point or large city to another, where it is left for mail trains to pick up. Other mail is taken on and advanced to another large city where it is dropped. In this manner more mail is advanced in dispatch than would be if the mail was carried straight through.

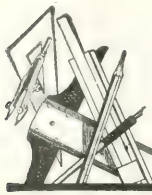
With the existing law, prohibiting the use of automobiles, the department is placed in the paradoxical situation of transporting mail by airplane to speed up the service, only to have the time gained entirely lost by loading it (*i.e.*, rural mail) into horse-drawn vehicles for the last lap of its destination.

A Non-Burning Exhaust Manifold Paint

A RUSTY exhaust manifold is unsightly, to say the least, and the manifolds on most car engines get rusty after a short period of use. Various methods of rust proofing this part have been tried, but apparently with little success. A new paint for manifolds, known as Kemick, is now being offered by the American Chemical Paint Co., and is claimed not to burn off. It is a black paint and is claimed to retain its color and stay in place even if the exhaust manifold gets red hot.

The paint consists of a pigment held in a liquid vehicle or binder. When heated the liquid evaporates and the pigment reacts with the iron of the manifold and forms a coating which prevents rust and adheres strongly to the iron itself. A quarter pint of the material is said to be sufficient for the exhaust manifold, exhaust pipe and muffler of four or six-cylinder car.

Before the paint is applied, all oil, grease, old paint and loose scaly rust must be removed from the surface, by means of a wire brush, stiff scrubbing brush or sand paper. Before applying the paint should be thoroughly stirred, and it can be applied either by means of a brush or spray. Kemick is not an outside paint, and when exposed directly to the weather it should be protected by a weather-proof paint.



The FORUM



Concerning Engine Lubrication

Editor, AUTOMOTIVE INDUSTRIES:

The article on performance of lubricants, by Herbert Chase, in your issue of July 6, brings out very clearly the principal points in connection with the fundamentals of lubrication that are receiving special study. The engineering industry in general has hardly ever given really serious attention to lubrication of machinery of any kind. The Mitchell bearing, which was developed within quite recent years, is almost a solitary example of the design of a bearing to maintain an oil film of the theoretically correct kind, and nearly all machinery has always been lubricated on the principle of providing far too much oil so that an adequate quantity will probably reach the points where it is required.

The lubrication of internal-combustion engines is especially complicated, by reason of the necessity for using a common oil supply for bearings and cylinders, and it is probable that the oiling system and the oil itself, for at least the conventional gasoline engine will always have to be a compromise.

One of the most surprising things is the slowness with which knowledge regarding oil grooving advances. It has been fully established for many years that most oil grooving prevents the formation of a proper oil film, instead of aiding its formation, and that, especially where oil is fed under pressure, the best bearing is usually one entirely devoid of any grooving except a single cavity of sufficient size to insure the admission of an adequate quantity of oil.

In an editorial in the same issue you mention the conventional system of drilling a crankshaft diagonally from pin to pin. I would like to point out that this has the disadvantage of supplying oil to the connecting rod bearings, in what is probably the very worst possible place. In his paper, given at the Summer Meeting of the S. A. E., Mr. Bull showed very clearly the advantages of drilling the oil hole in the crankpin from the inside, instead of from the outside. H. M. Crane, during the development of the American design of Hispano-Suiza engine, which has since further developed into the Wright engine, proved conclusively that there is a best position for the drilled hole in the crankpin, and that this position is not radially outward. Mr. Bull has expressed the argument so clearly that no room for doubt as to the correctness of his reasoning remains, but experience leads me to believe that it will probably be a long time before the fundamental correctness of his argument is appreciated as it ought to be.

At the end of Mr. Chase's article he makes mention of the addition of small quantities of animal or vegetable oil to mineral oil, and here he touches upon the most highly controversial subject of all. It may be said, generally, that such additions to mineral oil are capable of improving it in certain respects, but that compounding of this nature has in many cases led to trouble. Due to the instability of the animal or vegetable products. It is also worth while noting that comparatively recent discoveries have shown that mineral oils can be refined in such a way that they are given properties almost identical with those of compounds of mineral with other oils.

As Mr. Chase states, there is no question as to the need for more research, but the subject is excessively difficult owing to the very large number of variables in automotive engines. For instance, on the question of viscosity, while mechanical efficiency may be increased by using a lighter oil, this may be, and usually is, at the expense of an undesirable increase in the noise of operation. The function which oil fulfills in quieting the running of an engine is considerably greater than might be supposed by anyone who had not made actual tests. Incidentally, several engineers have lately been considering the possibility of completely separating the timing gears from the crankcase so that they can be loaded with soft grease and kept quite independent of the general oiling system. The idea has attractions, and in at least one case which came under the writer's observation, the effect of adapting an existing engine to accommodate grease lubrication for the front end was quite pronounced. In a sense, such an arrangement would, of course, be a complication, but it might be worth while for the highest grade of automobile. The temperature would always be high enough to insure a reasonable degree of fluidity in the grease.

IN this interesting and timely letter Mr. Clayden brings up a number of important points concerning engine lubrication which it will pay the engineer who is concerned with lubrication problems to study.

There is far too little constructive study of engine lubrication, and while the modern automotive engine is undoubtedly better lubricated than it was a few years ago, there is much still to be done before an approach to the ideal is attained.

A. LUDLOW CLAYDEN,
Chief Engineer Gas Engine Research,
The Sun Co.

Correction

IN an article on chrome molybdenum steel which appeared on page 1274 of the Research Issue of Automotive Industries (June 8, 1922) we attributed to C. N. Dawe the statement that "chrome nickel steel is still the best commercial case-hardening steel for important parts, though chrome molybdenum steel is a serious contender." Mr. Dawe advises us that this should read "nickel molybdenum is a serious contender of chrome molybdenum."

Quieter Valve Operating Mechanisms Feature Recent Car Designs

Good lubrication and other means for preventing excessive wear are important items in minimizing noise. Devices for maintaining constant tappet clearance also important. Use of chain drive and non-resonant construction of chain case are also aids to quietness.

By J. Edward Schipper

ONE of the very noticeable trends in automobile engine design is to be seen in connection with efforts to secure the quieter valve action. This applies not only to the L-head type of engine which has always had a reputation for being the most nearly silent of all poppet valve types, but also to the overhead valve engine. The recent announcement of a large manufacturer of overhead valve engines that he is using a combination aluminum and steel valve push rod is a good example of this tendency. Furthermore, it is particularly noticeable that efforts are being made to properly lubricate the rocker shaft in overhead valve layouts with the rocker arm type of action.

Attention has been called in a recent article in AUTOMOTIVE INDUSTRIES to the increasing use of the chain front end drive. This is also an indication of the same general trend toward silence in the functioning of the engine.

One of the best ways to promote silence in any engine is to make it easy for the owner to maintain it. If the parts which wear are rendered accessible, the owner will be more apt either to take care of it himself, or have it attended to by a service station, since he may reasonably expect that he will not be presented with an abnormally large bill for such service.

It was quite common three or four years ago for valve push rod guides to be so mounted that it was necessary to remove the entire cylinder block to get the guides out. Only in a very few of the up-to-date engines is this now the case. Practically all of the newer engines and those which are to be announced in the near future are so arranged that the valve guide assembly is accessible after removing the cover plate from the side of the engine. These cover plates are now generally being made oil tight as well as dust tight. The reason for this is that in place of running the valve action dry within the cover plate, it has been found readily possible to permit a mist of oil to circulate within the cover and, consequently, reduce wear and maintain silence. Valve cover plates were originally put on primarily in order to give the engine a neat exterior, and exclude road dirt. The oil tight housing is a later development which is proving of considerable value.

ONE of the companies which for years has employed the mushroom tappet has now changed over to the roller follower type. This is not only more nearly silent, but also a more efficient type of valve drive, and, while it is more expensive to manufacture, it gives a noticeable improvement in the quality of the engine if the roller assembly is made to close limits. One of the features of a hardened and ground roller is that, if properly made, the wear will be uniform, and, although wear reduces its diameter, it will still remain round and function properly, while the wear on the roller, as well as the wear on the valve seat can readily be compensated for in the adjustment.

Much of the noise from the valve action is, in some cases, accentuated by the front end gearcase cover. Nonresonant construction here is an absolute necessity if silence is to be maintained. Furthermore, it must be remembered that the front end of the engine acts as a sounding board through which a great many noises due to vibration which does not originate in the timing gears themselves are projected. There is no better way to break up these vibrations than by properly ribbing the timing gear cover.

ON the overhead valve engine silence can be maintained by proper lubrication once variable clearance due to temperature changes has been eliminated. In the recent development, wherein aluminum is used for the lower part of the push rod and steel for the upper end, the proportion of aluminum and steel is such that the increased expansion of the aluminum which is cooler than the cylinder, compensates for the expansion of the cylinder block and, consequently, the clearance does not alter materially during the rise and fall in temperature.

There is still a weak spot to be solved in valve drive and that is in the frequency with which it is necessary to make valve adjustments. Either the parts are too soft or the adjustment is not properly locked. Whatever the cause may be, it is certain that it should not be necessary to make as many changes of adjustment as are found necessary on the average car. The amount of wear on the end of the valve stem is being materially reduced in some cases by the employment of a composite valve wherein a hard alloy steel stem is employed. There are some engineers, however, who believe that one of the real cures for this trouble is to greatly increase the diameter of the bearing end of the valve stem. This increases the area subjected to wear and probably results in a reduction in the frequency of adjustment. Lighter valve parts, secured by the employment of hollow sections, are also of advantage in reducing valve weight and, of course, any saving which is made through reduction of inertia of the reciprocating parts is a decided benefit from a wear as well as from other standpoints.

Automobile Finance Companies Needed to Help Dealers

Some dealers are forced to extend credit almost equal to the total capitalization of their company. Finance corporation is better adapted to meet automobile dealers' needs than small banks.

By Harry Tipper

THE total buying of the railroad field in sales and equipment in a single year is estimated to reach two thousand million dollars.

The peak of buying in the automotive field of motor cars alone reached considerably over two thousand million dollars and the retail price given by the user for passenger cars and trucks in 1922 will reach approximately that figure, unless the industry is hit with a severe setback.

Approximately 75 per cent of these sales are made on a time basis. That means that fifteen hundred million dollars is involved in the credit sales. The amount of cash required on the average in the sale of automobiles and trucks for credit is approximately 40 to 50 per cent. This leaves approximately eight hundred to nine hundred million dollars to be taken care of by the financial institutions. Some of this, of course, is involved in trades which reduce the total amount so considered so that it would not be more than two hundred and fifty or three hundred million dollars.

Therefore, the actual credit required by the automobile retailer from the banks or other financial institutions amounts to somewhere between six hundred and nine hundred million dollars in the ordinary course of the year's business.

Where this credit is advanced by the local bank to the local retailer, it is necessary for the dealer to assume the responsibility for the credit of his customer by endorsing the notes to the bank before he can secure the required amount. Where the credit goes through a financial institution created for the purpose of providing this kind of credit, the customer's note will be accepted with certain provisions on the execution of the proper mortgages on the car in favor of the company which is doing the financing.

A retail dealer selling fifty cars at $2,000 each, approximately, will have to carry a line of credit on these cars amounting to about $45,000 in addition to his regular line of credits required for the operation of his business.

Having in mind the fact that 80% of the cars are owned in towns of 25,000 and less, the normal capital required for the operation of such an institution might not reach over $50,000.

In such case the credit extended on cars bought on time would be almost equal to the total capitalization of the company.

At the present time a great deal of the financing is carried on by the local banks and their operations in this case are similar to their operations in financing crops and stocks and other credit requirements. In proportion to the size of the community, however, the financing of the automobile truck is a heavy matter because the units are large and the depreciation is so much greater than the depreciation involved in many of the other items.

The development of the financing corporations for automotive purchases by the individual is a necessary requirement of the very rapid growth in the automotive market and the impossibility of securing well settled means of financing all these items during so short a time. The automotive business, as a business of volume, is not more than ten years old, and the large percentage of that volume has been developed within the last six or seven years. All methods of financing automobile purchases, therefore, are as yet more or less experimental and have not developed to the point where they can be examined for their comparative value without many reservations.

Considering the fact that about 80% to 90% of the buyers of automobiles have owned this kind of equipment before, and also considering the amount of money involved in the purchase of cars, it is not likely that the credit transactions will grow less. It is probable, in fact, that they may invade the used car field to a greater extent and involve a larger percentage of the total car market than they have done in the past.

The number of people who have available the amount of money necessary to pay cash for an automobile, without sacrificing some other investments, is comparatively small and the deferred payment is required not only for the purchaser of the cheap car but for purchasers of other cars as well. Undoubtedly, the deferred payment operations became a definite and regular part of the automotive sales, because retailers and sales managers saw how greatly the market might be extended if cars could be sold on the deferred payment plan.

The advantage to the dealer in dealing through a finance corporation, supervising automotive purchases, lies in the fact that most of these companies will take the notes of the purchaser direct with a chattel mortgage on the car so that the dealer's credit is not involved. The dealer secures the full payment for the car; his own credit obligations are kept within reasonable bounds and he is in a position to make a larger margin of profit on his turnover. This is not true of all finance corporations. A number of these corporations do business practically in the same way as the banks—that is—they require an endorsement of a note by the dealer so that he becomes responsible for its payment. In other respects,

the credit is established on a standard basis so that the credit conditions are known and can be depended upon.

In the case of securing the financing from the local banking institutions, the amount which they will loan upon the individual purchase, is a matter of depreciation and the dealer cannot be sure to what extent he is to secure credit for the notes as this depends upon the estimate of the bank as to the value of the notes themselves.

This makes it a good deal more difficult for the dealer to figure on his business and to make deals with his customers for the purchase of automotive equipment. It is almost impossible for him, unless he has a sufficient line of credit or cash of his own, to complete a deal with the customer until he has determined how far the bank will go with him in the advancement of credit on the basis of such notes.

It is the custom in many banks in smaller towns for each note transaction to come up before the officers or directors of the bank for their approval before the credit can be advanced to the depositor. In such cases, the individual loans from local banking institutions become involved in a personal equation and reaction of the officers and directors to the individual case. This has its advantages, but it also has very grave disadvantages because of the uncertainty of the credit and the difficulty of meeting the market requirements on any standard ground. The general market for automotive apparatus, particularly cars, is governed by the situation in the smaller towns and cities because the large market for future sales and replacements lies in these sections. In these sections the bank transactions are handled much more largely on the basis of the personal equation and the individual case, because of the intimate knowledge existing between the bank officials and directors and the people of the community.

Anything which develops uncertainty in connection with the business of retailing automobiles and trucks, operates to limit the market and delay the sale. Some uncertainty must exist at all times, but the operations of finance corporations, properly conducted, permit the removal of most of this uncertainty in the transaction of the business.

The finance corporation, adequately capitalized and properly managed, dealing with thousands of individual purchasers, and with dealers in many sections, is in a position to develop actuarial statistics in connection with its work which will provide a proper balance between the charges of average losses so that the entire credit will be on a sound basis. The local bank is in no position to conduct business along such lines. The loss in a single case will have too large a bearing upon the future loans and is likely to change the policy of the banking institution in its later credit to the dealers in the vicinity.

Generally speaking, from a theoretical standpoint, the finance corporation dealing with small loans in the thousands has a better opportunity to determine its business along practical lines than the local banking institution. A few years' development will enable these finance organizations to minimize their losses, establish the proper clearing house information, and develop their charges along similar lines to the insurance companies who have succeeded in getting stable rates on the most variable of statistics because of their establishment of the right conditions and averages through the examination of the trend in these thousands and thousands of cases.

It is to be expected that the same thing will develop in connection with the finance organization and its work in the automotive field. As this does develop, it should largely take the place of the local banking institution as an organization for the financing of individual purchases of automobiles and trucks.

Tractive Resistance of Roads Studied

INITIAL results secured from an investigation of the tractive resistance of roads indicate that information will be secured of great value to the highway engineer and the user of motor transport. The investigations are being carried on under the auspices of the Advisory Board on Highway Research of the National Research Council with which the Bureau of Public Roads, United States Department of Agriculture and the Quartermaster Corps, United States Army are co-operating.

One phase of the investigation shows that there is a great difference in the power required of the engine when a truck is traveling over different types of surfacing, the amount being more than twice as great on some of the lower types when compared with that on higher types. It is also shown that the power required to overcome the road resistance is not proportional to the speed of the vehicle, and after a certain speed is reached increases very rapidly.

The investigation when complete will cover tests with various types of motor vehicles with the load, tire and spring equipment varied on different types of surfacing and at varying speeds. The data will include gasoline consumption, internal engine resistance, wind resistance and road-surface resistance.

When carefully analyzed it will aid the highway engineer in determining under a given set of conditions what type of surface should be built for a given volume of traffic to result in the least total cost for road and vehicle operation. The same sort of study will be made as to expenditures for grade reduction to reduce operating costs.

The truck operator will be given valuable information on the effect of tire and spring equipment, lubrication, size of load and speed of vehicle on fuel consumption which should aid him in producing cheaper transportation.

Correction

T. A. BOYD, one of the authors of the paper which we printed in our issue of July 6, 1922, under the heading "Measuring the Tendency of Various Fuels to Knock," calls our attention to the fact that the caption for Fig. 3 and Fig. 5 were interchanged, as they were also on the preprint of the paper furnished us by the Society of Automotive Engineers. The cut over the caption marked Fig. 3 should have been placed over the caption for Fig. 5, while the cut over the caption marked Fig. 5 should have been over the caption marked Fig. 3.

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Sales Experts

FACTORY representatives play an important part in retail truck selling at the present time. Their activities include not only instructing the dealer in selling methods but also the actual work of interviewing the prospect in certain cases.

Consequently the methods of factory representatives should be the best known for truck selling work. They should be experts in merchandising methods as well as in knowledge of the component parts of the truck. Their scope of influence is wide. Their opportunity for constructive work is broad, but the danger of broadcasting poor methods is just as great. Such factory representatives should receive careful instruction before being sent out to aid dealers in making sales. Otherwise it is like the blind leading the blind.

A factory representative of a nationally known truck company went out to help a dealer sell a truck to a farmer the other day. After some difficulty the farmer was induced to come out to the road from the field where he was working to look at the truck. As he came out, the farmer kept protesting that he didn't want a truck; that he had no use for one, etc.

When the farmer did get out to the truck, the factory salesman started in to tell him all about the strong rear axle, the excellent body construction, the fine material used in making the frame, etc. Not a word about transportation. Not a suggestion as to how that truck would fit into the farmer's working plans, how it would save money or time for him; how it would be an efficient transportation tool.

The factory representative was talking to the farmer about the things that interested him as the salesman, not the things that interested the farmer as a possible user of the truck.

In the meantime the local dealer stood by getting education in truck selling methods.

Political Sop

IT is a pathetic commentary upon the Federal Government to allow a coterie of men to serve their selfish ends at the expense of efficiency and economy. There is printed elsewhere in this publication an article showing the effects of class legislation upon sales of automotive products. It is of sufficient importance to claim the attention of the entire industry.

The fact that Congress passed a law in 1916 prohibiting the use of automobiles on rural mail routes, except under certain conditions, indicates that the industry was not alive to the danger of such legislation at that time. The effect of this law which is now on the statute is easily apparent. The law automatically erected an almost insurmountable barrier to the extension of motor routes and the sale of motor vehicles to the Post Office Department.

The elimination of this feature of "spoils" system is urgently needed, inasmuch as it affects every citizen in the rural communities. Restriction of motor routes in the mail service tends to throttle progress and efficiency. The present administration and the majority in control of legislation boast of governmental economies. One is duly astonished that the party in power should allow this opportunist legislation to remain on the statutes. It is at its best a socially repressive policy which breaks down nationalism, and encourages sectionalism and isolation.

Undoubtedly some overzealous legislative agents of the organized rural carriers realized that it would be only a matter of years before motor cars would diminish time and space and become an indispensable factor in transportation. Efforts have been made recently to overcome the effects of this handicap and extend the rural routes, but in each instance the legislation has been tabled. It is high time that the Federal Government should change the situation and give the millions of citizens on rural routes the mail service they deserve. There is no economic justification for the time-worn theory that a motor truck on a rural mail route will abolish three jobs. It is only a question of time before the patrons of world mail service will rise up and demand mail *service* in preference to patronage to a few politicians.

Strikes Throttling Business Revival

By JAMES DALTON

WITH the miners' strike in its seventeenth week and coal reserves vanishing day by day, Washington is preparing to put into effect emergency measures which will provide

1. An emergency pooling of rolling stock under Federal control.
2. Reestablishment of war-time priorities to control shipments.

The consequence will be the throttling of the business revival by shutting off supplies of fuel and materials from industries which will be classed as non-essential.

As Automotive Industries pointed out last week, this industry is peculiarly fortunate because it deals in transportation. It can get along fairly well, in an emergency, without freight cars to transport its finished products, especially when the weather is good.

It can transport to its factories on trucks a good share of the parts and materials it requires for the manufacture of passenger cars and trucks. But it cannot successfully truck its steel supplies long distances from Pittsburgh and other steel centers. Even if it could, the steel mills are feeling the pinch of a coal famine and they are being forced to curtail their operations.

The freight congestion which unquestionably will follow the resumption of coal shipments with grain crops ready for the harvest, undoubtedly will stimulate demand for motor transport, especially trucks. There already are indications that large shippers are preparing to resort to trucks. The present situation probably will do much to hasten absorption of surplus stocks of commercial vehicles now on hand. But at best it will be an emergency solution of an emergency problem.

There is no occasion for the automotive industry to become panic-striken. In fact it is conceivable that it may profit from present conditions. The worst that can happen will be a slowing up of production and that, in the long run, may not be an unmixed evil. The pace of the past three months has been swift and if it continued indefinitely it might lead to all the evils attendant upon tremendous output.

The automotive industry has been notably patriotic in every great national emergency, however, and the present situation is bigger and broader than any single industry. The strikes now in progress, with their attendant complications, will retard by six months completion of the business revival which was well under way and which promised to bring a long period of reasonable prosperity.

One grain of comfort can be found in the industrial disturbances. That is the fact that they have checked suddenly what promised to be a secondary period of inflation, with steadily rising prices and poorly digested expansion plans. Industry as a whole was moving a bit too fast for its own good and unless it had been halted it might have worked itself back into a position analagous to that of 1920, although it would not have been anything like so dangerous.

Booms always are gratifying while they are in progress but the country didn't need a boom. What it did need was a gradual, healthy return to normal conditions. Such a return, to be permanent, must be built on a solid foundation.

There is some comfort, therefore, to be found in the strikes, but not much. Settlements of labor disturbances in the past almost always have been compromises. There has been no machinery to make the adjustments permanent and avert future crises. It has been a case of opportunism. There are many evils in the mining industry for which the operators are in part, at least, responsible. These problems are not impossible of solution.

The present strike was foreseen months ago by Secretary of Commerce Hoover but no steps were taken by the administration to avert it and no move for a settlement was made until the country actually was in peril of freezing the coming winter. The operators themselves have admitted the evils of the industry. The miners long ago urged the appointment of an impartial commission to study the question and make recommendations for reform. These reforms should be permanent and they should put an end to periodic strikes.

That probably will be the program which will be followed in settling the present disturbance. The miners will go back to work at the old scale pending the report of the commission. It may be necessary for the Government to take over the mines temporarily to bring it about but public opinion soon will force action even as drastic as this. Troops cannot be used successfully in America to drive striking miners into the pits and it takes skilled men to dig coal.

Suspension of railroad operations because of strikes has threatened the country every few months for years and the Railroad Labor Board was created to avert strikes. It has failed in its function largely because it had no authority to enforce its rulings. Some amendments must be made to put teeth into the law or a new system of dealing with the situation must be devised.

Persons who have followed closely the readjustment from war conditions have realized that deflation of wages and prices could not be brought about without serious difficulties with labor. Employers have contended that labor was avaricious and overbearing during the stress of war and that it must be taught a lesson. Labor has asserted that capital was trying to destroy unionism. This feeling on the part of the workers makes them the more determined in the present battles because they feel that the future of their unions is at stake.

The automotive industry is fortunate not alone because of its ability to withstand a collapse of the railroads better than other lines, but also because it has been free from serious labor difficulties.

Durant Adds Two Cars to His Line

Gets Locomobile; To Build the Flint

Redesigned Chrysler Named After Old Home—No Change in Locomobile

NEW YORK, July 22.—Two more spectacular moves for the expansion of Durant Motors, Inc., have been announced this week by W. C. Durant.

The first was that Durant will assume the presidency of the Locomobile Co. and control its destinies hereafter.

The second was the incorporation in Michigan of the Flint Motors Co. which will manufacture at Long Island City and in Flint a light six-cylinder car which will sell for $1,180.

The Locomobile announcement, which came first, had been discounted. It did not include details of the financial arrangements under which Durant takes control, but it paid high tribute to the character of the Locomobile and stated emphatically that this car will be continued in its present exclusive class and that it will be manufactured as originally in the factory at Bridgeport. No price change is contemplated at this time. Present owners will be assured of adequate service. Production will be governed entirely by demand.

The present Locomobile Co. will be superseded by a new corporation to be known as the Locomobile Co. of America, which has been incorporated at Albany with a capital of 600,000 shares of no par value. This company will be headed by W. C. Durant. In view of this step, warning has been given by Durant that the shares of the old Locomobile Co. which are being traded in on the Curb market are valueless. Practically all stock of the new corporation will be owned by Durant Motors, Inc.

Details of the terms under which Durant has taken over the assets of Locomobile have not been disclosed, but it is understood he reached an agreement with approximately 90 per cent of both the bank and merchandise creditors under which they accepted a certain percentage of their claims in cash in full settlement. Practically nothing will be left for the stockholders of the old company. The Durant proposition was accepted by the Federal court, by the receivers and by the creditors.

By the incorporation of the Flint Motors Co., which will have a plant at Flint, Durant has kept the pledge he made to the city of Flint, his former home, when

(*Continued on page* 190)

Business in Brief

NEW YORK, July 24—Uncertainties resulting from the mine and rail strikes have cast a dark cloud over industry and trade generally. The need for fuel is becoming more pressing daily, and serious freight congestion with all its attendant difficulties seems to be approaching.

Iron and steel trades have been hardest hit by the fuel shortage, and probably 10 per cent of the active furnaces in the country have been forced to close. Coal prices generally have been advanced, and considerable British coal has been booked for import, although it remains to be seen whether American longshoremen will unload it.

Distributive trade has been held up by the disposition to go slowly until the labor disturbances have been settled.

Were it not for the strikes the general outlook would be favorable. Western crops have held all the gains made in recent weeks, and cotton has been helped by hot weather.

The building industries still are running at top speed, and final returns for June show that it equalled May. Construction costs are steadily rising, however.

Raw and refined sugars have risen to the highest levels of the year.

Many more New England cotton mill operatives are returning to work, shoe factories are increasing operations and furniture factories have increased their operations.

Car loadings for the week ended July 8 were 718,319, as compared with 876,896 the previous week, and were the smallest for any week since April.

Industrial stocks are higher, rails firm, bonds strong, money easier and exchanges steady.

Bank clearings for the week ending July 20 were $7,061,394,000, a loss of 2.7 per cent from the previous week, but a gain of 17.5 over the same week last year.

NEW KELLY-SPRINGFIELD TRUCK

SPRINGFIELD, OHIO, July 24—A new model truck known as K-61 has been announced by the Kelly-Springfield Motor Truck Co. The specifications are as follows: 5-7 ton capacity, 4½ x 6½ motor, tires 36 x 6 front, 36 x 7 dual rear. The price of this chassis is $4,800.

Tire Fluctuations Threaten Industry

Effect of Goodrich Price Cut Uncertain—Costs Tend Steadily Upward

AKRON, OHIO, July 24—Possibilities of another tire price upheaval face the tire industry following the unexpected announcement of the B. F. Goodrich Co. of a blanket ten per cent cut in the prices of all Goodrich cord tires, and a fifteen per cent reduction on all Goodrich fabric casings, which were made effective as of July 20.

Goodrich is the first major tire company to slash tire prices instead of introducing new lines of cheaper tires in lieu of price cuts, as has been done by several others of both the larger and smaller tire producing corporations in the Akron district.

Last month the Goodyear Tire & Rubber Co. and several smaller concerns took action tantamount to a price cut by introducing new lines of cheaper cord tires to sell at from 20 to 25 per cent below the standard cord tire price lists. The new Goodyear casing is known as the cross-rib.

No Cheaper Line

The Goodrich policy, according to announcement of officials, will not be to continue a standard grade of tires at standard prices and at the same time to put out a cheaper tire in lieu of a price reduction, but will cling to the well advertised, popular and long standing standard Goodrich tires and of adjusting their prices downward to compete with other companies. No revision is made by Goodrich in truck tire or tube prices.

The Mason Tire & Rubber Co. this month made a 28 per cent cut in tire prices, while the American Rubber & Tire Co. increased prices 5 and 10 per cent.

Just what effect the Goodrich blanket cuts will have on other major companies is problematical, for the Goodrich cut comes at a time when nearly all manufacturers admit there is more justification for a price increase than for a price reduction.

In spite of the current trend of thought of tire manufacturers toward slightly higher prices, and despite the apparent justification for such reasoning in the steadily climbing price of cotton, one of the biggest items in tire manufacture, and the attempted corner of the crude rubber market by the British and Dutch governments, the Goodrich company will make its price reductions effec-

(*Continued on page* 191)

Effects of Strike Becoming Apparent

Material Shortage May Become Acute—Steadily Increasing Shipment Delays

By JAMES DALTON

NEW YORK, July 25.—While the coal and rail strikes have not yet seriously interfered with automotive production, their effects are becoming apparent in such centers of the industry as Detroit and Cleveland. If the walkouts continue another week they will result in a considerable slowing up of operations.

Curtailment of steel production and reluctance of companies to accept orders has brought keener competition and the payment of larger premiums by automobile makers for immediate deliveries of much needed supplies. This shortage will rapidly become more acute.

Parts makers have encountered no actual car shortage as yet, but deliveries of their shipments of finished products and of raw materials to them are showing steadily lengthening delays. Freight congestion is becoming more severe at the strategic gateways, and embargoes are being declared at such important centers as St. Louis.

"Drive-aways" Probable

Passenger car and truck manufacturers will be able to deliver a large part of their products by resorting to the expedient of driving their vehicles from the factories to their destinations but their output will be seriously impeded in a very short time by difficulty in obtaining supplies. "Drive-aways" from the factories are no novelty for automobile makers. The Detroit Edison Co., which supplies power to most of the plants in that city, still has on hand considerable stocks of coal.

The seasonal decline in passenger car sales has become a little more general in the past week but has not reached serious proportions, and is considerably less than normal. If serious industrial stagnation results from the strikes and the shortage of railroad rolling stock, buying power naturally will diminish and the demand for automobiles will fall off somewhat.

The market for heavy trucks is dull but it probably will be stimulated by inability of the railroads to move the freight offered them. Farm demand for light trucks is expected to increase in a short time.

Manufacturers in the automotive field will resort, so far as possible, to the use of trucks to bring in their supplies and they probably will be able to avoid closing their plants, provided the strikes do not cause comparatively complete suspension of iron and steel production. This would be a situation with which trucks could not cope.

Departmental Bonus System Proves Successful Stimulant to Team Work

By E. F. Roberts,

Vice-President in Charge of Manufacturing, Packard Motor Car Co.

Detroit, July 24.

PACKARD has instituted a departmental bonus system of rewarding effort by our employees and for encouraging better workmanship. In the three months since its installation it has been found to be the most satisfactory working arrangement for both employees and company that we have known.

Within a short time the system will be effective in all our departments, entirely superseding the former piece work system which, though successful in stimulating individual effort, lacked the important factor of encouraging organized effort which the new bonus system has been found to develop.

Under our plan a careful time study of the work in a department has been made and a standard of production has been fixed at 80 per cent of the possibilities of the department working at maximum efficiency. As this arbitrary figure is exceeded, the bonus applies upon the wage scale of the men according to the points by which they exceed it. When an eleven point gain is shown, the men receive a bonus of eleven per cent upon their fixed salary.

The bonus applies to every man in a department from the sweepers to the foremen, thereby encouraging everyone to give his best effort. We have already found that where there were shirkers in a department the men themselves have either compelled them to work or get out. Where new men have been taken on, the entire department is interested in perfecting them at the work assigned them. Spare minutes are now being employed in helping the next fellow and by so doing helping the department.

Owing to heavy production pressure, much overtime has been necessary to keep up with sales requirements. Installation of the bonus system has made the overtime unnecessary. In some departments where it was thought extra men would be required, even with overtime schedules, it has been found possible to get the necessary output without either overtime or more men.

Under the bonus plan, no allowance is made for work scrapped. If the work does not pass inspection it is not included in the total output. This has made far more careful work. The inspectors in the departments are not included in the bonus award, so that any possibility of poor work getting by is avoided.

In every department where it has been employed it has proven highly successful. In starting it, we picked out departments that had been on a piece work basis in some cases for fifteen years and it vindicated our judgment. The men are better satisfied in that it makes opportunity for all to partake equally. It encourages the steady, painstaking worker and does away with the tendency to get out work that will pass inspection but is really not desirable from the company standpoint.

Though it has had a tendency to wipe out the high points of the piece work basis, it has kept the rate of earnings about equal to former averages. The system that permitted individuals to make record earnings gives way to a system making for team work. Under the former system, work that was scrapped was paid for because it was uneconomical to have too many inspectors. This is eliminated under the department inspection plan.

THOMART CUTS CAPITALIZATION

AKRON, OHIO, July 24—Stockholders of the Thomart Motor Co. of Akron and Kent to-day approved the company plan of reducing its capitalization by decreasing its preferred stock from $5,000,000 to $2,000,000 and its no par common from 100,000 to 70,000 shares. The decrease is made as a means of reducing taxes. Production at the Thomart plant at Kent is averaging one speed truck a day.

Milwaukee Maintains June Sales Average

MILWAUKEE, WIS., July 24—Dealer business so far in July has come up to every expectation, and while some dealers have not been able to maintain the average of May and June, others are able to report increases in sales. It had been expected generally that, as usual, July might show a uniform decline that might carry through August, with a rising sales curve in September, under the influence of offerings of 1923 models, the exhilaration of the annual state fair in Milwaukee upon local and state business, city and rural, and the seasonal fall buying period.

Thus there has been no real exhaustion of prospects; on the contrary, there is plenty of material for salesmen to work upon. Motor truck sales are increasing.

Associated Motors Plans No New Line

No Additional Plants Until Needed—Sales Offices Centralized at Dayton

CHICAGO, July 24—Further details of the plan of operation of the Associated Motor Industries, the merger of nine automobile and parts manufacturers which was announced two weeks ago, are being worked out in meetings of the board of directors here this week. The board has confirmed many of the actions taken by the organizers and has authorized the officers to qualify the company to do business in the various states.

Will I. Ohmer, chairman of the board, stated that, although it is the purpose of the corporation to take in a number of other manufacturing units, no definite steps toward that end have as yet been taken.

"Additional manufacturing plants will be bought only when needed," he said. "We do not want a lot of idle space, and we are not going to take in additional plants until we are ready for them."

To Run at Capacity

Among other things which he discussed were the future production plans and the financing plans of Associated Motors. He said he proposes to visit each of the plants beginning next week, together with other officials, and make a survey of the possibilities of each factory, and as soon as possible get each one into capacity production.

"I am confident," he said, "that most of the plants can produce twice as much as they have ever produced in the past. They will all be organized along the most economical lines. The whole business will be directed from the central office at Dayton. The Associated Motors owns outright all the other plants, and there will not be any other boards of directors or officers except those of the Associated Motors. We will need at each plant an executive manager and a factory manager."

Specializing Production

He said tentative plans call for the manufacture of all electrical and ignition equipment at the Dayton plant, sheet metal, fenders and the like at the Saginaw plant and transmissions and gears at the Lockport, N. Y., plant. Further specialization of parts production probably will be worked out.

Discussing the financing plans, Ohmer said practically all the securities that would be issued had already been subscribed for. The securities include a $6,000,000 bond issue, which he said has been largely subscribed for by banks holding bonds of the member companies for the retirement of which the Associated Motors bonds are issued. There will be no general offering of stocks or bonds to the public, he said.

He made it plain that the sales policy for all the products of the company will be formulated and directed from the central office at Dayton. A plan to finance retail sales has been worked out and is to be operated by R. A. Crandall & Co., a separate corporation in which the Associated Motors will hold a substantial interest. Details of this plan will be announced soon.

An engineering and designing department will be maintained at Dayton. It is planned to continue manufacturing the National, Jackson and Dixie Flyer cars and no plans have been made for new models, Ohmer said.

288,000 JUNE TOTAL RECORD PRODUCTION

NEW YORK, July 22—Practically complete returns to the National Automobile Chamber of Commerce on production of cars and trucks for June show that the total approximated 288,000. This exceeded by 17,000 the estimate of 271,000 based on returns from companies making 90 per cent of the motor vehicles turned out. It was an increase of 12 per cent over the May record of 256,000.

The June figures, according to the N. A. C. C., indicate a production of more than 2,000,000 motor vehicles for 1922. The output for the second quarter now stands at 763,000.

COVERT GEAR SHUT DOWN

BUFFALO, July 22—The Covert Gear Co. of Lockport, N. Y., which recently merged with other manufacturers of automobiles, trucks and parts under the name of the Associated Motor Industries, has closed its plant on Grand Street for an indefinite period. At the offices it was explained that a readjustment of the departments was under way preparatory to a visit by the executive committee of the new organization. The plant there will reopen. The employees, numbering about 150, claim the action of the Covert company is a lockout against them. Last Friday the men filed with the officials a petition for an increase in wages, asking ten cents an hour more without any piece work.

NEW GUM-DIPPED FIRESTONE

AKRON, OHIO, July 24—A new gum-dipped cord tire has been introduced by the Firestone Tire and Rubber Co. The process used is said to be an old one originally perfected by Firestone and only recently revived. It consists of dipping the fabric for tires in a special rubber gum to add strength and resiliency to the tire carcass. The new gum-dipped cord has been placed on the market at prices to compete with the standard cord tire grades of other major companies in sizes 30 x 3½ up to 34 x 5. The 30 x 3½ non-skid casing is being advertised to the consumer for $13.75.

New Process Gear Plant to Be Sold

Upset Price $1,900,000 — Completes Physical Liquidation of Willys Corp.

SYRACUSE, July 24—The plant and all other assets of the New Process Gear Corp., estimated at more than $3,000,000 in value, will be sold here on August 22 by Mayor George R. Lunn of Schenectady and Francis G. Caffey of New York as special masters appointed by Federal Judge Frank Cooper of Albany. The upset price has been fixed at $1,900,000.

This sale will complete the liquidation of the Willys Corp., of which the New Process Gear is a subsidiary, so far as physical properties are concerned. There will remain, however, several million dollars worth of Willys Corp. treasury assets to be disposed of.

Receivers were appointed for the Willys Corp. in November, 1921, in the equity action brought by the Ohio Savings Bank and Trust Co. of Toledo.

The New Process Gear is to be continued, it is learned through an automotive source. It is understood that strong interests in the automotive field are preparing to bid in the property and carry on the work. The plant, which covers eight acres, is at this time working day and night shifts of men, more than 800 being employed, which is about the capacity of the plant. The work at this time is the manufacture of gears for the Durant and also the new Star.

It is believed probable that Durant may take over the Syracuse interests of the Willys Corp.

John N. Willys acquired the New Process Gear Corp. from the late Thomas W. Meachem and other members of the Meachem family, in November, 1918. All of the $3,000,000 capital stock was taken over in this transaction.

Pierce Would Solve Financial Problem

BUFFALO, N. Y., July 24—Directors of the Pierce-Arrow interests will meet this week to discuss measures looking toward either the reorganization of the company or raising new funds. Some financial interests do not believe assessment of stockholders will be necessary.

This belief is strengthened by the fact that the company has practically no liability other than a bank debt of $7,900,000, and it is believed the banks will do everything possible to avert drastic action.

Response to the company's recent price reduction on passenger cars has been gratifying. Orders have more than doubled since the announcement. Additional men are being taken on and production is expected to reach ten cars a day. Truck demand continues to lag and the truck output is under five a day.

To Develop Safety Formula for Trucks

S. A. E. Help Sought by Highway Department—Sub-Committee to Study Matter

DETROIT, July 24 — Twenty-four members of the truck division of the Standards Committee of the Society of Automotive Engineers met here to-day to examine the possibilities for a safety formula for trucks. Discussion developed the opinion that, in order to meet the requirements of the motor vehicle departments of the various states, it would be necessary to include in the formula suitable static factors of safety on the axle and steering gear as well as a retardation test.

The meeting was called largely as a result of a letter to B. B. Bachman, president of the S. A. E., from A. L. McMurtry of the Motor Vehicle Department of Connecticut, asking for immediate help on a formula which would enable the state authorities to use definite requirements as a basis for passing on the safety of trucks seeking licenses. The measure is particularly necessary in view of trucks assembled from units of doubtful or ancient origin.

A sub-committee has been appointed with instructions to take the matter under immediate advisement.

Some discussion also was engaged in regarding the new small wheel and large diameter tire sizes which brought to light the fact that truck manufacturers are somewhat dubious as to the matter of clearance under the brake arm and overhung bearings with these wheels.

Ford Men Selling Lincoln Everywhere

DETROIT, July 24—Lincoln cars will be sold abroad just the same as in this country—by Ford dealers, that policy having been decided upon by the Ford company. Shipments already have been made to Ford representatives in Manchester, England; Copenhagen, Denmark; Antwerp, Belgium; Bordeaux, France, and Cadiz, Spain, as well as to the branches in Buenos Aires, Montevideo and Sao Paulo.

An initial shipment already has been made to Havana and two Lincolns are on their way to Manila. Shipments soon will be made to China and Japan. The Lincoln will be introduced to Brazil at the Brazilian Centennial, which will be held in Rio de Janeiro in September.

COLUMBUS SALES HEAVY

COLUMBUS, OHIO, July 22—Demand for passenger cars in Columbus and Central Ohio has shown a remarkable increase during the past two months, according to leading dealers and distributors. All classes of cars are selling briskly, but the principal demand centers between $800 and $2,500. In many instances agents cannot make deliveries of cars sold; this applies especially to closed jobs.

The farming sections of the state are buying cars and are paying cash to a certain extent, showing that money is easier in agricultural sections.

Agents and distributors look for a continuation of the good demand for the remainder of the summer months and up to rather late in the fall.

Gardner Announces New Closed Models

ST. LOUIS, July 22—Two new Gardner closed jobs are to be ready for delivery Aug. 1. They are a 5-passenger sedan priced at $1,345 and a business coupe at $1,095. The body lines follow very closely the present phaeton. The business coupe has a wide roomy seat, upholstered in straight grain leather, and there is plenty of leg room. Just back of the seat is a convenient compartment for carrying suitcases, packages, extra tools, etc. The door windows are raised and lowered with automatic rotary type noiseless lifters.

A special roof construction consists of cross bows covered with fine mesh wire screen and heavy duck, which is padded to give a smooth appearance and prevent sagging. Included in the equipment are a corrugated steering wheel, ventilator, sun visor and rainproof windshield.

The sedan has smart straight lines which are accentuated by the finish, which is dark blue with black enameled fenders and nickel plated satin finish hardware inside the body. A forward tilting ventilator throws air around the feet of those in the driving compartment. The windows are fitted with silk shades, and the hardware is satin finish. The four door design allows easy entrance to both front and rear seats without disturbing those already seated. All doors lock from the inside, except the right front which locks with a Yale lock from the outside.

Closed Car Business Keeping Hudson Busy

DETROIT, July 24—Production of Hudson closed cars during the second quarter of 1922 was at the rate of 54 per cent of the total output during the quarter. The factory declares these figures show that the proportion of closed car business has continued steadily through the warm months, the percentage during the first four months of the year being 55.

Essex closed car production for the second quarter was 41 per cent of its total output, a total that is considered remarkable in view of the price class.

Production of Hudson-Essex in the second quarter of the present year makes it the largest similar period that the company has known. Two of the three months during this quarter, May and June, set up new high output and sales records.

Continental to Jump Output 20 Per Cent

Star Engine Production Nearing 1000 Daily—Plants Well Supplied with Coal

DETROIT, July 22—Continental Motors Corp. will increase its production of passenger car engines in August by 20 per cent over the total in July. This increase, while more marked in its light six model than in others, nevertheless represents an increase in production in all passenger car models. Business in the truck field is fluctuating, the company reports.

Many of its passenger car companies are making commitments on a ninety-day basis at this time, whereas the truck buyers are holding orders to a much closer schedule owing to uncertainties in this field. By reason of the longer commitments the company is enabled to make more prompt deliveries in the car field than in the truck.

Production of the engine for the Durant Star car is steadily mounting and will reach 1000 daily in the near future.

The company reports itself to be well supplied with coal at both its Detroit and Muskegon plants, at both of which it operates its own power-producing plants.

Rolls-Royce About to Produce Bodies

SPRINGFIELD, MASS., July 25—Rolls-Royce of America, Inc., are installing machinery in their branch factory for the manufacture of bodies and will soon have this department in actual production. Owing to the necessity of making the painting and upholstery departments scrupulously clean, new floors and sidewalls have been built in the workrooms of the six-story section of the Knox Motors building, which was leased for the purpose. A force of about 100 will soon be at work there under the management of George W. Kerr, superintendent of coach work, with N. H. Manning as assistant manager and purchasing agent, and Jules Olivier, body designer. At the main plant eight chassis a week are being made, and an increase to ten a week is contemplated when the coach department gets under way. It is stated that orders are now in hand sufficient to keep the factory running on full time through November.

OHIO JOINS N. M. A.

CLEVELAND, July 25—Trustees of the Ohio Automobile Association who met here last week, voted to resign membership in the American Automobile Association. The resignation was telegraphed to Washington, and the trustees then voted to affiliate the state body with the National Motorists Association, which is now made up of 450 clubs in twenty-three states.

Dyer Act Reduces Inter-State Theft

Department of Justice Recovers 2,120 Cars Since Passage in Oct., 1920

WASHINGTON, July 24—A total of 2120 automobiles, valued at $2,567,208 have been recovered by the Bureau of Investigation, United States Department of Justice, since the passage of the Dyer anti-theft automobile law in October, 1920, according to figures of the Bureau. The Department has investigated 2391 cases of stolen cars, involving 4385 persons. There were 2773 arrests made in connection with the theft of the mentioned number of cars, and of this number 1533 has been indicted and 1113 were convicted The average sentence was slightly more than two years in the case of each person indicted for the theft of an automobile.

In a great many cases the investigation was made in connection with the American Automobile Association, who is generally accredited in successfully supporting the anti-theft bill, introduced in Congress by Congressman L. C. Dyer of Missouri.

The outstanding feature of the law is the fact that it places inter-state transportation of stolen motor vehicles under federal law and makes such an action punishable in federal courts.

Before the passage of the Dyer act it was found that there had been built up a growing traffic in stolen motor vehicles by thieves who maintained assembly factories at various points, and who through their ability to transpose parts of various machines were able to so alter a stolen automobile as to make it practically unrecognizable to the original owner. Under the Dyer measure this practice has been materially lessened, says the Bureau.

Gets Locomobile; to Build the Flint

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he organized Durant Motors, that one of its plants would be located there. The factory will be similar in size to that built at Lansing for production of the Durant 4.

The Flint car will be a refinement of the so-called Chrysler Six which was to be manufactured in the huge Elizabeth, N. J., plant of the Willys Corp., which recently was taken over by Durant Motors. When Durant purchased this plant, he acquired the rights to the Chrysler car which had been designed at a cost of approximately $2,000,000. The car will be redesigned and made somewhat larger than the original model. It will include the seven bearing crankshaft and other special features.

The Flint will have its first showing September 15 and deliveries will begin January 1, 1923. It is named after the city of Flint where the main plant will be located.

Flint cars to meet the Eastern demand will also be manufactured at the Long Island City plant, which has been occupied by the Durant Motor Car Co. of New York to manufacture the Durant Four. The building of Durant Fours for the Eastern territory will be transferred to the Elizabeth plant, which is large enough to house both the Durant Four and the new Star.

With the addition of the Locomobile and the Flint to his line, Durant will have factories at Bridgeport, Conn., Long Island City, Elizabeth, Muncie, Ind., Lansing, Flint, Leaside (Toronto) and Oakland, Cal.

The Durant line will include the Locomobile, Durant Six, Flint Six, Durant Four and the Star. He also will control the new Mason truck which will be manufactured in its own plant at Flint and in the Locomobile plant at Bridgeport.

Durant achievements with the General Motors Corp. never were so spectacular as those which have attended the building up of Durant Motors, Inc., to its present size in almost exactly two years.

Locomobile Co. Started in 1899

NEW YORK, July 24—The Locomobile Co. of America, which has just come under control of W. C. Durant, dates its inception back to the first days of the automobile industry. The records show that it was incorporated in West Virginia in June, 1899, at which time the company was manufacturing a steam car, with Amzi Barber of asphalt fame as head of the concern. Barber and John Brisbane Walker bought patent rights from the Stanleys and each formed a separate company, Barber making the Locomobile at Newton and later moving to Bridgeport, while Walker started manufacturing the Mobile steamer at Tarrytown, N. Y.

After three years Barber turned to gasoline, and in the famous New York-Boston run of 1902, A. L. Riker made his appearance with the Riker gasoline car, which then was taken up by Locomobile and the manufacture of steam cars abandoned.

Locomobile started with a four-cylinder vertical motor, located well forward, which practice was adhered to for years. Riker, who had dabbled in electric automobiles and who came from the Electric Vehicle Co., became a dominant factor in the Locomobile company, which became a leader in the high priced class. As such it gained distinction in 1909 by being the first American car to win the Vanderbilt cup race.

Built Riker Truck

During the war the company brought out the Riker truck, which became one of the leaders in this field.

About two years ago Locomobile was included in the new organization, Hare's Motors, along with Mercer and Simplex. Last winter Locomobile withdrew from Hare's and in February went into a receivership which finally has been ended by the deal which has placed W. C. Durant in the presidency.

Milwaukee Reports Parts Demand Heavy

No Let-Up Apparent—Employment Still Increases—Apprehensive of Strikes' Effects

MILWAUKEE, WIS., July 24—Encouraging reports continue to come from the automotive industries of Milwaukee and Wisconsin. There has been no appreciable let-up in demand for engines, frames and parts generally; in fact, July delivery schedules are as urgent as in the last four to five months, and forward specifications are increasing as factories speed up production for the 1923 season.

In retrospect the situation as analyzed by the largest bank in Milwaukee in its monthly summary of business and financial conditions is better than it appeared currently. The July summary says in part: "In the motor field there seems to have been little or no slackening. Parts and accessories manufacturers generally showed increases in employment during the past month. One company making motors increased its working force from May to June. Its sales were 20 per cent better than in the previous month, and 100 per cent better than in June, 1921.

"The motor truck department of the automotive trades is making slow progress as compared with passenger cars, but it is away ahead of the record for 1921," is a significant paragraph in the report. It continues: "Firms making automotive switches, timers and other widely used equipment and accessories have been fully employed and some of them are sold up far ahead. Foundries appear not quite so active.

"The net increase in number of employees for all industries in Milwaukee during June was 2522, or 6.09 per cent; since Jan. 1, the net increase has been 6118, or 16.1 per cent."

So far the railroad shopmen's strike and the coal mining interruption have not had any marked adverse effect on the business of Milwaukee industries. However, much apprehension is expressed by manufacturers with steam power plants and also those using central station current from steam generation, over the possibilities of the situation next fall and winter unless the coal supply is greatly augmented without much more delay. Public utilities, including artificial gas and coke concerns, are showing considerable alarm as well.

STAR MOTORS GETS CHARTER

WILMINGTON, DEL., July 24—A charter has been issued to Star Motors, Inc., with a capital of $100,000,000, which will be a holding company and an acceptance corporation for the various Star enterprizes fathered by W. C. Durant. Star Motors will have branches in every state in the Union. The incorporators are W. C. Durant, C. P. Daly and Carroll Downes.

See South Good Mart for Business in Fall

Improved Cotton Crop Means Money for Cars Instead of a Lull

LITTLE ROCK, ARK., July 24—With the automobile business over the peak in the north, middle west and far west and a lull in sales expected for late July and August, the south, which has been trailing other sections in the volume of business done, is expected to reach its extreme buying power in late August and September.

Automobile sales in Arkansas have been unusually good during June and July, but other sections of the country have absorbed the output to such an extent that thousands of orders are on the books of dealers that are unfilled.

With the practical assurance of a good cotton crop, together with a fair price for the product, automobile factories should find an excellent outlet for a good portion of August, September and October production.

Ford dealers in this section are receiving less than 50 per cent of their requirements, with the result that many other cars in the low price class are being purchased by would-be Ford owners. Chevrolet and Overland dealers are selling all the cars they can get and taking orders for future delivery. Essex, Dodge, Oldsmobile and Oakland also are oversold, while many others are confining sales to cash purchasers.

Used car stock in the hands of Little Rock dealers, with one or two exceptions, are down to the lowest point in three years. Good used cars are bringing better prices than during the winter months and requiring less effort to sell.

If business slows up in other sections as expected, more automobiles will be sold in Arkansas during the fall and early winter months than ever in the history of the state. The cotton crop is estimated at from 1,000,000 to 1,200,000 bales, against 850,000 in 1921.

HUB PROSPECTS MANY BECAUSE OF THE STRIKE

BOSTON, July 24—Some of the Boston car and truck distributors have noticed that the strike has started people making inquiries about the possibilities of getting motor vehicles quickly, if necessary. In talking with dealers some of those looking for cars have seemed to figure out that in case the railroad strike grows worse and food commodities may be a bit curtailed it would not be a bad plan to own motor vehicles to go foraging. And one fellow plainly told a distributor that he was going to buy a car and motor down South for the winter with his family where, with wood enough around to keep warm, he would not be troubled with cold weather. Business men have been inquiring about trucks.

Tire Fluctuations Threaten Industry

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tive at once, reads the company's official statement.

Manufacturers admit they are unable to explain the steadily increasing demand for tires at a time when, according to all the laws of precedent in the automotive industry, it is reasonable to expect a seasonal slump in sales both to car manufacturers and to motorists.

In June many manufacturers began to watch the corners closely in anticipation of a July slump. But July orders exceeded not only expectations, but all previous records. And now manufacturers admit that there are no signs of any diminishing of sales for August, although a glance at the history of tire production for the past ten years shows July and August to have been low months both on tire production and sales for every year.

The Akron district to-day is turning out 105,000 tires a day—above the old 1920 short-lived peak just before the depression period came. The plans for extensive use of automobiles and motor truck caravans to handle commodity shipments, in event of a complete railroad tie-up, may be partially responsible for the mounting demand for tires, but even conceding this fact, the demand is abnormally high for this time of the year.

Goodrich reports that its sales for the last 60 days exceeded all previous records, and that June production was the heaviest in the company's history, with every prospect of July's business going far ahead of June's and making a new record with over 20,000 tires a day.

The Firestone Tire & Rubber Co. reports that it cannot meet the demand for tires. For the first eight months of the Firestone fiscal year, which ends next October 1, the company reports a net profit of approximately $5,000,000.

Goodyear continues its pace of 26,000 tires a day, and the Miller Rubber Co. is straining every department to exceed its present mark of 7500 casings a day, in order not to fall behind orders. The same holds true of smaller companies.

FORD'S IRISH PLANT EXPANDS

NEW YORK, July 24—Announcement is made that the Ford Motor Co. is expanding its Cork, Ireland, plant, so as to be able to ship parts to Manchester, Bordeaux, Antwerp, Cadiz and Copenhagen branches.

Charge Ford Wants Gift from Nation

Norris Denounces Muscle Shoals Offer—Claims Ultimate Aim to Build Automobiles

WASHINGTON, July 24—Characterizing Henry Ford as the head of a "piratical" corporation seeking from his bid for Muscle Shoals a "virtual donation of $14,500,000,000 from the nation," Senator George W. Norris (Rep.) of Nebraska, who has led the fight against the Detroit automobile manufacturer's securing possession of the project, delivered one of the bitterest denunciations ever heard on the floor of the Senate.

The occasion for Senator Norris's remarks was the presentation to the Senate of the majority report of the Senate Agriculture Committee, which has voted 9 to 7 against accepting Ford's offer to take over the Muscle Shoals project. The crux of the Committee's fight waged around Ford's refusal to sign a contract not to make automobiles at the Alabama project.

It was charged by Senator Norris that Ford sought to gain possession of the water power potentialities, which it is said are greater than any project in the world, with the ultimate aim of making automobiles. The Detroit manufacturer was assailed both as to his motives and for his offer to buy the project on "unreasonable terms, and in addition demand that the government furnish all the money for its development and the taxpayers of the country taking all the risk," Senator Norris declared.

Ford Adherents Attacked

Ford's adherents were severely attacked by the report as constantly throwing up barriers to any proposal, government or otherwise, for development of Muscle Shoals other than the Ford bid.

It was charged by Senator Norris that an attempt was being made by Ford to obtain the "greatest gift ever bestowed upon mortal man," and asserted that the public has been victimized by propagandists into believing the Ford proposal a just and fair one. Little merit is seen in any phase of the Ford offer by the majority of the committee. This is particularly true of the 100 year lease term demanded by the Michigan automobile manufacturer.

Huge Cash Gift

Senator Norris said:

"Assuming that a fair interest rate in the commercial world is 6 per cent interest, this would give this corporation during a 100 year period a total gift of cold cash of $236,250,000, and if this money were compounded, as Ford asks the government to compound what he pays, the profits to the corporation at the end of 100 years would be $14,500,000,000. This is more than half our total cost of the world war."

To Use Duralumin in Goodyear Ship

Largest Semi-Rigid Dirigible Ever Designed in U. S. Will Be Built at Akron

AKRON, OHIO, July 24—Duralumin will be used in the construction of the new government semi-rigid dirigible, by the Goodyear Tire & Rubber Co. of Akron, aeronautical engineers of the company announce.

The ship will be the largest semi-rigid dirigible ever designed and constructed in the United States and will be 290 feet long, with a capacity of 700,000 cubic feet of gas. It will be designed and built to carry helium gas in place of hydrogen gas. The bag will be 71 feet in maximum diameter. The ship will be equipped with four Liberty motors and two propellers in conjunction with two reduction gears for the purpose of getting higher propeller thrust efficiency.

The keel of the ship will be entirely of duralumin. The keel will be of triangular cross-section running from nose to tail, with a large structural nose cone and fixed tail surfaces all built into the keel, the idea being that considerable support will be gained from this structural backbone of the ship, thereby reducing car flying pressures.

The ship will have two gas compartments and two air compartments. It will have a speed of 70 miles an hour and will carry 15,000 pounds of gasoline.

The ship will have a crew of 12, with complete facilities for carrying 20, including six sleeping bunks, electrical cooking facilities and many of the conveniences common to modern ocean-going vessels. It will carry three cars—the forward one being 50 feet long and 8 feet wide. The two power cars, each equipped with two Liberty motors of 400 horsepower each will be 20 feet long and 6 feet wide. All cars will be constructed entirely of duralumin members covered with duralumin sheeting. The total horsepower will be 1600. The motors, however will be throttled to reduce this to about 1200 horsepower for the purpose of increasing the durability of the engines. Facilities will be provided for free communication between the three cars through a passageway through the keel of the ship.

Means of getting on top of the huge gas bag will be provided through a vertical shaft 70 feet long, and a machine gun will be mounted on the top of the envelope to assist in protecting the ship during flight. Three other machine gun nests will be located in the lower part of the ship.

M. A. M. A. PLANS FALL MEETING

NEW YORK, July 24—Plans made for the fall convention of the Motor and Manufacturers Association, which will be held in Buffalo, Sept. 13, 14 and 15, call for special sessions of the credit managers, advertising managers, traffic managers and export managers at the Hotel Lafayette. President E. H. Broadwell will preside at the general session. Ezra W. Clark, chairman of the advertising managers council of the association, will preside at the session for advertising managers; W. O. Rutherford, first vice-president, will be chairman of the export meeting; Herman Deuster, manager of the traffic department of the association, will handle the meeting of the traffic experts.

Plans for the meeting of the credit managers are in charge of a committee headed by C. A. Burrell, manager of the association's credit department.

The third day will be given over to a field frolic of outdoor sports, which will be in charge of O. J. Rohde, vice-president of the Wire Wheel Corp. of America, and a committee made up of Buffalo members.

Milwaukee May Have Fokker Air Concern

MILWAUKEE, WIS., July 24—Latest developments in the Milwaukee campaign to secure the location of a new aircraft enterprise sponsored by A. H. G. Fokker, noted Dutch designer and manufacturer, are that a committee of fifty prominent business men is engaged in raising a $100,000 fund. This will be used to make a survey to determine the possibilities of aerial transportation in the United States and the merits of Milwaukee as the center of operations, both for production and for passenger and commercial transportation.

Fokker departed from Milwaukee to sail from New York. His confidential adviser, Frits Cremer, will conduct the survey financed by Milwaukee capital.

Fokker said:

If the report on this survey is favorable and if Milwaukee will provide a good terminal with land and water facilities and an adequate factory site, I will make Milwaukee my future headquarters and move here from Amsterdam and New York, where I now have factories and offices. I note that enough money already has been raised to assure the completion of the fund and make it advisable to start actual work within 10 days.

NASH SALES MAKE RECORD

KENOSHA, WIS., July 24—In the six months ending June 30 Nash Motors Co. sold more passenger cars than during the entire year of 1921. This also is the largest half year of business in the history of the Nash company. The factory still is behind on orders, and indications point to a continuance of the heavy demand throughout the summer months. Additions now are being made to the four cylinder plant in Milwaukee which, when completed, will enable the company to catch up some on orders. This new building is to be 600 feet long by 100 feet and three stories high. At the same time the Nash Six plant in Kenosha will be in a position to increase its production to a point commensurate with orders received.

Strikes Threaten to Check Output

Rationing of Power Near—Factories at Capacity While Supplies Last

DETROIT, July 25—Increased delay in the receipt of coal, steel and other materials because of the strike situation will lead to a severe curtailment of automobile production in this district unless prompt steps are taken to relieve conditions. The Detroit Edison Co. has awaited the outcome of the conference in Washington before deciding upon the necessity of rationing its power. Unless it can be assured of a coal supply, the company will in all likelihood be compelled to cut off its power from all but essential industries. This curtailment of service will not occur within two weeks, but it is practically certain to come by that time, as the company is now operating with not more than 45 days' coal supply.

All of the smaller Detroit automobile and truck manufacturing companies and parts and material makers buy their power from the Detroit Edison Co. Factories like Ford, Dodge, Packard, Maxwell, Cadillac, Continental Motors and Timken Axle produce their own power and will be able to run beyond this point. The absence of small but essential parts, made by the smaller companies will make their operation futile, however.

All companies have been delayed in getting deliveries of steel, manufactured or raw, for the past sixty days, but this situation has only now become acute. The former three day service from Pittsburgh and other steel producing points has been prolonged to ten days and more.

The time required for the switching and placing of cars for unloading has been quadrupled.

Embargoes on all but perishable goods in some parts of Ohio has required the use of trucks to transport materials and parts to lake ports from whence they are brought to Detroit by boat and then delivered by truck. The boat service between Detroit, Cleveland and Buffalo has been reduced to only night sailings owing to the coal shortage, and there is a possibility of this being suspended entirely. In this event factories are preparing to ship their materials the full distance by truck.

Driveaways of finished cars and trucks have not materially increased owing to the availability of freight cars for shipping and the continuance of some service by the boats.

Practically every factory in Detroit still is operating at capacity. There has been no laying off of help because of falling demand, and indications are that there will be none unless it becomes impossible to operate owing to lack of materials. There are fair quantities of most supplies in stock. There is no factory, however, in position to continue manufacturing for more than thirty days should supplies cease.

Men of the Industry and What They Are Doing

Haynes Going to Europe

Elwood Haynes and Mrs. Haynes will sail for Europe on Aug. 1 for an extended tour of England and the Continent.

Anderson Quits Duesenberg

Harry W. Anderson has resigned as general sales manager of the Duesenberg Automobile & Motors Co., Inc., of Indianapolis. He has made no plans for the future.

Westman Leaves Kant Kut

E. E. Westman has resigned as treasurer of the Kant Kut Tube Products Co., Indianapolis, Ind., to take effect Sept. 1. For several years before assisting in the organization of the above company he was purchasing agent of the Cole and Premier companies. Future plans have not yet been announced.

Appleton Adds to Duties

Robert W. Appleton, production engineer of the Pierce-Arrow Motor Car Co., has been appointed manager of purchases of the company. Appleton will also continue his duties as production engineer. He has been identified with the Pierce-Arrow factory for more than twenty years.

Haynes Advances Tway

The Haynes Automobile Co. announces the appointment of Charles W. Tway to the position of Southern district sales manager. Tway was for ten years a Haynes distributor for the twelve Southern states he will now travel. Headquarters will be maintained at Atlanta, Ga.

Mills to Head Fisher Pontiac

Fisher Body Corp. of Detroit, which recently purchased the O. J. Beaudette Body Co. of Pontiac, announces that Franklin E. Mills will be made general manager of the Pontiac division. Mills has been associated with O. J. Beaudette in body manufacture for the Ford Motor Co. for many years. When the sale was made he was secretary-treasurer of the Beaudette company, and was active in the management of the plant. It is announced that there will be no further change in the personnel of the plant.

Quigley Sent to Toronto

Arthur H. Quigley, assistant general manager of the Kenosha works of the American Brass Co. division of the Anaconda Copper Co., has been transferred to Toronto, Can., as general manager of Canadian interests, the Bronze, Brass & Copper Rolling Mills, Ltd. It is stated on excellent authority that this transfer means the generous enlargement of the Toronto mills to embrace other departments of the brass industry, so that Canadian requirements may be filled. Quigley began work with the American Brass Co. at Torrington, Conn., then the Coe Brass Co., in 1902, as a clerk. He was transferred to Kenosha in 1910, and in 1917 was promoted to assistant general manager.

Cletrac Promotes Soule

Cleveland Tractor Co. announces the appointment of Edward Soule as foreign sales manager with headquarters at the Cleveland offices. From a career as an attorney-at-law, Soule joined the Studebaker Corp.'s foreign department and later held the position of assistant foreign sales manager of the Cleveland Tractor Co. He held this position from the beginning of 1917 until his recent promotion.

Ungar Representing Liggett

G. A. Ungar, consulting engineer and Eastern representative for several automobile parts manufacturers, has been appointed Eastern representative for the Liggett Spring & Axle Co., Monongahela, Pa.

Clark to Represent Davis

Fred B. Clark of Los Angeles has been appointed Pacific Coast representative of the George W. Davis Motor Car Co., manufacturer of the Davis. Clark is widely known to automobile dealers and distributors in that territory.

Murray Promotes Shanahan

J. W. Murray Mfg. Co., Detroit, announces the appointment of George D. Shanahan as general manager of the Detroit plant. Shanahan has been with the company since its inception, and has held the positions of plant follow-up, production manager, and assistant general manager. J. W. Murray and J. R. Murray will continue to have active interest in the Detroit organization.

Crawford Now General Manager

Steel Products Co., Cleveland, announces that F. C. Crawford, formerly sales engineer for the company's plants, has been appointed general manager of the Detroit plant. Crawford succeeds H. B. Garman, who has become works engineer for all the plants, including the main plant in Cleveland and subsidiaries.

Cathcart Leaves Packard

Thomas Cathcart has resigned as head of the advertising staff at the Packard Motor Car Co. to become manager of the Promotional Department of the Crowell Publishing Co., New York. No successor to Cathcart has been named by Packard officials.

Wiggins Joins Holt

E. R. Wiggins, formerly with the Chilton Co. of Philadelphia as technical editor of a tractor journal, has joined the sales department of the Holt Mfg. Co., Peoria, and will do special work as a sales engineer. Wiggins has in the past been connected with the J. I. Case Threshing Machine Co., Aultman & Taylor Machinery Co., and Deere & Co., in their various engineering and experimental departments.

Christensen With Carl Pick

E. G. Christensen has resigned as vice-president of the Ryan Sales Engineering Co. of Detroit, and has accepted the position of sales manager of the Carl Pick Co. of West Bend, Wis., manufacturers of universal joints and propeller shafts.

Schuyler Leaves Scintilla

William A. Schuyler has resigned as president and general manager of the Scintilla Magneto Co., Inc. Schuyler, a native of Switzerland, first became connected with the ignition industry when with the late Edouard Nieuport, inventor of the Nieuport aeroplane. He represented the Nieuport interests in this country. Later on he introduced the Simms magneto on the American market. Also he was European sales representative of the General Motors Export Corp. Schuyler will soon leave on an extended business trip to Europe.

Standard to Market Four Cylinder Model

BUTLER, PA., July 25—The Standard Motor Car Co. will soon be ready to market a four-cylinder car, which will be a companion to the Standard eight. The new Standard factory buildings recently completed at the Butler, Pa., plant are well appointed to take care of volume production. The main assembly building stories and equipped with track system is 800 feet long, 200 feet wide, two of progressive assembly.

COATS DENIES STEWART RUMOR

CHICAGO, July 24—George A. Coats, head of the Coats Steam Car Co., denies a report from Columbus, Ohio, that his corporation has been taken over by the Stewart Motor Car Co. The Coats Steam Car Co. is a selling organization controlled by Coats to market steam passenger cars, trucks, buses and a special light delivery wagon.

The Stewart company is a manufacturing concern which has been licensed to produce, under the Coats design, a car which will sell at $1,085. It is one of a group of manufacturing companies which are expected to make the various Coats products.

Allan Ryan Files Bankruptcy Papers

130,000 Stutz Shares, Given as Collateral, May Be Sold by Bankers

NEW YORK, July 24—The personal failure of Allan A. Ryan has been recorded through a voluntary petition in bankruptcy filed here, with liabilities fixed at about $18,000,000 and assets at $643,533. Secured claims, held mostly by the financial institutions, amount to about $14,000,000. The principal creditors are the banks which took over the management of Ryan's affairs following the famous Stutz corner of 1920. The brokerage house of Allan A. Ryan & Co. and his other business interests are not affected.

Ryan has figured most prominently in the automobile industry through his financial support of Stutz, Stromberg carbureter, Bethlehem Motors and the Times Square Auto Supply Co.

Shares Control Stutz

Francis G. Caffey, receiver for Ryan, will appear before Judge A. N. Hand of the United States District Court next Monday and question the right of the Guaranty Trust Co. to offer at an auction sale on Aug. 2 the 130,000 shares of Stutz stock, which Ryan had posted as collateral for loans. The receiver desires a private sale.

The scheduled auction is based upon Ryan's trust agreement with the Guaranty Trust Co. covering more than $11,000,000 of the $14,000,000 secured claims. The referee's attorney now is scrutinizing this agreement to determine if the auction can be stopped. If it is the standard form of agreement, a stay cannot be granted, for the recognized law in such a case was laid down by the Circuit Court of Appeals in 1907, when it was ruled that the pledgee has the right and cannot be stayed from selling collateral held by it under a trust agreement couched in the ordinary phraseology of such agreements.

Interest in the receiver's proposed action is intensified by the fact that these 130,000 shares mean the control of the Stutz company, there being only 200,000 authorized shares of Stutz issued. At auction, it is felt, the stock would not bring the returns that a private sale would.

May Form Syndicate

Rumor has it that there may be a syndicate formed for the purpose of taking over this Ryan stock because of the company's present financial strength and earnings. John J. Watson, Jr., of New York, one of the Stutz directors, estimates $40 a share as the present value of Stutz stock, an opinion based on the company's report on Dec. 31, 1921, which reported assets and liabilities on the basis of $6.71 of the former for $1 of the latter. At that time the net current assets totaled $2,038,000, and the net current liabilities $302,000. Watson also asserts that at the present time the company has no bank loans and no mortgage on the property.

Whether or not the directors of the Stutz company will unite to take over the Ryan shares interests the financial district at the present time. A special meeting of the board will be held to consider the situation.

In automotive circles there has been considerable speculation over the possibility of W. C. Durant acquiring the Stutz property if control can be obtained at an attractive price. Durant and Ryan are close friends and neither has any affection for Wall Street. It was said at Durant headquarters that so far as known Durant has not given serious consideration to this suggestion.

Selden-Atlas Merger Declared Operative

NEW YORK, July 26—The merger of the Selden Truck Corp. and the Atlas Truck Corp. has been declared operative, and the Industrial Motors Corp., which is to take over the two companies, has been organized under the laws of the State of Delaware with an authorized capital stock of 1,000,000 shares of no par value.

John J. Watson, Jr., president of the new company, said that no new financing would be necessary. The balance sheet of the combined company will show assets of $2 to each dollar of liabilities, Watson said, adding that the Atlas company had virtually no liabilities and the Selden company only about $1,000,000. Numerous companies have made application to be included in the combination, but these will not receive consideration until the organization of the parent company has been completed.

MERGER PLANS COMPLETED

DETROIT, July 24—Details of a merger of the Detroit Lubricator Co. with the American Radiator Co. have been agreed upon, according to a notice to stockholders of the lubricator company. Under the terms it is proposed to exchange the $600,000 common stock and $300,000 preferred stock outstanding of the lubricator company for $3,600,000 shares of a new series preferred stock of the American Radiator, on a basis of four for one, and making $3,600,000 involved in the deal. If the merger is consummated the Americal Radiator will have three plants in Detroit. Part of the plant of the present lubricator company will probably be used for the making of ice machines.

COLE ANTICIPATES DEMAND

INDIANAPOLIS, July 24—Anticipating a good fall business, the Cole Motor Car Co. expects to have its factory running to full capacity by Aug. 1. Orders are coming from all parts of the country and at the present time the company has more orders ahead than at any time in two years.

Price Maintenance Law Cases Dropped

Involved Manufacturers' Right to Fix Retail Prices—No Complaints Pending Adjudication

WASHINGTON, July 25—Formal complaints against seven automobile accessory and tire manufacturing companies were dismissed to-day by the Federal Trade Commission, all of them charged with violations in respect to the resale price maintenance laws. The cases were dismissed by the government, without prejudice to its case, pending the final decision of the Beechnut Packing case, which was selected and advanced by the Federal Trade Commission as a test case.

The cases involve the right of a manufacturer to fix the resale price of manufactured goods. Pending the final adjudication by the United States Supreme Court the Commission has announced that no further complaint against manufacturers who manufacture a commodity and fix the retail prices will be made.

The seven companies against which the government dropped its prosecution are as follows:

Kryptok Sales Co., New York City, lens manufacturers; Curtis and Co. Manufacturing Co., and Curtis Pneumatic Machinery Co., St. Louis, Mo., accessories; Goodyear Tire & Rubber Co., Akron, Ohio; Klaxon Co., Newark, N. J., automobile horns; J. H. Haney & Co., Hastings, Nebraska, tire pumps; Marshall Oil Co., trading as Tungsten Mfg. Co., Marshalltown, Iowa, spark plugs, and The Denver and J. E. Hunt & Co., Baltimore, automobile belt manufacturers.

More Claims Against Standard Parts Filed

CLEVELAND, July 24—Frank A. Scott, receiver for the Standard Parts Co., has reported to the United States court here that there have been filed with him, in addition to the regular claims, contingent claims for work in process and for breach of contracts, in the sum of $1,463,077. These claims were cut down $811,117 and a total of $651,960 has been allowed to these creditors. The total of all claims allowed by the receiver against the company is $9,755,531. To date a total of 25 per cent of the face value of these claims has been paid.

ACASON IN RECEIVER'S HANDS

DETROIT, July 24—Acason Motor Truck Co., Inc., has been placed in the hands of Val H. Kendall as receiver pending adjudication in bankruptcy proceedings instituted by merchandise and bank creditors in Federal Court here.

An appraisement of the assets of the company is now being made by the receiver. The company is declared to have a considerable number of orders on hand and accounts receivable on its books of $58,000.

Railroad Priorities Hit Motor Industry

Automotive Interests Placed in Lowest Classification by Interstate Commerce Commission

WASHINGTON, July 26—Restriction of production by automotive industries is seriously threatened as the result of the car service orders of the Interstate Commerce Commission and plans of the Hoover committees for the distribution of coal. For the purpose of meeting the existing emergency, declared by the commission, automotive industries are automatically placed in the fifth and lowest classification of "other purposes" with regard to plants which are to be served by railroads east of the Mississippi river. The same classification has been given to gasoline, while fuel oil is placed on the preference list for the movement of traffic.

Problems of Handling Coal

If the railroads serving automotive plants can supply their requirements as to incoming shipments of coal and other raw products or can handle their outgoing finished products without interfering with shipments of products on the preferred list, the normal movement will be maintained. But it is not believed that such a movement can be sustained uniformly.

Ruling May Disturb Makers

The acute situation growing out of coal shortage and the necessity of rationing fuel to the favored sources of consumption has caused the commission and the Hoover committee to adopt plans that, it is believed, will be a source of great disturbance to automotive makers. Their plants cannot be operated without coal, and it is plain under the rigid program of the government it will, if necessary, cut off shipments to all consumers not on the preferred list and divert shipments from their plants as they see fit, or even by shutting off the car supply prevent shipments.

While it is too early to say that such a drastic course may be necessary, the fact remains that the possibility of such a condition exists. Under the government plans it can take any or all shipments of coal to plants not on the preferred list, regardless of contracts or agreements, a fact which indicates the sweeping powers of the commission.

Trucks to Haul Gasoline

The elimination of gasoline from products to be given preferred movement means that shipments from refineries, if railroad cars are required for other purposes, will have to be moved on motor trucks. The greater portion of gasoline, however, comes from the mid-continental fields, such as those of Oklahoma and Kansas over lines not affected by the order. It also is recognized that the railroads haul only about 27 per cent of petroleum and its products. But plans for mobilizing motor trucks to handle traffic of various kinds will call for increased shipments of gasoline, and it may be found necessary to give it a preferred movement.

Cadillac Putting Out New Type Closed Body

DETROIT, July 24—A new type of body termed a Victoria but resembling a coupe in its general characteristics is now being put out by the Cadillac Motor Car Co., on its type 61 chassis. The new model, which seats four passengers, has been altered in dimensions to give the effect of greater length and less height. The interior has been considerably enlarged to provide more room for the occupants. The seats are longer and the driver's seat is now placed in such a way that it is directly behind the steering wheel. The auxiliary folding seat, which is beside the driver's seat, is so arranged that it gives added leg room for the person occupying it. The rear seat has also been lengthened and widened.

The interior appointments have been refined by the use of new types of pull-to handles on the doors and other fittings. The features in the former Victoria model have been continued. These include rear corner lamps, parcel compartment directly behind the driver's seat, foot rest, cigar lighter, leather panel sun visor and the rear deck compartment which is large enough to accommodate a small trunk, several bags, golf clubs or fishing kit. The price on the new Victoria is $3,875, f.o.b. Detroit.

WILLYS CORP. RECEIVES REPORT

NEWARK, N. J., July 24—Receivers for the Willys Corp., filing their report of conditions resulting from the financial difficulties of the corporation in the United States District Court, state that the total amount of judgment approved for payment is $663,388. The mechanics' liens, which have been filed but not reduced to judgment, do not exceed $1,200,000. It also is stated by the assistant district attorney that the Government has a claim against the Duesenberg Motors Corp., whose stock was taken over by the Willys Corp., the amount not being announced. As yet the receivers have not been notified of it.

BUICK PLANS BIG YEAR

DETROIT, July 27—The Buick Motor Car Co. has set the biggest schedule in its history for the fiscal year beginning August 1. The largest previous year the company has had was 130,000 and the total output for the fiscal year just ended was 100 000. The company is preparing to launch a vigorous sales and advertising drive that will continue throughout the year, $2,000,000 having been set aside for advertising purposes.

Small profits and large sales will be the business policy of the entire General Motors organization. It is persistently reported that the prices of the 1923 models displayed this week, will be somewhat lower than in the 1922 line.

Lafayette to Move Plant to Milwaukee

New Factory, Next to Nash's, Will Be Operating First of Year

INDIANAPOLIS, IND., July 26—The Lafayette Motors Corp. of Indianapolis will transfer its operations to Milwaukee the latter part of this year, according to an announcement made to-day by Charles W. Nash, president of the company, thereby benefiting by a closer association with the Nash group of industries of Kenosha and Milwaukee, of which it is financially a unit.

Land has been acquired adjacent to the Milwaukee Nash factory, and work will start immediately on a model plant for the exclusive manufacture of Lafayette cars. Nash predicts that the company will be housed and operating in the new factory by the first of the year.

"The Lafayette has been greatly handicapped for space in its present plant," Nash said, "and this handicap will become much more serious as the company's production increases, thus making necessary an increased capacity either here of elsewhere. In view of these conditions and the desirability of a closer geographical co-ordination of all Nash activities, it seemed logical to the directors of our company to establish the Lafayette in a new plant in Milwaukee, even at the sacrifice of the many advantages which have been found in Indianapolis. The new Milwaukee plant will triple the present manufacturing capacity of the company.

"In its new location the Lafayette Motors Corp. will preserve its independent operating integrity, and the management will remain the same. It is naturally the intention to retain the entire organization as thoroughly intact as possible. We are committed definitely to the policy of producing in the Lafayette a car of the highest quality, and the new plant has been laid out with the manufacturing requirements of such a car carefully in mind.

"The Lafayette business has now reached a point where we are able to determine an operating program with some accuracy. While the new plant will take care of all anticipated expansion for the next few years, it will not be too large, with a consequent burden of expense. Every advantage developed up to date, both for manufacturing efficiency and accuracy of workmanship, essential to a car of this standard, will be provided. The location is near the main line of the Chicago and Northwestern Railway.

"Plans have been made to reduce to a minimum the interim between the operations in the present plant and the new one. The lapse in production should be very slight."

It is reported that tentative negotiations are already under way for the sale of the present Lafayette property.

Oldsmobile Reduces List on Two Lines

Prices Also Lowered by Velie and Leach Biltwell—Goodrich Cuts

DETROIT, July 27—Lower prices on the Oldsmobile eight and four-cylinder lines are effective July 30, the reductions on the eight ranging from $100 to $150, and on the four from $30 to $50. Prices on the large eight and the Oldsmobile Economy truck are unchanged. Comparison of new prices and old is as follows:

8 Cylinder	New	Old
Touring and roadster..	$1,495	$1,595
Sport	1,725	1,825
Coupe	1,995	2,145
Sedan	2,145	2,295
4 Cylinder		
Touring and roadster..	1,095	1,145
Semi-sport	1,225	1,265
Calif. top tour.....	1,395	1,425
Coupe	1,595	1,645
Sedan	1,745	1,795

Goodrich Cuts Line 10 to 15 Per Cent

NEW YORK, July 24—New Goodrich tire prices announced July 20 are as follows:

CORDS

	New Price	Old Price
30 x 3½ cl.....	$13.50	$18.00
32 x 3½ s.b.....	22.95	25.50
31 x 4 s.b.....	26.45	29.40
32 x 4 s.b.....	29.15	32.40
33 x 4 s.b.....	30.05	33.40
34 x 4 s.b.....	30.85	34.25
32 x 4½ s.b.....	37.70	41.90
33 x 4½ s.b.....	38.55	42.85
34 x 4½ s.b.....	39.50	43.90
35 x 4½ s.b.....	40.70	45.20
33 x 5 s.b.....	46.95	52.15
35 x 5 s.b.....	49.30	54.75

FABRICS

	New Price	Old Price
30 x 3 "55".....	$9.65	$10.35
30 x 3½	10.65	10.90
32 x 3½ s.b.....	16 30	19.15
32 x 4 s.b.....	21.20	24.95
33 x 4 s.b.....	22.35	26.30
34 x 4 s.b.....	22.85	26.85

BURN OIL TRACTOR CUT

WARREN, IND., July 24—The price of the Burn Oil Tractor, manufactured by the Burn Oil Tractor Co., has been reduced from $1,435 to $1,395.

KALAMAZOO TRUCK REDUCED

KALAMAZOO, MICH., July 24—A price change has been announced by the Kalamazoo Motors Corp. effecting their model G-1, 1½ ton, the price being reduced from $2,495 to $1,800.

WALTER ADDS NEW MODEL

NEW YORK, N. Y., July 24—The Walter Motor Truck Co. has added a new model to their line. The specifications are as follows: Walter, M 2½ ton, motor 4½ x 5¾, tires 36 x 4, 36 x 8, double reduction drive, and is priced at $3,850.

1,148,788 VEHICLES SIX MONTHS' OUTPUT

WASHINGTON, July 26—Figures compiled by the Department of Commerce from reports made by approximately ninety passenger car manufacturers and eighty truck manufacturers show a total of 1,148,788 motor vehicles produced in the first six months of 1922. Trucks made in the first half numbered 114,058, or almost exactly 10 per cent of the total.

June production totaled 287,875, of which 261,963 were passenger cars and 25,912 were trucks.

Production figures by months follow:

1922	Passenger Cars	Trucks	Totals
January	81,693	9,344	91,037
February	109,170	13,121	122,291
March	152,959	19.651	172,610
April	197,221	22,227	219,448
May	231,724*	23,803*	255,527
June	261,963	25,912	287,875
Grand Total..	1,034,730	114,058	1,148,788

*Revised

LEACH BILTWELL PRICES DOWN

LOS ANGELES, CAL., July 22—The Leach Biltwell Motor Car Co. has announced a price reduction of $1,000 on all their models. The standard price for all cars now being $5,500.

VELIE PRICES LOWER

MOLINE, ILL., July 22—Velie Motors Corp. announces a price reduction on Model 58 open body types as follows:

	Old Price	New Price
2 pass. roadster	$1,395	$1,275
5 pass. touring	1,395	1,275

GRAMM-PIONEER REDUCED

LIMA, OHIO, July 24—A complete revision of prices has been announced by the Gramm-Bernstein Motor Truck Co. affecting the whole line of Gramm-Pioneer trucks with the exception of one model. The price changes are as follows:

Model	Capacity	Old Price	New Price
10	1-ton	$1,365	$1,245
15	1½-ton	1,900	1,750
65	1½-ton	2,500	2,250
20	2-ton	2,925	2,475
30	3-ton	3,275	3,300
40	4-ton	3,995	3,850
50	5/6-ton	4,895	4,450

The model 75-P, 3½-ton remains unchanged at $4225.

AIR MEET POSTPONED

CHICAGO, July 24—The aviation meet, air craft exhibition and aeronautical congress, which was to have been held here Aug. 4 to 13, has been postponed until a time to be announced later, according to an announcement made by Charles S. Rieman, president of the Chicago Aeronautical Bureau.

Suggest Financing Chinese Highways

Would Open Up Automotive Market—Survey Shows Vast Potentialities

WASHINGTON, July 22 — American financing of good roads in China has been suggested to the Automotive Division of the Department of Commerce by attaches of that Department in China as a means of creating a market there for automobile exports. China offers the greatest potentialities of any country in the world for the import of automobiles, which is dormant, due to bad roads.

A survey of the automotive market, sent to the Department, states:

The Chinese are doing their best to construct new roads and create markets for mechanical transportation. A highway loan to China of say $100,000,000 would build 20,000 miles of new roads and provide a market for automotive products which would soon exceed the original investment.

The national government has just taken up the question of good roads, which is being continually agitated, and has promulgated rules for the improvement of highways. Some of the provinces have also considered the matter.

The co-operation of the American motor car manufacturers and manufacturers of road materials for the purpose of extending credits for the construction of roads in China would be one of the most important steps in the extension of the American automotive trade.

Motorcycle Prices Have Been Reduced

NEW YORK, July 24—Heavy price cuts have been announced by three leading motorcycle companies on their 1923 models which have just been introduced. The Excelsior Motor & Mfg. Co. of Chicago has reduced prices on the Excelsior Twin and on the Henderson De Luxe as follows:

	Old Price	New Price
Excelsior	$365	$310
Henderson	475	398

The Ace, another four-cylinder machine, has been cut from $435 to $335. It is made by the Ace Motor Corp. of Philadelphia.

The price of the Nearacar has been brought down from $225 to $185, making this machine now equal in price to the Cleveland.

Other motorcycle price cuts are expected within the next two weeks. The other leading twin-cylinder jobs will probably be priced somewhere in the neighbo hood of the Ex.elsior, when new models are announced.

BOSCH IMPORT BAR LIFTED

NEW YORK, July 24—It is announced by the Australian Department of Trade and Customs that the prohibition of importation into Australia of goods bearing the word "Bosch" has been removed.

Manufacturers Lax in Foreign Trade

Department of Commerce Sifts Complaints and Gives Hints for Procedure

WASHINGTON, July 25—The American automobile manufacturers' and exporters' methods of making sales in foreign fields are not redounding to the credit of the U. S. automobile industry, according to letters received by the Department of Commerce from foreign and prospective buyers.

Hundreds of letters are received weekly by the Department from foreign dealers, jobbers, importers and actual purchasers of automobiles, asking for information on American makes of automobiles. Many of the letters contain complaints that the automobile which they desire is sold in their locality by representatives or agents who have not given them satisfactory service through some fault or another. To each of these letters the Department makes replies and immediately takes it up with the automobile manufacturer concerned.

Faulty Approach of Buyer

The largest difficulty of the American exporter of cars to foreign countries, as revealed by the correspondence to the Department is the faulty approach of the foreign buyer.

M. H. Hoepli, acting chief of the automotive division of the Department, whose duty it is to read and answer the foreign correspondence of the division, has made some observations, which, it is believed, will prove of value and interest to the American exporter in his method of approach and in overcoming the foreign competition which is growing more and more marked, the letters indicate.

"Obstacles"

These "obstacles" Mr. Hoepli has summed up as follows:

One-third of the replies were written in an unmistakable tone of condescension, as if the American firms soliciting automobile business were conveying a favor to the foreign inquirer. This method of approach is particularly out of place in Latin countries.

One-third of the solicitations, while not containing any information as to the standing, size and activities of the concern making the offer, stress the fact that they had been in business for a number of years, whereby it was assumed that the prospect in the foreign country did either know all about the American manufacturer or would go through the trouble of securing the necessary data.

One-third of the offers did not contain any information whatever concerning the American firms from which they originated, except in catalogues sent under separate cover.

One-seventh of the letters of solicitation informed the inquirers of the goods that were offered. The other six-sevenths either had to guess or write again for the desired information.

While the foreign inquirers requested c.i.f. quotations, seaport, one-fifth of the American manufacturers only were able to give the desired quotations, while an equal number of firms did not quote any prices at all.

Less than one-fourth of all offers only made mention of letters of credit as a method of payment and a great many of the prices on trucks and passenger cars were f.o.b. factories.

Contrasted to the American method of doing business in some instances with the foreign exporter, the Department states that the thoroughness with which the export business is carried on by competitors of ours makes it imperative that such warning be heeded, especially by new exporters in the automotive field.

It is reported that in similar instances European competitors have quoted prices either in local currency, out of local stocks, c.i.f., local seaport and are either extending from 30 to 90 days credit or else define how letters of credit should be drawn. Under such competition, the Department points out, it is necessary for the American automobile manufacturer to enter the field equipped or lose the business.

New R. & L. Gasoline Cabs in Production

CHICOPEE FALLS, MASS., July 27—A gasoline-engined taxicab to be known as the R & L cab is now being produced by Rauch & Lang, Inc., well known as manufacturers of electric vehicles. At the present time 25 of these cabs are going through the factory, and plans have been made to manufacture 250 of these vehicles at the rate of 50 a month beginning in September. Two body styles are offered—one a limousine at $2,350 and the other a limousine-landaulet at $2,475. The bodies are built by Rauch & Lang and are ruggedly constructed, as they have been specially designed for taxicab service.

The new cab is assembled of standard parts. The engine is a four-cylinder counter-balanced Buda, with cylinder dimensions of 3¾ x 5⅛ in. Other standard units used are Brown-Lipe clutch and gearset, Standard Parts axles, Robert Bosch magneto and Gray & Davis lighting generator. The wheelbase is 112 in. Disk wheels and 32 x 4 in. non-skid cord tires are standard equipment.

The cabs will be sold through selling agents who are being appointed in half a dozen of the larger cities. These agents will act entirely independently of the sales organizations handling the electric vehicles manufactured by this company.

ARGENTINE SHOW ANNOUNCED

BUENOS AIRES, ARGENTINA, July 3 (*By Mail*).—Directors of the Automovil Club Argentino have announced that the forthcoming annual automobile exposition will be held during the first half of November and that it will be opened for ten days. As in past years, the showing will be open to passenger cars, trucks, tractors, tires, parts and equipment, motorcycles, bicycles, and aviation and marine engines.

Truck Trains Pooled to Aid Washington

More Than 500 Merchants Combine to Supply City with Fuel and Food

WASHINGTON, July 26—Automotive transportation will be employed by Washington merchants in supplying the city with the necessities of fuel and food, under a plan already agreed upon and made public to-day by the Washington Merchants and Manufacturers' Association.

More than 500 members of the association have agreed upon a plan of operating truck trains between this city and outside points of supply. A committee has been appointed by the association and now is employed in securing the necessary trucks for use in the truck trains. Economy of operation, it is expected, can be secured by pooling their motor transportation, and an agreement has been entered into among the merchants to turn their trucks, or a certain number of them, over to the truck committee for daily use in the truck trains.

The duty of the committee will be to supply coal and transportation for Washington merchants. Under the plan, it is expected that merchants who have to go long distances for small quantities of goods would lose money on motor truck hauls, but by pooling their truck transportation this loss can be avoided.

AUTO-LITE GIVES MORTGAGE

FOSTORIA, OHIO, July 24—A $3,000,000 mortgage in favor of the Columbia Trust Co. has been issued by the Electric Auto-Lite Co., successor of the Auto-Lite division of the Willys Corp., covering all of the company's property. It secures 10 year 7½ per cent first mortgage bonds issued July 1.

The Allen Motor Co.'s plant, located in Fostoria, is included, a special master's deed, conveying this property to the Electric Auto-Lite Co. having been filed at the same time as the mortgage. The consideration was $4,700,000.

WILSON BODY MAKES ADDITION

DETROIT, July 26—C. R. Wilson Body Co. will complete by September 1 a six story addition to its present plants which will give it about 300,000 more feet of manufacturing space. The building will be a complete unit in itself, the three lower floors being devoted to body building and the three upper floors to the painting, upholstery and finishing departments.

HUPP'S ORDER BOOK FILLED

DETROIT, July 24—That July orders now are equal to June, which was the company's largest month, is the statement made by Vice-President Von Schlegel of the Hupp Motor Car Corp. August prospects also are bright.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

The lack of demand for funds from industrial and commercial sources has been a factor in the pronounced ease of the money market for the last few months. This ease was continued during last week and call loans ranged between 3 per cent and 4½ per cent, as compared with a range of 2¾ per cent to 4½ per cent in the previous week. The undertone was easy for fixed date maturities and funds were in large supply. Sixty and ninety day maturities were quoted at 3¾ per cent to 4 per cent; four and five months' at 4 per cent and six months' at 4¼ per cent, as compared with a range of 4 per cent to 4¼ per cent for sixty and ninety days' and four months' and 4¼ per cent for five and six months, maturities in the previous week. The prime commercial rate was lowered, quotations ranging from 3¾ per cent to 4 per cent, as compared with a flat rate of 4 per cent in the previous week.

The Federal Reserve statement as of July 19 showed an increase of $9,502,000 in gold reserves and $12,282,000 in total reserves. Bills on hand increased $4,821,000, while earning assets showed a decline of $10,098,000. Deposits increased $17,594,000 and Federal Reserve notes in circulation decreased $25,274,000. The reserve ratio increased from 77.3 per cent to 77.8 per cent.

Strike Affects Business Recovery

The sixteenth week of the coal controversy, together with railroad troubles, is having a more marked effect in impending general business recovery. The rising trend of pig iron output has been checked and several blast furnaces have been compelled to bank through lack of fuel. Steel work operations have also been moderately curtailed.

The foreign trade statement for June was somewhat more favorable than for any preceding month this year. Exports valued at $334,000,000 exceeded any month since October last and compared with $308,000,000 for May and $336,898,606 for June, 1921. Imports at $260,000,000 compared with $254,000,000 in May and only $185,000,000 in June, 1921. For the fiscal year ended June 30, 1922, exports amounted to $3,770,000,000 as compared with $6,515,510,033 in the preceding fiscal year; imports were valued at $2,608,000,000 as compared with $3,654,459,346 for the fiscal year ended June 30, 1921. Allowance must be made for lower range of commodity prices this year of perhaps 10 or 20 per cent. For the fiscal year ended June 30, 1914, exports amounted to $2,364,579,148 and imports to $1,893,925,657. The excess of merchandise exports over imports this fiscal year was $1,162,000,000; for the fiscal year ended June 30, 1914, it was $471,000,000.

United States Steel Corp. reported net income available for fixed charges and dividends for the three months ended June 30, 1922, at $27,286,945 and the deficit for the quarter at $1,462,345. For the first quarter of the current year this net income amounted to $19,339,985 and after dividend deductions the deficit was $6,759,468; in the second quarter of last year income was $21,892,016 and the deficit amounted to $4,571,668. Unfilled orders on the books of the corporation as of June 30 totaled 5,635,531 tons, as compared with 4,494,148 on March 31, the end of the first quarter, and 5,117,868 on June 30, 1921.

"Survey" Puzzling Farm Tractor Makers

CHICAGO, July 24—A purported survey of the farm tractor industry of the United States, sent out from Minneapolis and St. Paul over the signature of the "Farm Implement Research Bureau" whose identity and place of business were not made known, has aroused considerable interest in tractor and farm implement circles here.

At the headquarters of the recognized national organizations of the industry, including the National Association of Farm Implement Manufacturers and the National Institute of Progressive Farming, it was said that nothing was known of such as organization as the "Farm Implement Research Bureau."

The purported survey, which painted a dark future for most of the tractor manufacturers, was mailed in plain envelopes on which there was no printing or writing other than the address to which it was sent. The survey was in typewritten form with typewritten signatures. A notice at the end stated that similar surveys would be issued later on other agricultural subjects.

G. M. STOCK OWNERSHIP

NEW YORK, July 24—At the end of the third quarter of 1922 the number of General Motors stockholders was 71,331 compared with 72,665 at the end of the second quarter and 70,504 at the end of the first quarter. In 1921 there were 66,837 at the end of the fourth quarter and 65,324 at the end of the third.

It is interesting to note the way common has stood up without a dividend. The count in 1922 runs 48,348 stockholders in the first quarter, 50,591 in the second and 49,725 in the third. In 1921 there were 43,001 for the third quarter and 44,640 for the fourth.

A. E. S. A. MEMBERSHIP GAINS

DETROIT, July 25—Backed by the efforts of the manufacturers of starting, lighting and ignition equipment, who have pointed out to their service representatives the value of membership in the Automotive Electric Service Association, the membership in that organization has grown from 62 at the annual meeting Jan. 31 to approximately 230 on July 1. The midsummer meeting of the governors of the association will be held in Detroit Aug. 11, at which time recommendations will be made for the consideration of the manufacturers at their summer meeting at Old Orchard, Me., Aug. 31.

FINANCIAL NOTES

Hayes Wheel Co. for the six months ending June 30, show a net of $544,321 compared with $269,682 for the same period of 1921. Total sales were $6,155,431, compared with $5,556,361 and gross profits $819,653 compared with $521,924. Net profits, after fixed charges, but before Federal taxes, for the first half of 1922 were $510,331 against $184,153.

Durant Motor Co. of New Jersey's 6½ per cent serial coupon bonds, totaling $3,500,000, have been purchased by S. W. Straus & Co., New York. The bonds, which are offered at par and accrued interest, are a first mortgage on all the property and equipment of the concern at Elizabeth, N. J., which represents an investment of $13,106,294.

Sears Tire & Equipment Co., Davenport, Iowa, has had a judgment of $31,228 entered against it in favor of Blunk & Joehnke, contractors. The lien is for construction of the company's factory on Rockingham road. The Scott County Savings Bank and Jansen & Ernst, contractors, are joint defendants with the tire concern.

Overman Cushion Tire Co., Inc., will hold a stockholders' meeting Aug. 7 to vote on a resolution to reduce the common stock, now consisting of 5000 shares, par value $100 each, to 2500 shares with the same par value; also to approve the authorization of 2500 shares of preferred stock to be known as ex-preferred.

The Autocar Co. has called for redemption on Aug. 21, 1922 at 102½ and accrued interest, all of its outstanding 6 per cent serial notes dated Sept. 1, 1921. The company's 6 per cent outstanding serial first mortgage bonds, dated April 1, 1919, are called for redemption at the same rate and time.

American La France Fire Engine Co., reports earnings for the first half of the year at the rate of 16 per cent on its $2,900,000 common stock, $10 par, selling around $13 and paying 10 per cent. All but about $20,000 of the $1,500,000 bonds have been converted into common stock at par.

B. F. Goodrich Co. shareholders at a special meeting authorized the issuance of $20,000,000 of an authorized issue of $25,000,000 of first mortgage 25-year 6½ per cent bonds. The bonds have already been sold subject to approval by the shareholders.

Stewart-Warner Speedometer Corp. reports that the Company's sales in the second quarter established a new high record, 10 per cent over previous record quarter a year ago. July sales are said to be running 50 per cent over July of last year.

Firestone Tire & Rubber Co. profits for the first eight months of the fiscal year approximated $5,000,000. Sales this year will materially exceed last year's figure of $66,372,000 and may approach 1920, which contained six good months.

Chandler Motor Car Co., Cleveland, reports net profits of $927,114 for the three months ended June 30, after allowing for all expenses, including charges and taxes. In the first three months of the year net profits approximated $850,000.

McCord Mfg. Co.'s financial affairs are reported to be improving so much that an extension proposition on remaining debts is being taken up with the creditors. The creditors' committee will be discharged soon.

Yellow Cab Mfg. Co., Chicago, reports net profits for the second quarter of $692,286, or more than double the dividend requirements.

Mack Trucks, Inc., will show earnings for the second quarter well in excess of the $255,197 net profits of the first quarter.

INDUSTRIAL NOTES

Moreland Motor Truck Co., Los Angeles, has selected Portland as its northwest headquarters to handle wholesale business for the entire Pacific Northwest. C. H. Smith, one of the pioneer Moreland officials, will be in charge of the branch as northwest manager. Simultaneously with the location of the branch there a local company to be known as the Moreland Motor Truck Co. of Oregon was formed to handle retail sales in this territory. The company is composed of F. H. Nash, C. E. John and W. M. Fried, all business men of Portland.

Briscoe Devices Co., Pontiac, Mich., reports demand for the Scoe carbureter has increased by 50 per cent over the high record of the spring. The production now is the greatest in the company's history. The Briscoe company increased its financial strength during the past winter by sale of an issue of stock, largely in the local field, and is prepared to handle the increase of business.

American Motor Body Co., Philadelphia, successor to the Hale & Kilburn Co., is now operating at 50 per cent of capacity, with the schedule to be gradually advanced until November, when it will be at 100 per cent. Night work is necessary at present in some departments. The company recently closed a contract with Durant Motors, Inc., for the manufacture of 50,000 car bodies.

Electric Storage Battery Co., Philadelphia, has opened several departments in its Crescentville plant, built at a cost of approximately $2,000,000 and will be operating it in full by October. It is now working at full capacity, with some departments operating on overtime schedules. It is employing as many men as it ever had and the outlook for new business is excellent.

Van Dresser Bros., Detroit, announce the termination of their contract with the International Purchasing & Engineering Co., Detroit, covering the sales and distribution of Van Dresser cylinder and reboring tools. In the future all sales, distribution and service will be handled by Van Dresser Bros. at 1157 Concord Avenue.

Jordan Motor Car Co. common stock has risen 135 points in one week on the Cleveland stock exchange following reports of exceptional business. Jordan reports a volume of about $1,500,000 in June, with a total running inventory of $700,000.

Jacques Mfg. Co., has been awarded the contract for the first unit of 2500 closed bodies for the Lexington Motor Co. The Jacques company contemplates a one-story extension of 200 feet to its present building.

E. Edelmann & Co., Chicago, manufacturers of automotive equipment, have started construction of a new plant at Logan Boulevard near Western Avenue, which will be ready for occupancy Nov. 1.

EMBEZZLEMENT CHARGED

ATLANTA, GA., July 22—Embezzlement of more than $90,000 of the funds belonging to the Oliver Rim Co. of Atlanta is charged to Elmer Oliver, founder and former president of the company, in an indictment that has been returned by the grand jury here. According to witnesses testifying before the jury, most of whom were stockholders of the company, the defalcations of Oliver will amount to twice the above amount.

Four British Firms Announce New Models

LONDON, July 18 (*By Mail*)—Four firms have recently allowed particulars to issue relating to entirely new models.

The Daimler Co. has put forward the smallest Knight-engined model it has yet produced, a six cylinder engine of approximately three liters, the bore and stroke being approximately 3 x 4½ in. It is the first monobloc Knight engine which the company has made. With a four-speed gearset and Lanchester worm axle, the chassis price is at present £750. Battery ignition is used for the first time.

Vauxhall

A recent introduction is the 23-60 hp. Vauxhall, which displaces the 25 hp. model and has the same bore and stroke, namely, four cylinders, approximately 3¾ x 5½ in. The engine throughout is entirely new, having overhead push-rod operated valves. Is said to develop 32 b.hp. at 1000 r.p.m., 47.5 at 1500 and 60 at 2000 r.p.m. The Lanchester Harmonic balancer is fitted for the first time to a four cylinder motor. This is a high-priced medium powered chassis, the chassis price being £850.

B. S. A.

It is known that the B.S.A. Co. in 1923 will standardize an 11 hp. four cylinder light car. This company re-entered the automobile industry at the end of last year with an air-cooled two-cylinder light car. The new model will be water-cooled.

Austin

The new Austin is to be something smaller than even the popular light car. It is to be termed the 7 hp. with a four cylinder engine of approximately 2⅛ x 3 in., giving about 42 cu. in. capacity. It is designed to sell in the neighborhood of £200. It has a three-speed gear-set in unit with the engine, plate clutch and spiral bevel final drive. Front wheel brakes are used in conjunction with internal expanding brakes on the rear wheels. Total weight is under 700 lb. with a body for two adults and two children or luggage. It is claimed to have a maximum speed of 45 m.p.h.

THE NEW EARL JOB

JACKSON, MICH., July 21—The new Earl cabriolet referred to briefly in these columns last week is a four-passenger model patterned somewhat after the Earl brougham model, but designed to sell at a lower price. It has two doors and the forward seats have folding backs, and are arranged to tilt forward. The upholstery and interior finish is grey Spanish leather. The top and sides of the upper body are covered with black Duratex fabric while the lower body is blue and the fenders black. A rear trunk platform is provided, located between the body and the rim carrier, the body being protected by natural finish maple slats. The weight given is 2780 lb. Standard equipment includes sun visor, windshield wiper and dome light, but trunk, bumpers and certain other items are furnished at extra cost.

METAL MARKETS

The traffic manager is a more important personage these days than either the sales manager or purchasing agent. It is the movement of steel from mills to consumers' plants which engages the attention of sellers and buyers to the exclusion of more than passive interest in prices that might apply to fresh buying if there were any. So far the chief artery of automotive steel supply, i.e., from the Pittsburgh and Youngstown districts to Detroit has been kept pulsating with relatively slight congestion of shipments. Indications of embargoes against diverse commodities are in evidence on less well equipped lines, and structural steel consumers in the South Atlantic division are resorting to motor truck transportation.

So far the larger steel mills have been able to maintain a very satisfactory flow of raw material into their plants, and what diminishment in the rate of operations is taking place is not so much to be ascribed to shrinkage of their coal piles and shortage of basic material as to lack of a sufficient quota of efficient labor and the seasonal inroads made upon efficiency of production by midsummer weather.

Some of the independent steel mills are substituting fuel oil for coal wherever possible. Steel producers mining their own coal are bending every effort to enlarge their output. All of these activities absorb the complete attention of executives, and it is a large question whether producers or consumers of steel are the more apathetic as concerns the market's future. Certain it is that automotive steel consumers have so far displayed not the least interest in fourth quarter offers, and, as a matter of fact, steel producers have not sought to stimulate this interest. Buyers are not even giving much thought to September. What they are perturbed about are August shipments.

Amid these conditions which give the right of way to immediate urgency a constructive price program for the remainder of the year is a difficult problem, and the most influential steel market factors are averse to hasty changes. Their conception of what is best for the market is apparently to maintain the prevailing schedule of quotations intact, and to await more definite developments as to the demand and to production costs before undertaking any revision of their attitude as to the adequacy or inadequacy of the prices now in force. Hardening of prices in the steel bar market denotes merely the continuing pressure upon the supply exerted by consumers in need of rush shipments, especially so of makers of cold-finished automotive bars. The best that can be said for prevailing quotations is that they are well maintained for nearby deliveries and that they have not yet been tested for deferred shipments.

Pig Iron.—Although the market rules quiet, it has an ominously strong undertone. Automotive foundries are watching the situation closely.

Steel.—There is virtually no change in the sheet market. Rollers of full-finished automobile sheets continue to enjoy a considerable backlog of orders. Some of the non-integrated interests experience difficulty in securing an adequate supply of sheet bars. Although the price for the latter is maintained at $35, several producers are restricting sales of sheet bars to the vanishing point, preferring to convert their entire output themselves. Cold-finished bar makers are confronted with similar difficulties in securing their hot-rolled raw material. Strip steel mills suffer more or less from fuel shortage.

Calendar

SHOWS

Aug. 4-13—Chicago, Aircraft Exhibition and Aeronautical Congress.

Aug. 26-Sept. 1—Toronto, Ont., National Automobile Show held in conjunction with the Canadian National Exhibition.

Sept. 4-9—Indianapolis, Automobile and Accessory Show in conjunction with the Indiana State Fair, Auto Show Building, under the auspices of the Indianapolis Automobile Trade Association, J. B. Orman, manager.

Sept. 23-30—New York, Closed Car Show, Grand Central Palace.

Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon, Coliseum and First Regiment Army.

FOREIGN SHOWS

March 10-July 31—Tokio, Japan, Peace Exhibition.

July 1-24—London (Olympia), Aircraft Exhibition.

Sept. 1922 — Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Associação Automobilista Brazileria.

Sept. 15-20—The Hague, Automobile Show.

Sept. 25-Oct. 3—Berlin, Automobile Show at the Kaiser-Damm Hall under the auspices of the German Automobile Manufacturers Association.

September — Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.

Oct. 4-15 — Paris, Automobile Show, Grand Palais.

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 10 - Dec. 19 — Brussels, Automobile Show, Palais de la Cinquantenaire.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

CONVENTIONS

August 28-Sept. 2 — Detroit National Safety Congress.

Sept. 18-23, 1922 — Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

Sept. 13, 14, 15—Buffalo, Lafayette Hotel, Annual credit meeting, Motor and Accessory Manufacturers Ass'n.

Studebaker Quarter Brings Big Profits

DETROIT, July 26—Profits of $8,110,926 for the three months ended June 30, 1922, as against $4,575,836 in the first quarter are reported by the Studebaker Corp. After allowing for reserves, net profits were $7,086,552, against $4,059,848 in the March quarter.

This means a profit equal to $11.50 a share earned on the $60,000,000 common capital stock outstanding, after allowing for the regular preferred dividends, as against an earning equal to $6.49 a share in the first three months of this year. As the company is paying dividends at the rate of $7 a share on the common, the earnings for the six months were equal to more than two and one-half times the annual dividend requirements.

A meeting of the directors will be held next Monday, and it is expected they will either increase the regular dividend on the common or declare an extra payment for the quarter.

DISTEEL BRINGS SUIT

DETROIT, July 26 — The Detroit Pressed Steel Co., which manufactures Disteel wheels, has brought suit in Federal District Court at Chicago against the Forsythe Bros. Co. of Harvey, Ill., alleging infringement of patents Nos. 1,255,928 and 1,280,927, issued to Alden L. Putnam. The plaintiff states that the suit has been begun without malice and with no intention whatever of hampering the wheel industry in general. The Detroit Pressed Steel Co. contends that its patents are basic in the field of single disk steel wheels.

NATIONAL BODY SHOW PLANNED

NEW YORK, July 24—The Automobile Body Builders Association, with headquarters at 1819 Broadway, announces that its second national show will be held in the 12th Regiment Armory, Sixty-Second Street, west of Broadway, Jan. 8-13. The exhibits will consist of dump bodies and other heavy duty bodies, omnibuses, sight seeing buses, ambulances, light commercial bodies, closed passenger bodies, open passenger bodies as well as materials and parts entering into body construction, trimming and finishing.

Slight Decrease Seen in Canadian Exports

WASHINGTON, July 25—Automobile exports from Canada in June decreased 13 per cent in value compared to the May exports, according to figures furnished the automotive division of the Department of Commerce. The June exports were 2267 passenger cars, valued at $1,328,340, representing a decrease of 11.6 per cent in number and 11.5 per cent in value as compared to May. There were 170 trucks exported in June, valued at $74,047, a decrease of 32.3 per cent in number and 34 per cent in value. June exports of accessories were $100,877, representing a decrease of 11 per cent.

Australia, United Kingdom, South Africa, New Zealand, Sweden and British India, in the order named, were the principal countries of imports, Australia taking 805; United Kingdom, 368; South Africa, 267; New Zealand, 169; Sweden, 111, and British India, 76.

PLANS EXPANSION

DETROIT, July 26—Sales of Wills Ste Claire cars in the first six months of 1922 exceeded the sales for all of 1921, according to a statement by C. H. Wills, president of the producing company. A larger production than ever is being planned for August, September and the fall months, Wills says. Plants recently acquired by the Wills company are being equipped for production and will employ about 400 additional men. The company is now doing its own painting of phaetons and roadsters. To provide additional facilities for this work a building with 104,000 square feet of floor space will be erected at the south end of the present plant.

Steel Loading Block Helps Car Shipments

DETROIT, July 24—Motor Wheel Corp., Lansing, has brought out a steel loading block which is designed to facilitate the loading of automobiles in freight cars, and to take the place of the timber in which most cars heretofore have been cradled for transportation. Relative to the new block, President H. H. Harper of the Motor Wheel Corp. says:

Reduce Loading Cost

"Use of the Gier steel loading blocks by several car manufacturers has enabled them to reduce loading and unloading time and cost considerably, and at the same time has kept the cars secure from damage in transit. Following the unloading of the cars, the blocks are returned by the distributor or dealer and may be used over and over again.

"In a test made in the Buick yards, a freight car of automobiles anchored with Gier blocks was kicked against a string of thirteen empty box cars with all brakes set at a speed of 25 miles an hour. The double draft timber and the end of the box car were broken by the impact, but the automobiles were held by the block and were not damaged.

Weigh 10 Lb. Each

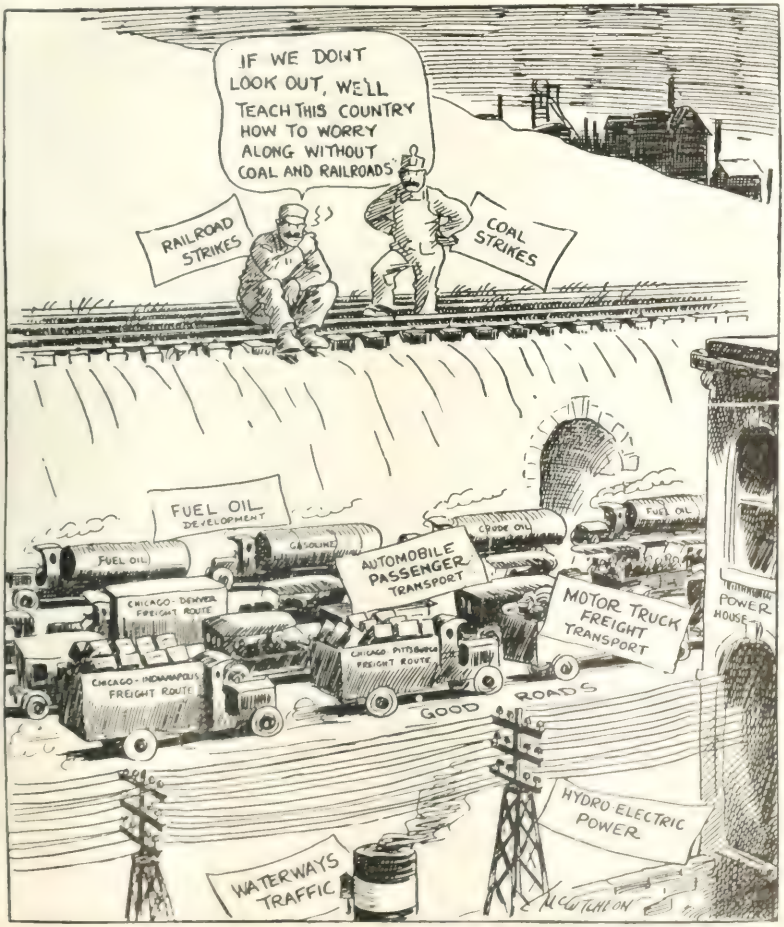
"The Gier blocks are 10½ in. high and stamped from No. 10 gage, blue annealed, pickled, oiled and limed stock. They weigh 10 pounds each and can be nested and returned to the factory in bundles of four or more by fourth class rating. The blocks average one and a half trips a month. Each is stamped with the shipper's name to prevent loss in transit.

"Tabulated figures show that the blocks earn their cost in five trips. Many letters from dealers express approval of their use because of the time saved in unloading and the fact that they prevent chafing of the tires. Railroads endorse them from a claim protection standpoint. They also lessen damage to the freight car floor."

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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What We May Expect if Rail and Coal Strikes Continue



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California Railroads Seek to Crush Highway Transport

Boycotts and specious propaganda based on contention motor vehicles don't pay fair share of road costs. Would give railroad commission power to force trucks and buses out of competition.

LOS ANGELES, Cal., July 28.—Indications now are that California will be the scene of a titanic transportation struggle between the heretofore impregnable rail carriers and motor transportation.

Forces on both sides will be massed, although in the early stages every advantage will be with the rail operators because of their solidified front and tremendous financial power. The actual struggle is not likely to assume a rate-slashing aspect as the rail carriers have tried that and failed. Neither will it be a battle for business, as that also has been undertaken in the past with similar results.

The political arena will witness the staging of this encounter. Already both sides are making plans, as the nominating election will be held Aug. 29. Eighty members of the state Assembly and twenty of the Senate will be chosen at the final election in November, but the primaries will witness the first attacks. Efforts are being made to pledge every candidate for a legislative office.

The railroads in this state undoubtedly have felt financially the effect of motor competition. With the advent of motor carriers, they no longer rule transportation. They have to face competition that last year, it is estimated, carried 10,000,000 passengers and an enormous freight tonnage. In many instances motors provided passenger and freight transportation to points not served by the rail lines, but in a vast majority of cases there was direct competition.

Trucks and stages have grown in favor with the public because of convenience. There is practically no difference in rates for either passengers or freight, as this state has a Railroad Commission which regulates these charges. The greater convenience of motor transport is evidenced by the fact that freight is delivered to points 100 miles distant from Los Angeles in six hours from the time it leaves the consignor's door. By rail two or three days would be required for the same service. Passenger trains serve the outlying districts three or four times each 24 hours, but stage service is twice that frequent.

There are some railroad officials who acknowledge that transportation is their business and that they must serve the public. These far-seeing men say rail methods should be revised to meet conditions but there are others, who apparently predominate, who maintain they can continue with present methods and crush motor transportation. It is because of the judgment of these that the struggle will come about. Already there are open breaches and hostilities have begun.

The principal plea of the railroads for public support is based on the contention that the people built the highways and have turned them over to stages and trucks for use to compete against the railroads without the state deriving sufficient compensation. The railroads, as do all public utilities in California, pay 5.4 per cent of their gross income to the state in taxes and they want motor carriers compelled to pay the same. At the 1921 session of the Legislature this tax was raised to 7 per cent, but railroads have succeeded in obtaining an injunction and tying the case up in the courts so that collection of taxes has been prevented.

This 5.4 per cent tax is in lieu of all others. The rail carriers pay no direct tax on their right-of-way, rolling stock, or other equipment. Motor carriers pay a number of taxes, such as a state license, personal property, business tax in every town through which they pass, a garage tax, station tax, and many others. It is estimated that in some instances they aggregate between 15 and 20 per cent of the gross revenue.

Motor carriers meet the railroad argument that the public builds the highways for competitors by pointing out that the railroads use the highways also at every grade crossing and many city streets. They also call attention to the millions of acres of land grants that the railroads were given by the people. They don't overlook the fact, either, that in certain sections great oil holdings have developed on these land grants. These oil holdings have enabled the railroads to organize and own oil companies that are producing oil and gasoline used in motor vehicles, so that from their free land they obtain a big source of revenue from motor carrier competitors.

CALIFORNIA is the second state in the Union in the value of its agricultural and horticultural products. A large part of the enormous tonnage developed from these sources is passed along by motor carriers to the railroads. Improved transportation facilities have brought about increased production. In this connection, about the only actual competition between the rail and motor carriers is when canned or crated horticultural products, or baled or sacked agricultural products are hauled from the canneries, packing houses and granaries direct to seaboard ports by trucks. This hauling has come about solely because trucks accomplish in a few hours what it requires rail carriers several days to do.

The Southern Pacific Railroad, which now is suffering from strike conditions at its shops in Roseville, stood in a position a few months ago to profit from methods invoked by the same striking employees. The Roseville Local of the United Brotherhood of Carpenters & Joiners of America and the Local of the Brotherhood of Railway Clerks undertook blacklisting and boycotting methods in opposition to motor carriers.

They established a "We Don't Patronize" ban on the Roseville-Sacramento stage line and notified members this

line had been put on the "We Don't Patronize" list. The body passed a motion to impose a fine of $1 for the first offense and $5 for the second and subsequent offenses if their members rode on the stages. Representatives of these railroad labor organizations visited the merchants of Roseville and sought to induce them to sign an agreement not to patronize freight trucks hauling freight for stores and others into Roseville and also not to patronize stages.

THEY gave as the ground for this request that inasmuch as Roseville is a city largely supported by the railroad and that members of the various railroad forces are union men, it was to the advantage of the unions that the railroad should be patronized rather than the freight and passenger trucks. Merchants were told that unless they signed an agreement not to patronize motor carriers, employees of the railroad would be notified not to patronize them, and if employees did deal with the merchants, pressure would be brought to cause the dismissal of those employees from railroad service.

The attention of railroad officials was directed to this situation and it is reported that at first little cognizance was given the matter, but that later the officials claimed they could not be held responsible for the acts of employees.

The scene of attempted railroad influence against motor transport was next shifted to San Francisco. There was organized there what was known as the "Southern Pacific Good Service League" which, according to the May issue of the League's *Bulletin*, is an organization composed of men and women in the employ of the Southern Pacific Railroad. One of the principal objects of the League as presented in the *Bulletin* is "to assist in combatting unfair competition, such as auto truck and bus lines operating in territory served by our lines." This League petitioned the San Francisco Chamber of Commerce and other business organizations with a resolution which said:

"The League is an organization of Southern Pacific employees in San Francisco numbering approximately 6200 persons, and it asks business associations and their members to patronize railroads rather than the commercial auto bus and truck lines and to use their good graces in placing the highway carriers on an equal basis of taxation with the railroads. The employees feel that the continued inroads into the railroad business by the bus and truck lines which operate over the public highways almost tax-free, threatens their positions and decreased business will necessitate cuts into the railroads' working forces."

Another resolution was directed, strangely enough, to the Draymen's Association of California, an organization of motor truck owners, many of whom are such competitors as the resolution seeks to restrict. The resolution read as follows:

"WHEREAS: We, the members of the Southern Pacific Good Service League, are employees of the Southern Pacific Company in San Francisco, and

"WHEREAS: Our prosperity and the continued welfare of our families are dependent on the prosperity of the Southern Pacific Company and the patronage of the Southern Pacific Company by the business men of San Francisco, and

"WHEREAS the following facts are true and of interest to the members of the Draymen's Association, to wit;

"(a) That the Southern Pacific Company is meeting severe competition under unjust conditions from commercial motor trucks and buses operating over the public highways virtually tax free as compared with the huge sums paid by the railroads to the State in taxes;

"(b) That taxes thus paid by the railroads are used in part to pay the bill for highway construction and maintenance, a cost that is steadily increasing because of the severe usage of the highways by said trucks and buses.

"(c) That continued unequalized competition by the highway carriers will so decrease the revenues of our company that its service to the public will be impaired and its purchase of supplies and its employment of working forces will have to be curtailed, thereby affecting the general prosperity of San Francisco and the State at large.

"That the Company's taxes in California based on 5¼ per cent of its gross receipts for 1920 were $6,125,700;

"That the Company's annual purchases in San Francisco (actual for 1920) total $17,731,800;

"That the Company's average payroll monthly in San Francisco (actual for 1920) is $1,165,440.50;

"That San Francisco merchants and business men benefit from the Company's purchases and payroll expenditures in San Francisco.

"NOW, THEREFORE, BE IT RESOLVED: That, we the members of the Southern Pacific Good Service League appeal to the Draymen's Association and its members to patronize the railroads rather than the auto bus and truck lines and to use their good offices in bringing about a just basis of taxation for the highway carriers which will place them on an equality with the railroads who not only have to maintain their own roadways, but in addition contribute large amounts through tax channels to the upkeep of public highways."

CALIFORNIA railroad interests are trying to kill off motor freight and passenger competition by means of insidious propaganda. They base their specious plea upon the old contention that motor vehicles do not pay their share of highway costs.

"Southern Pacific Good Service League" petitions all kinds of organizations, including Draymen's Association, to patronize railroads instead of highway carriers.

Railroad employees' boycotts another weapon used.

Referendum proposed on measure which would give Railroad Commission power to close highways to trucks.

This article tells in a straightforward manner the present status of a menacing situation.

ANOTHER body to receive this resolution was the Motor Car Dealers' Association of San Francisco. The action of Southern Pacific employees brought about immediate response from the Dealers' Association, which incorporates in its membership all the leading truck distributors of Northern California. These dealers were so incensed that they appointed a committee to call upon the President of the Southern Pacific and ask the meaning of such action.

Without waiting for his verdict, however, several of them advised their factories they would accept no more shipments over Southern Pacific Lines. Some of them ordered carload shipments en route to San Francisco by Southern Pacific diverted to competing railroads. Los Angeles learned of this action and as there are close relations between the San Francisco Association and that in this city, some of the dealers here followed the same procedure.

A committee of the Dealers' Association called on the

Southern Pacific president, vice-president, passenger traffic manager, freight traffic manager and their assistants, and informed the railroad officials the Association looked with disfavor upon the propaganda of the Southern Pacific Good Service League.

After a discussion, President Sproule instructed the general manager of the operating and maintenance departments to instruct division superintendents that the Southern Pacific would not be a party to any kind of a boycott against the automobile industry and looked with disfavor upon any stand taken by employees that smacked of blacklisting. Motor transport advocates point out this action by Southern Pacific officials was not taken until after the dealers' representatives visited them.

The railroads of California derive in revenue approximately $10,000,000 annually from shipments of automotive supplies. Dealers in various parts of the state have begun to awaken to their power if they turn against the railroads because of the position those carriers have taken toward motor competition.

The railroads are now charging $4.66 per 100 lbs. for some types of motor vehicles from eastern points to Los Angeles. Water competition is entering a bid for this business, with a rate of $1.50 per 100 lbs. This is a difference of $3.16 on every 100 lbs. and if all motor vehicles were shipped by water instead of rail the average freight charge paid by purchasers of motor vehicles in this State could be more than halved.

Some dealers already have tried water shipping and say they found it quite satisfactory. Cars and trucks come through by water in approximately the same time as by rail. If methods were adopted whereby all shipping was by water, the loss to the rail carriers on cars and trucks alone, to say nothing of what would happen if the accessory dealers joined in the movement, would amount to many millions of dollars. This retaliatory method would be one of the strongest cards the industry could play.

As indicated by the statements of the Southern Pacific Good Service League, railway employees are imbued with the idea that motor competitors are responsible for the existing wage situation. In this instance they seem to have assumed the troubles of their employers, which records will show is quite a radical departure from custom.

In addition to boycotts and propaganda of both the spoken and printed kinds, a new line of attack was opened recently. Petitions are being circulated throughout the State favoring an initiative measure which would bring about an amendment to the constitution which would provide that the Railroad Commission have exclusive power to grant franchises for street, interurban and suburban railways and motor vehicle transportation of persons or property for compensation upon streets and highways, prescribe terms and conditions thereof, and regulate rates thereunder.

The active sponsor and supporter of this movement is the California Real Estate Association. To help boom real estate promotions, extensions of street car lines are necessary. Where these promotions take the form of town sites, the interurban lines are asked to put down tracks and provide service. The street car and interurban companies have refused in many instances to make these extensions because of the probability of motor competition.

Signatures to the petitions are being paid for at the rate of five cents per name and in order to stimulate signatures solicitors have stands on all the principal corners, in the banks and many other buildings. Their slogan is "sign this petition and reduce street car fares." As a matter of fact, there is nothing in the petition to assure anyone of lower car fares but the public grabs the idea and is signing readily.

If this initiative measure became a law it would give the Railroad Commission authority to assume control of all the for-hire trucks and passenger cars in the State. Approximately 80 per cent of all trucks are in this class, as well as all stages and taxicabs. The Railroad Commission at this time controls motor vehicles operating in the intercity business but the new plan would apply to all others, except those used exclusively by the owner in his private business.

If the Commission were given this authority it would have the power to limit any truck to operation over certain streets and highways and prevent it being used elsewhere. It is felt that this would tend to destroy the mobility of the truck, which undoubtedly is its chief asset, because operations would be circumscribed.

The Commission could also fix rates to be charged by the owners of such vehicles and it is felt this would interfere with free and unrestricted competition. If the plan became effective, some sort of a zoning system would have to be inaugurated and certain operators assigned to each zone. They would have no authority to leave that zone nor could any others accept business within it. The job cut out for the Commission under this plan would be tremendous, as routes would have to be established for approximately 30,000 trucks and several thousand taxicabs applying to many thousands of miles of streets and highways.

Under this proposal the Railroad Commission would have authority to bar motor vehicles entirely wherever it might see fit. When the Railroad Commission originally was given jurisdiction over intercity motor carriers, its authority did not include those lines in existence at the time, but the new proposition would apply likewise to these.

Railroad propaganda has been so effective throughout the State that Chambers of Commerce, real estate associations, and county supervisors have been influenced to adopt resolutions and petitions directed to the Railroad Commission asking that body not to grant any more franchises to motor carriers until such time as they are made to pay a bigger proportion of their revenue to the State for the privilege of using the highways.

Railroads have sent attorneys to many parts of the State to address various organizations in the endeavor to bring this about. Railroads have employees of local influence almost everywhere and never is an opportunity to restrict motor transportation overlooked.

"WHAT will the automotive interests do to combat the railroads?" is the big question.

The battle must be fought out in the political arena. A united front must be presented if it is to be won.

Public interest in the controversy must be aroused and a counter fire of propaganda started before railroads can be forced to submit to fair competition.

The entire industry will be interested in this exposition of conditions in the state where motor transport has been most highly developed.

With this situation existing, the big question becomes: "What will the automotive interests do to combat it?"

In looking about for an answer, the many complexities make the solution difficult to determine. The railroads are united, but truck interests are not. The most effective weapon has been the plan of withholding freight by automotive dealers from at least one rail carrier. There is no centralization of motor interests. With the exception of a few individual efforts, there has been no attempt to offset railroad propaganda because of lack of unification of ideas.

The public knows what motor vehicles do for California commercially but the public will not decide this issue. The state's highway commission, Motor Vehicle Department, supervisors, and other officials have singled out commercial vehicles for their attack on the ground that they damage the streets and highways. A multitude of sins in highway building is being covered by the assertion that trucks have caused a large proportion of the damage.

From the standpoint of public sentiment, it is doubtful if a very serious outcry would be made if all trucks were ordered off the roads. Of course this situation would change if trucks did stop because then the public would learn its almost total dependence on this type of transportation for food and building supplies.

This state of affairs has led interests friendly to motor transport to realize the battle must be taken into legislative halls. Practical politics must be applied by practical methods. It is now planned to get from every candidate for the legislature a statement as to his position on the right of motor carriers to use the highways.

These carriers are not asking and don't intend to ask for anything unreasonable. They are willing to accept a reduction in load limits which, on state highways, now is 30,000 lbs. They are willing to pay more for the privilege of using the highways, but they will not consent to being taxed out of existence. California has 57 counties. Under the state law each county has authority to reduce the weights allowed on state roads for application on county roads. More than a score of the counties have done this, so that the state is a patch-work of weight regulations.

Trucking interests ask for a uniform law above everything else. Unfortunately, however, they are not united on what this should be. The automobile clubs have gone on record as advocating a gross maximum limit not to exceed 22,000 lbs. The Truck Owners Association of Southern California, California Draymen's Association, the Dealers Association of San Francisco, the Los Angeles Dealers Association, and most of the owners of heavy duty equipment, advocate a limit of not less than 26,000 lbs. and permission to continue to operate trucks which, when loaded to their rated capacity, weigh in excess of that figure for the life of the equipment.

Knowing that weights, uniformity and tax will be the crux of the situation, the preliminary conflict will be waged at the polls and the battle subsequently carried to the legislature for determination. To influence the public at election time will require a vast amount of propaganda and at this time efforts of motor transport are woefully weak. They have a chance to win if they strengthen their forces, but, unless they do, they unquestionably will be defeated.

Forest Products Laboratory Activities

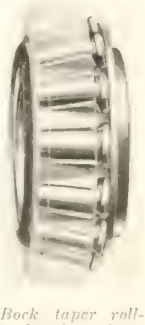
THE Forest Products Laboratory has recently issued a comprehensive program of the work it has planned for the fiscal year 1922-23, which contains much information of value to all users of wood products. Inasmuch as the automotive industry is a large user of wood, those in the industry concerned with the manufacture of bodies, wheels and other parts in which wood is employed can profit materially by following the work of the laboratory. The printed program referred to not only gives the plans for future work, but the status of work already in progress, together with a list of reports issued to date on the numerous subjects upon which research has been completed.

The work planned or in progress includes such items as the following, among many others: mechanical and physical properties of wood and the influence of moisture and other factors upon these properties, testing machines and methods, methods of wood bending, glues and gluing, study of the finishing of wood, study of relative efficiency of various types of kilns and auxiliary apparatus, air seasoning of wood, specifications for wood and wood products, etc.

The Association of Wood Using Industries is co-operating with the Forest Products Laboratory in much of its work and is endeavoring to have reports prepared in such a way as to make them understood by non-technical foremen and others who should profit by use of the information they contain. One subject in which this organization is especially interested is that of wood finishing, or the painting, staining, varnishing, etc. of wood products. A part of the program in this connection calls for the establishment of a class at the Forest Products Laboratory to which manufacturers can send employees who will learn the fundamentals of finishing woods of different character and be encouraged to read the publications of the laboratory and other literature of similar character. The plan is, through education, to eliminate, in time, rule of thumb methods and substitute a more logical and scientific scheme of operations in the finishing department.

Improved Cage for Bock Bearing

THE Bock Bearing Co. has announced an improved form of cage to be used in the taper roller bearings which it manufacturers. The cage and rollers are now assembled with the cone as one unit, the second unit of the complete bearing being the cup. There are thus but two units in the complete bearing instead of three units formerly used. This is said to make for greater convenience in handling and to leave less to the judgment of the mechanic who assembles the bearing in the axle or other part in which it is employed. The accompanying cut gives a phantom view of the Bock bearing and serves to show the form of the new type of cage.



Bock taper roller bearing, showing new form of cage which is now standard.

Automotive Manufacturers Hold Same Views on Big Problems

Rather remarkable unanimity of opinion expressed on such important questions as prospective farm markets, trend of prices and effect of European situation on America.

MANUFACTURERS in the automotive field are chiefly concerned at present with the all important problem of what effect the mine and rail strikes will have upon their business, but there are other big questions to which they are giving much thought. They include:

1. Is the harvest going to bring the farmer into the buying market?

2. Is the European situation holding back our permanent development more than we care to admit?

3. Have prices in general reached bottom or is another downward sag ahead?

Upon these subjects AUTOMOTIVE INDUSTRIES has obtained the views of representative manufacturers in the passenger car, truck and parts fields. In general, they manifest a rather remarkable unanimity of opinion on these fundamental problems. It is evident all of them are looking at the situation broadly and that they are eager to obtain the views of others not only in their own industry but in other lines.

"A detached viewpoint is a great thing," writes one engine maker. "Men with families generally see no faults in their own close groups but the neighbors are sure to discover the flaws. In business, leaders are generally so close to their own problems that they are blinded to both the limiting and determining factors.

"To-day, as never before, a detached viewpoint is necessary. More than ever, I believe, you and I must stand away from our businesses and view them with a critical, impartial eye. And, further, we must be keen to observe indications in all the other industries—indications which find their reflections in our own business.

"If I am to feel the pulse of the automotive industry, I must be able to sense and to properly interpret the activities in the steel, iron, coal, oil, leather and in all other lines of basic supplies.

"ALTHOUGH the automotive business finds itself once more in a healthy condition, this state has been achieved without the assistance of a healthy foreign outlet for merchandise. There are as many disturbing elements at work right now in the world as we have ever known. Business improves in spite of them.

"The question is will business continue to improve?

"Business just naturally must grow better from now on. But world adjustments must soon come to provide an outlet for surplus goods. The farmer is going to have cash in his back pocket this fall as the result of the coming and present harvest. People with money to spend are spending it—confidence has been restored in the face of the fact that all commodities are not yet where they should be in price."

Primary interest naturally centers in domestic demand but automotive manufacturers are keenly alive to the fact that American prosperity is dependent in large measure upon the restoration of Europe to normal conditions. They seem to feel, however, that the return of the farmer to the market is more important at this juncture. Most of them are confident that there will be a return of purchasing in the agricultural districts next fall, but they have no exaggerated notions as to its volume.

A prominent manufacturer of axles believes "the present harvest will bring the farmer into the buying market for automobiles although I doubt if it will make him a heavy purchaser of farm implements. In my opinion the first money the farmer gets will be spent for an automobile and for that reason I look for a good farmer trade on the light, cheap cars."

"THE present outlook is for a very large harvest of grains, fruits, undoubtedly a large crop of hogs, with an ample supply of beef cattle, and the time has gone far enough for us to feel more or less positive that the crops of the year 1922 are safe from any very grave danger," says a substantial truck maker. "This ample supply of farm products in the northern and western states means a great deal of new wealth for the country. The effect on the farm demand would be much greater this year if it were not for the existing hangover of debts contracted during 1920 and 1921, but it should revive the farmer's buying power and change his mood to that of a buyer, to some extent, as it will tend to bring a much more cheerful condition through the extinction of debts which have been hanging over the farmer's head for the past two years.

"To sum up, my opinion is that the farmer will again resume buying during the fall months, as he cashes his crops, but that this buying will probably be shadowed by ideas of economy, due to the lessons of the past two years. In other words, the farmer will buy what he really needs, and not be led into extravagances for the time being.

"There should be an increased demand for motor trucks late in the year from the farmer, as, by that time, the market will have been cleaned up of a large quantity of the models of 1920 and 1921 which have remained in the hands of the dealers in the agricultural territory."

On the subject of farm buying, the president of a New England company manufacturing electrical equipment says:

"I am of the firm opinion that the present harvest is going to bring the farmer into the buying market in a substantial way. I am not referring particularly to passenger automobiles, but rather over the wide range of merchandise which is necessary to the farmer's existence.

"To sum up the farm situation, the farmer never takes care of his equipment, which has always meant frequent replacement. A certain amount of equipment is absolutely

necessary for the working of his farm, and for two years he has bought practically nothing, so that, as soon as he gets the proceeds from this year's harvest, he must immediately start replacing his tractors, his farm engines, his pumps and all the other incidentals that he, of absolute necessity, must have.

"THIS will probably spread to a larger purchase of motor cars by the farmer this fall, but if the farmer himself really does not enter the motor car market as a prominent factor, the other equipment which he must purchase will result in at least a slightly increased demand for passenger cars."

Another parts maker says there is little question but that the present harvests will enable the farmer to enter the markets with a greater volume of business than for many months past. He points out that there has been a very substantial improvement in the farmer's situation, particularly in the Middle West and South, as reported by the field men of his company. Referring specifically to the South, he says:

"In the South, while the farmer in some cases has been troubled with altogether too much water and was forced to replant two or three times, this misfortune happened at such a time that, while adding to the expense of planting, the final planting was not too late to be productive of good results providing the weather conditions are favorable." It might be added parenthetically that weather conditions have been good since this opinion was expressed.

Only two or three of the twenty-five men whose views were obtained expressed any forebodings about an increase in the sale of automotive products in the great rural districts in the next few months. One of the dissenters, the secretary of an Indiana gear company, said:

"The present harvest will bring the farmer into the market to a certain extent only and the commodities which the farmer buys will be commodities that he needs more than he needs gasoline driven vehicles. The present price of gasoline is so high and the present price of feed is so low that I personally know a good many farmers in this vicinity who have put their tractors in the barn and are using horses. I don't feel, therefore, that the tractor market is going to be very good this year and I believe that the sale of trucks to farmers will not be on an extensive scale, although they will buy more than they have for the past year."

In considering the second great question, there is practical agreement that the European situation is holding back American development. Here are brief summaries of some of the opinions expressed:

"In my opinion, the European situation affects our return to prosperity more than is admitted throughout the larger part of the United States. I find the Eastern viewpoint reasonably agreed with this thought, but the Middle West does not accept it."

"The European situation is undobutedly retarding our industrial expansion to a considerable extent, but it is not a paramount influence in determining our own prosperity."

"The European situation can but be having an effect upon our permanent development, but not as serious as was anticipated by some economists."

"The European situation cannot help but hold back our permanent development, when it is taken into consideration that we are being deprived of approximately 50 per cent of our export market at this time."

"The European situation is, I believe, holding back real development more than we realize."

"I think the European situation is holding back our permanent development more than we care to admit. The sooner we come to the conclusion that we are not an isolated community, but are a part of the world, the better off we will be."

"The European situation is undoubtedly holding back our permanent development, although to what extent it is practically impossible to tell because of the many existing complications and unusual conditions."

"If official Washington would sidetrack politics long enough to work out a scientific tariff for this country which would neither permit dumping of low-priced merchandise nor yet put a tariff wall around us, the export situation would be very greatly improved."

"I do not believe the European situation is holding back our permanent development to a very large degree. There is so much work undone in this country that we can go along for some time if we devote ourselves to our domestic needs without any permanent ill effects, and in the meantime Europe will get cleaned up."

Taking up the subject of prices, it seems to be the consensus of opinion that industry must base its operations on a slowly falling market for a long period. It is not believed that there will be any radical or sudden changes, especially in the automotive field, but that the tendency of all prices, including labor, will be downward. Here are some of the opinions on this question:

"For some years to come we shall, broadly speaking, be in a declining period, and reductions of all kinds are consistent with economic observations of the past, provided these reductions are not such as to wipe out profits.

"THERE are a number of products, basic in their nature, such as iron, lumber and foodstuffs, which have reached prices which will not be appreciably lowered in the next five years; but there are a number of manufactured products, such as textiles, shoes and hardware, which undoubtedly will have to stand further deflation. Fortunately for the automotive industry, its deflation is nearly completed."

"Prices have not reached bottom, as large quantity production always permits of economies."

"Prices on the basic materials of the automotive industry reached their lowest point this year, and I do not think they will go lower."

"We believe the prices of some manufacturers have reached bottom, but other manufacturers have not made

AUTOMOTIVE manufacturers are thinking as never before of the bearing upon their own business of the big, vital problems which govern trade and industry as a whole. Automotive Industries has obtained the views of representative makers of cars, trucks and parts on these three important questions:

1. Will the harvest bring the farmer back into the market?

2. How much is the European situation holding back our development?

3. Have prices in general reached the bottom?

The views of these manufacturers are mighty interesting. They show a rather remarkable unanimity of opinion on all three subjects and for that reason are especially valuable.

very many cuts, and they should be in a position to make additional reductions."

"I feel that prices have not reached the bottom and won't for several years, and that the tendency will be continually down, with occasional increases such as we have had for the last sixty days or more."

"I believe prices have about reached bottom in the present cycle, and I maintain that we cannot have increasing prosperity until a stiffening of prices begins. This is already beginning to take shape in the primary markets."

"I do not believe that prices in general have reached the bottom if a long-time view of the situation is taken. We have before us a period of some years of steadily lowering prices, the progress of which may be so slow that it will not bring seasonal or marked reductions."

"I believe that we are still on a downward swing of prices. I don't believe the bottom will be reached until 1927 or 1928. A gradual reduction is the one thing that will keep our industry in a stable condition during this period."

"I look to see a more or less gradual drop in prices in this country and a gradual betterment of conditions in other countries until we get to a point where the differential is reasonable."

"I think that automobile prices, in general, have about reached the bottom."

Practically all the manufacturers are convinced that the country has before it a long period of reasonable prosperity. Forecasts for the immediate future are complicated by the strike situation, but with only two or three exceptions they predict a seasonal decline in automotive sales, regardless of the hampering influence of labor difficulties. Most of them predict that fall business will be better than it was last year but not so good as in the first half of 1922.

U. S. Department of Agriculture—Bureau of Public Roads

Federal Aid Status

Financial Statement as of June 30, 1922

STATES	Federal Aid Apportioned F.Y. 1917 to 1922	Federal Aid Under Construction**	Available for New Construction	Federal Aid Completed††	Uncompleted Federal Aid on Projects Under Construction	Amounts Federal Aid Paid States	Balance Federal Aid Earned
Alabama	$7,329,973	$4,485,559	$2,844,414	$2,521,926	$1,963,633	$2,023,403	$498,523
Arizona	4,824,633	3,449,798*§	1,374,835	2,911,866*	537,932	2,706,621	205,245
Arkansas	5,874,072	4,420,402	1,453,670	3,799,457	620,945	3,291,482	507,975
California	10,846,453	7,931,166	2,915,287	5,719,194	2,211,972	3,856,186	1,863,008
Colorado	6,121,240	3,871,070	2,250,170	3,243,844	627,226	2,680,248	563,596
Connecticut	2,170,222	1,304,048	866,174	920,636	383,412	809,822	110,814
Delaware	813,280	735,655	77,625	462,055	273,600	461,548	507
Florida	4,036,938	2,872,155§	1,164,783	1,520,548	1,351,607	810,235	710,313
Georgia	9,405,536	7,618,839	1,786,697	6,934,550	684,289	6,678,707	255,843
Idaho	4,298,926	3,463,240	835,686	3,261,661	201,579	3,145,837	115,824
Illinois	15,270,548	11,425,553*§	3,844,995	11,323,404*§	102,149	11,093,043	230,361
Indiana	9,374,148	5,818,839	3,555,309	3,828,792	1,990,047	2,445,878	1,382,914
Iowa	10,042,216	8,722,711	1,319,505	7,645,029	1,077,682	5,604,936	2,040,093
Kansas	9,997,591	8,020,719	1,976,872	5,790,705§	2,230,014	4,597,477	1,193,228
Kentucky	6,787,243	4,710,498	2,076,745	3,592,490	1,118,008	2,838,897	753,593
Louisiana	4,739,514	3,798,558*	940,956	3,527,353*	271,205	3,083,184	444,169
Maine	3,341,124	2,836,214	504,910	2,296,779	539,435	1,861,223	435,556
Maryland	3,031,378	2,524,511	506,867	2,372,810	151,701	2,278,187	94,623
Massachusetts	5,148,741	3,336,506	1,812,235	2,680,558*§	655,948	2,066,810	613,748
Michigan	10,210,828	7,182,693	3,028,135	5,050,393	2,132,300	4,477,186	573,207
Minnesota	9,938,980	8,922,574*	1,016,406	7,454,714	1,467,860	7,162,927	291,787
Mississippi	6,246,449	4,466,940	1,779,509	3,394,319	1,072,621	2,784,496	609,823
Missouri	11,770,204	6,040,434	5,729,770	3,637,968‡	2,402,466	3,227,749	410,219
Montana	7,045,713	3,909,310*	3,136,403	3,562,603*†§	346,707	3,414,071	148,532
Nebraska	7,447,951	4,757,467	2,690,484	4,509,400	248,067	3,364,816	1,144,584
Nevada	4,480,713	1,869,900	2,610,813	1,581,123	288,777	1,258,303	322,820
New Hampshire	1,508,714	1,167,082	341,632	1,074,594	92,488	1,016,026	58,568
New Jersey	4,208,170	2,255,703	1,952,467	1,850,195	405,508	1,464,777	385,418
New Mexico	5,579,618	3,283,289	2,296,329	2,645,584*	637,705	2,214,206	431,378
New York	17,385,250	8,834,921§	8,550,329	4,546,815	4,288,106	3,403,340	1,143,475
North Carolina	7,980,025	6,134,672	1,845,353	5,960,877	173,795	5,308,161	652,716
North Dakota	5,387,202	3,613,888	1,773,314	2,976,305*	637,583	2,679,976	296,329
Ohio	13,025,952	8,113,465*§	4,912,547	7,386,461*‡§	726,944	7,034,570	351,891
Oklahoma	8,090,585	5,533,700	2,556,885	3,964,534	1,569,166	3,550,571	413,963
Oregon	5,514,842	4,588,556	926,286	4,258,897	329,659	4,250,034	8,863
Pennsylvania	16,031,598	13,801,510*	2,230,088	12,384,763	1,416,747	11,244,455	1,140,308
Rhode Island	1,006,791	637,411	369,380	589,379	48,032	575,853	13,526
South Carolina	5,007,855	3,862,648*	1,145,207	3,070,984*	791,664	2,679,077	391,907
South Dakota	5,656,943	4,090,700	1,566,243	3,008,456§	1,082,244	2,573,570	434,886
Tennessee	7,875,830	6,726,906	1,148,924	3,747,311	2,979,595	2,757,207	990,104
Texas	20,525,577	15,242,320	5,283,257	12,086,142	3,156,178	9,637,560	2,448,582
Utah	3,966,624	2,510,177	1,456,447	1,674,758	835,419	1,135,907	538,851
Vermont	1,607,729	879,597	728,132	694,514	185,083	564,869	129,645
Virginia	6,908,559	4,964,149	1,944,410	3,882,103	1,082,047	2,323,766	558,337
Washington	5,075,385	4,259,009	816,376	4,053,149	205,860	3,929,289	123,860
West Virginia	3,724,864	3,402,341	322,523	2,846,732	555,609	2,431,279	415,453
Wisconsin	8,809,097	6,254,806	2,644,291	5,613,262	641,544	4,964,542	648,720
Wyoming	4,313,176	3,416,812	896,364	2,700,143	716,669	2,149,245	550,898
TOTALS	$339,875,000	$242,068,961	$97,806,039	$194,560,135	$47,508,826	$166,911,552	$27,648,583

NOTE:—*Reduction due to payment of final vouchers. †Correction. ‡Reduction due to withdrawal or cancellation of projects. §Difference due to revision of project statement or agreement estimates. **Includes projects entirely completed. ††Includes completed portions of projects under construction.

Hudson and Jewett Announce New Body Models

Hudson seven-passenger sedan has an aluminum body in which are incorporated numerous refinements and increased seating space. Jewett four-passenger coupe and roadster are also provided with ample space for both passengers and luggage.

A NEW seven-passenger sedan with a body practically all of aluminum has been added to the line of the Hudson Motor Car Co. This body replaces the previous sedan and incorporates a number of changes. It is 3 in. lower, of lighter weight and has wider front and rear seats. All the body panels are of aluminum. The body is of Biddle & Smart manufacture. The 3 in. increased length has been given to both the front and rear compartments, particularly between the rear and auxiliary seats, to give greater knee room at this point. Additional space has also been given the driver and the front seat, designed along the general lines of the Hudson touring limousine, has been laid out to give greater comfort to the driver. The contour of all the other seats has also been changed, to afford an easier seating position, and the rear seat is deeper.

Better ventilation than on previous models is provided for by a larger cowl ventilator equipped with a deflector. The rear window glass is larger and the triangular panes of glass which form part of the windshield give the body a longer appearance and afford the driver a greater range of vision.

The upholstery on the new sedan and the floor rugs are of a deep blue color. The interior accessories include rear quarter shades, dome light with switch so located that it can be reached equally well from the front or rear compartment, smoking set, rear vision mirror and other similar improvements. All the doors have four hinge supports, and entrance to the body has been facilitated by increasing the width of the doors. Drum type side parking lamps at the base of the windshield are also standard equipment on this body. The body panels are finished in valentine blue and the chassis parts are black. This car is priced at $2,295.

A NEW coupe has been added to the Jewett line. It has been designed to give a full four-passenger capacity. The body is 48 in. wide and from the dash to the rear window measures 77⅛ in. It is claimed that the passenger space in this new Jewett coupe is almost as much as in the coupe on the big 6-66 Paige model. The two-passenger rear seat is 36 in. wide by 19 in. deep.



New Hudson sedan body, seating seven, is larger [illegible]

For the fourth passenger, a well-upholstered folding armchair measuring 14½ x 14 in. is provided. This seat has 23¼ in. of leg room. There is a rear deck behind the coupe which provides space for several handbags. The coupe sells for $1,395.

A roadster has also been one of the recent additions to the Jewett line. This has also been increased in roominess and now has a 45-in. seat and new side curtains. The curtains are tailored and tight fitting, giving complete protection from the weather with ample window space. There is also considerable space under the rear deck.



The new Jewett coupe which seats four passengers

Some Mechanical Details of French Grand Prix Racing Cars

High engine speed and failure of lubricating systems caused some eliminations. Roller bearings on crankshaft, exceptional stream lining, novel front axle and means for operating front wheel brakes are among the most interesting features of the winning Fiat car.

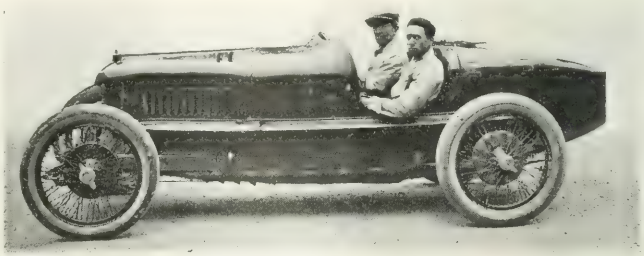
By W. F. Bradley

THE fast pace set by the Fiats was largely responsible for the failure of so many competitors in the recent French Grand Prix race. The three Sunbeams had shown themselves to be the fastest in practice until the Fiats appeared on the scene, when the English engineers decided to drop their gear ratio from 3.6 to 3.8. Made on the eve of the race, there was no time to try out the effect of this change, and the contest showed that the engines were running beyond the safety limit, for in each case a valve stem broke and caused withdrawal of the car.

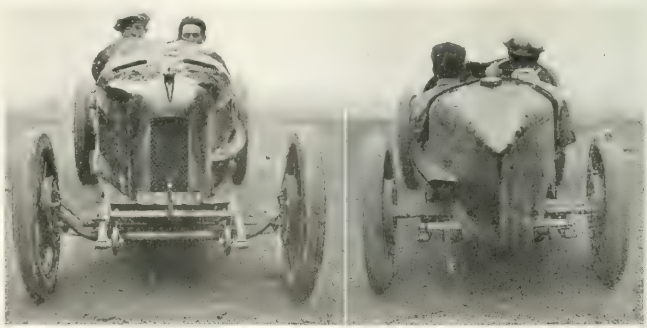
Ballot claims that his cars raced with standard 2-litre chassis, specially streamlined. The best performance in this team was made by Foresti, who went 43 laps and was forced out, when holding third place, by reason of the failure of the lubrication system, which caused a bearing to run and broke a rod and a piston. Another Ballot was abandoned on the 18th lap with a broken connecting rod caused by inadequate lubrication.

The eight cylinder Rolland-Pilains proved to be green. Guyot went out on the third lap, when holding third place, with a *broken crankshaft*. Louis Wagner's car broke a connecting rod on the second lap. A fire started on Hemery's car on the seventh lap, and it was finally abandoned after the flames had been extinguished.

Bugatti came to the start with four cars equipped with a new type eight cylinder engine. Friedrich was the fastest of these drivers and succeeded in getting the lead for a few minutes on the third lap. On the 12th lap he went out by reason of the breakage of the gears in one of his two magnetos. These magnetos were mounted side by side on the dash and driven from the overhead camshaft by a universal joint shaft. When the magneto gears went they broke up the intermediaries. The three other Bugattis went to the end, but they were never at any time serious contestants for first place. They were very liberally lubricated and smoked freely throughout the race.

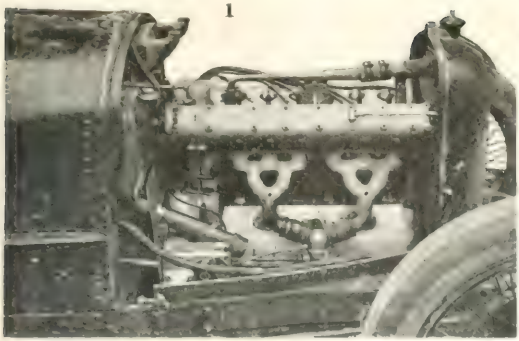


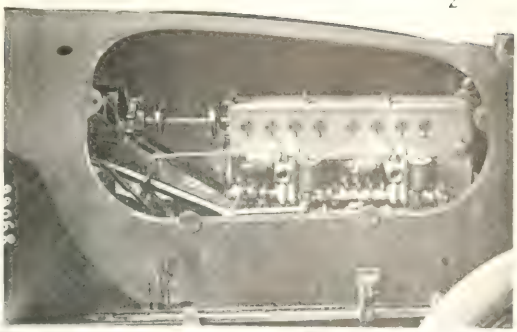
Side view of the two-litre Fiat, showing how the underpan conforms to the streamline form



Two views of the winning Fiat which was characterized by excellent streamlining resulting from the work of the Fiat aviation department. Even the side members of the frame were swept in at the rear. Note the unusual cross member to which the rear end of the rear spring is attached

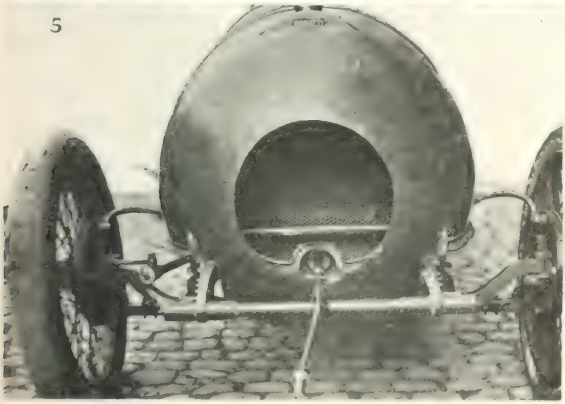
The winning Fiat had no trouble whatsoever. Felice Nazzaro went through the race without lifting the hood of his car. During his one stop he took on gas and changed both rear tires. Bordino stopped twice for plug changes; he also took on oil during the race. On the 49th lap Bordino ran out of gas. On these cars the oil supply was in a dashboard tank behind the engine, and above this was a smaller tank in two compartments, one of which contained a gallon of gasoline and the other a small supply of kerosene for

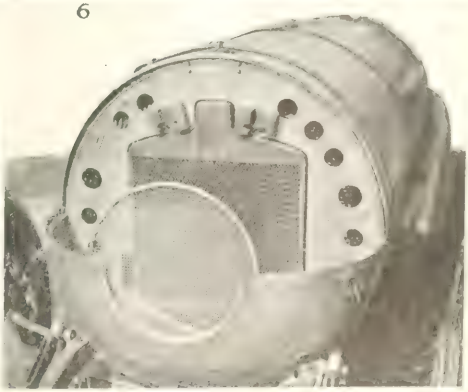












1—Winning six-cylinder Fiat engine, showing double "Y" manifold with single carbureter. 2—Bugatti eight-in-line engine, showing magneto drive from rear end of overhead camshaft. Magnetos are mounted on the dash. 3—Tail of Bugatti, showing opening for exhaust gases. Note also the stream lining, and the peculiar cantilever rear spring. 4—Front end of winning Fiat, showing tubular axle, through which the springs pass, and front wheel brakes. 5—Front of the Bugatti, showing peculiar front cowling, axle construction and front wheel brakes. 6—Front of Ballot with part of radiator cowl removed

the clutch. When the main fuel supply failed Bordino switched over to the reserve, and while he was filling up at the pits the mechanician reconnected the main gas line to the carbureter. This incident only lost him two minutes.

Biagio Nazzaro endeavored to stop a leak in the fuel tank but not being successful he pulled up on the following lap, lifted out his gasoline tank in two minutes and got away in 14 min. 25 sec. after having fitted a new tank and made gasoline and air line connections. This was only possible by the car having been designed to meet such an emergency.

Aston-Martin, an English firm, entered two four cylinder cars of only 1500 cc. (91 cubic inches) which, despite their handicap, made a good display until half distance, when one of them was abandoned with a burned out magneto armature and the other broke the magneto drive.

Technical interest naturally centers around the Fiats, designed by Engineers Fornaca and Cappa, because they proved themselves superior to all the others. Fiat was the only competitor to use steel cylinder construction, with sheet steel water jackets around each group of three, and the two groups placed very close together on an aluminum

base chamber. The valves, inclined in the head at 42 degrees, measured 39 mm. in diameter and each one had three concentric springs. A vertical shaft and bevel gearing at the rear drove the two overhead camshafts and a very light follower was used between the cam and the valve stem. There was a roller bearing between each pair of cams.

ONE of the features of this car was the very successful use of a type of roller bearing designed and produced in the Fiat shops. For the crankshaft, which was in one forging with balanced throws, there were eight roller bearings. The rods were H-section with split ends and two bolts, also with roller bearings. The wrist pin worked direct in the domed head aluminum alloy piston, which had two rings. A single Scintilla magneto was used and fired K.L.G. plugs placed centrally in the head. This magneto was of the fixed type but with an ingenious system by which the timing could be varied. Originally it had been intended to use two carbureters, one for each group of three cylinders, but in the race a single Fiat carbureter was employed, with an unusual type of cast aluminum intake manifold of small section forming a double "Y."

Unit construction of engine and gearbox with direct attachment to the frame members and center control for the four speed gearbox were employed. For the first time in racing Fiat used an enclosed propeller shaft. Drive was thus transmitted through the spherical head, just back of the gearbox.

An unusual type of tubular front axle was used. It consisted of two forgings fitting one into the other, pinned together and slotted to overcome any tendency for one-half to turn in relation to the other. The short semi-elliptic springs went through the axle itself, and the lower arm of the Hartford shock absorber was bolted to a lug forged on the axle. The upper arm of the shock absorber was attached to a yoke on the oval section front cross frame member, instead of to the side frame members. In addition to this, rubber bands were placed around the axle and the frame, just ahead of the axle. The front wheel brakes were operated by toggles instead of cams. A short lever on the top of the steering head had its inner end attached to the toggles operating the brake shoes, and the end outside the drum attached by a ball and socket to a rod going through the king bolt. A chain on the lower end of this rod passed around a small sprocket underneath the steering knuckle, and connection was made from the lower end of this chain to a bell crank on the axle by a rod with wing nut adjustment on its end. From this crank to the pedal, connection was by means of steel cables to the servo brake operating mechanism, these cables going through the underpan, passing through copper tubes to prevent chafing.

All the competitors had paid very close attention to streamlining, but the Fiats were the most pleasing in this respect. This feature of design and construction had been turned over to the Fiat aviation department, which produced a body of exceptional lightness and perfect lines. To get the best shape, the main frame members gradually swept in from the center to the rear, so as to follow the outline of the tail. The mechanician's seat was staggered about 8 in., and the space back of the driver's seat was used for the mechanician to obtain a grip. The fire extinguisher and a thermos bottle were carried in this compartment, so that the mechanician had his hand on the extinguisher practically all the time. Another good feature of the design was the provision made for rapid dismounting of the gasoline tank. The value of this was shown when Biagio Nazzaro broke connections and lifted the tank out in less than two minutes. All the under portion of the car was as carefully streamlined as the upper part, the axle and shock absorbers being inside the pan. At the front the steering drop arm was inside.

Bugatti had a big circular cowl around the radiator, with a large hole for the passage of the air. A long circular section tapering tail, having the exhaust going through it, was employed. Ballot had a somewhat similar general arrangement in front, with a much narrower pointed tail and external exhaust pipe. The Fiat arrangement of riveting the exhaust collector to the body, thus making use of it to stiffen this latter, was very good.

MINIMUM weight was fixed at 1433 lb. The 91 cu. in. Aston Martins were below this weight and had to carry ballast. The Fiats had the exact weight. The Bugattis averaged 1630 lb., and the Ballots were the heaviest, for Masetti's car scaled 1850 lb.

Tires gave wonderful service, there not being a single blowout and only one or two punctures. The winning Fiat changed two rear tires as a precaution; but the other Fiats did not make a tire change. Pirelli straight side cord tires, 30 x 3½ front and 31 x 4 rear, were used in these cars. Sunbeams used the new Dunlop straight side cord tire. Ballot and Rolland-Pilain had Michelin clincher bead tires. For the first time in a European road race all the competitors went away without a spare wheel.

Cars in the Fuel Consumption Race

THE Peugeot cars in the so-called "fuel consumption" Grand Prix, were fitted with a new type sleeve valve engine which will be put on the market next year.

Empty, the cars were required to weigh 3086 lb.; with the driver, ballast representing three passengers, nearly 32 gal. of gasoline and oil, two spare wheels, spare tubes and tools, they scaled at least 4400 lb. when ready for the race.

There were no tire troubles in this race, either on the Michelin equipped Voisins or on the Peugeots with Dunlop straight sides. Because no outside assistance of any kind could be given, the drivers carried three spares, but experience showed that a single spare wheel would have been a sufficient precaution.

In the case of the Voisins a modified sporting type chassis was used, with a sleeve valve engine of 95 by 130 mm. bore and stroke. The compression was considerably increased and dry sump lubrication with air circulation through the base chamber was made use of. Ignition was by both Scintilla magneto and battery, with a special type of plug known as the Jam, having water circulating through it. A Solex carbureter was used on the winning cars.

A SELF-CONTAINED horizontal press for general work has been placed on the market by the Oilgear Company. It has a capacity of 25 tons at pressing speeds of from one-quarter to six in. p.m. The maximum ram speed in the direction of the work is 37 in. p.m. and the maximum return speed 56 in. p.m. The ram speed can be changed instantly by means of a small handle controlling the variable stroke pump. A constant speed two hp. electric motor drives the pump.

Needless Numbers Are a Nuisance

Factory service costs can be reduced by elimination of useless numbers in shipping and receiving materials. Fifty cents' worth of bolts often have ten numbers attached to them. "System" is often carried too far and is no substitute for clerical intelligence.

By Dwight Davis*

TO-DAY there came to my desk a typical Shipping Advice: it had the usual serial number, say, 25789, and meant that one of our customers had ordered and received some bolts that were not exactly what he wanted so he was returning them for exchange.

This Shipping Advice carried the usual data as to routing, date of shipment, etc., and also afforded the rather elaborate and interesting information that:—

1. Shipment was covered by Bill of Lading No. 1220.
2. The bolts had been purchased on Purchase Order No. 41144. Req. No. 6754.
3. We had shipped them on *our* Shipping Order No. 2387, Bill of Lading No. 9834.
4. The customer had received them on his Receiving Report No. 9678.
5. His inspectors had found them incorrect and so reported on Inspection Report No. 2121.
6. The customer's Accounting Department was sending us Debit Memo No. 11556.
7. He would immediately send us a new Purchase Order No. 46876, Req. No. 8890 to secure the bolts he really did want.

These bolts, by the way, are worth about half a dollar.

THIS article tells how to simply work and save money. It is written from practical experience and applies definitely to nearly every factory in the automotive industry.

* * *

The writer not only shows how many needless numbers confuse clerical practice and add to overhead expense, but also presents a constructive plan for solving the difficulties. Every executive interested in the handling of parts will want to read this interesting discussion.

Exaggerated? Not a bit—it is only a typical example of the frequent use of a procession of "needless numbers" to record the simplest sort of transaction.

There's something radically wrong, if "system" calls for so many clerical operations, transcriptions, and repetitions, to say nothing of the filing involved.

Of course, records are needed, always, and regardless of the values in question. Dozens of cases like this come up daily and various internal departments must be provided with their individual records of each transaction.

The same principles, however, that have so often reduced the special sizes and shapes in manufacturing can well be applied to office practice. Many steps can be eliminated; numerous "forms" can be discarded and the whole process simplified by using fewer papers but making each tell more nearly the whole "story."

The various forms in the case illustrated undoubtedly supply records of each step in the transaction. Considered independently, each seems ideal for its purpose, but standing alone is hardly intelligible; it must be tied up to all the others to get the real truth or to understand just what the thing is all about.

Right here lies the grave danger of carrying so-called "system" too far; the danger of too great subdivision of clerical operations into so many apparently simple steps that only average intelligence is needed to handle any one of them.

It can only result in an office-full of mediocre clerks instead of potentially future executives. We are too often discouraged by the erroneous assumption that clerical forces can only be recruited from a class of only average intelligence. We don't choose as carefully as we might, and then we supply the deficiency by means of a lot of inferior tools in the shape of "fool-proof" forms that "anybody can handle."

It is said that the late John H. Patterson, of the National Cash Register Co., believed he could at any time "fire" his general manager and hire a new office-boy, and things would go on as smoothly as ever.

He meant, in other words, that each employee had been selected with a view to some day filling the job just above him.

This method is the only sure way to build up a really efficient personnel. Each new employee should then be trained in the atmosphere of the basic principles of orderly, logical office operations and learn the real purpose of the whole organization as fast as he is capable. If need be, he should be dismissed the moment it is found there is only one thing he can do; for many a system or process has been founded on the limitations of the clerk, apparently with the idea that if he can only understand a little, we must devise some simple little job for him to do and then some other little step for each other little clerk. Thus many simple jobs of filing or recording or indexing are countenanced and continued just because "it is convenient and doesn't cost much?"

These operations multiply rapidly, and two distinct losses result: clerical operations and records are often duplicated, and, transactions which could be readily handled by extra

*Assistant Service Manager, Timken-Detroit Axle Co.

copies of a single carefully designed "form" telling a clearer story are needlessly complicated by a multiplicity of separate papers meaning practically nothing in themselves.

This is the principle which this article purposes to outline. The observations and suggestions which follow are the result of an experience of several years in the service departments of the Timken organization and others. Probably a service department affords a broader opportunity to study the varied processes of a great many concerns, because service operations cover both incoming as well as outgoing movements of materials, so to speak.

In our own case the problem has to do with the recording and shipping of orders for a largely assorted stock of automotive parts to hundreds of different customers. After several years in the business we felt we had built up a rather ingenious system. As is usual, we thought the first thing to do with an order was to translate it into our own language; to give it our own serial number and then request our customer "to use *our* number in future correspondence, etc."

We filed the customers' orders in one place, our correspondence in another, and of course we had to have another file for the papers to which we had transcribed the orders. Naturally such a plan called for the usual schemes of cross-indexing, registering, transcribing, etc.

Anyone at all familiar with every-day office practice will recognize the picture, without our going into detail here. With local variations it is the same general plan in use everywhere.

A Natural Filing Method

NOW compare it with the following brief outline of a much more natural, simpler, easily understood method based on the principle that the customer's "reference" or his "order" or his "number" is likely to be the key to every inquiry that may be made about a specific transaction, in the future; in other words, let's adopt the customer's method as far as we can—not only because he *is* our customer and so entitled to whatever courtesy we can extend—but because it is really the most commonsense plan after all.

File the order, attaching thereto all letters, memos, stockroom orders, shipping documents, etc. Use the customer's number as the only numerical reference to be considered. Each one will of course have his alphabetical division in the file and his orders will naturally fall into more or less chronological sequence as his numbers run along. Incidentally, if he happens not to have given a formally numbered order for some item whose shipment is requested simply by letter perhaps, the date of such letter, particularly if written thus:—"1003" (meaning Oct. 3rd), or perhaps "924" (meaning Sept. 24th), will furnish just as convenient a filing key as any other.

In the Claims Division of our Service Dept. an unusual opportunity has been afforded to study the methods of many different concerns. They stand high in the business world as models of so-called efficiency. Some of them maintain efficiency departments. Their clerical processes seem logical and necessary. The forms used are well designed for their specific purposes. Their various filing systems are standard and afford rapid reference—but most of them appear to be founded on the theory that not only the clerks who handle each file, but even those outside the immediate organization understand the system followed, as well as though specially trained therein. This statement needs no further proof than the experience we so often have when writing to another concern about one of *our* orders and being requested to quote *his* "reference number" before our inquiry can be understood.

In other words the average system is not only intricate for those who sponsor it but even more so to those it ought really to serve.

In the bolt incident responsible for this discussion, every document in the whole chain might just as well carry the same serial number, provided each paper is properly dated. As a matter of fact the date itself is merely a "number" in a different guise.

Granting without argument that each recording operation relating to those famous bolts is necessary, in some form or other, let us first consider the possible danger of confusing one "form" with another. In the first place, the title of the average form usually automatically describes its function. In correspondence, in oral reference to it, in all cases we always refer to it as "Purchase Order No. 1333" or "Credit Memo No. 1333" or "Bill of Lading No. 1333" as the case may be. The title and the matter written on it clearly identify it. There's no possible chance of confusing it with any other form. The serial number in itself tells nothing; it only suggests an indexing process, or a cross reference, or a method of filing.

If, through habit—there is no other logical reason—we *must* use a serial number, let us by all means adopt a system of numbers that not only mean something but which can be automatically originated by the writer of each document and be at once understood by each reader thereof.

In our modern civilization there are two devices we use daily, in fact almost hourly, and yet we somehow or other haven't seized the splendid opportunity to adapt them to the simplification of this endless maze of arbitrary serial numbers in which we are all involved. We have the calendar and the clock. If we look at the calendar and read "June 21," we may perhaps write it as "6/21"—we could just as well write it, "621." We glance at a watch and note that it is "half-past-ten;" we write it, "10:30" and yet we might just as well write it, "1030."

If it could be generally understood that every paper, every document, every order, even every letter we write carried the date as well as the "hour" and these "numbers" were written in the style just described, we should never more need an index or a register of any sort to record them.

This modified method of writing dates is mentioned here only as showing the possibilities of such a plan—such numbers however, with their inherent intelligibility might well add to the benefits to follow the general scheme of using only one number to identify each of the several forms in the bolt matter before mentioned.

Records Kept Chronologically

TO return to our illustration—A Purchase Order No. 621 is issued for 150 Automobile Axles of a certain design, the order being dated, say June 21. On June 24, 70 axles are received, and recorded on "Receiving Report No. 621," *dated* June 24. Thirty of these axles are not exactly according to specifications, so they are to be returned and "Shipping Order No. 621," *dated* June 24, is issued to accomplish it. Right here a very natural question arises—suppose more than one lot is received the same day perhaps. Isn't there some danger of confusing one lot with the other? Not if each document in the case tells its full story. The trouble with the average form in present day practice is that it is too abbreviated; too much dependence is placed on the distinctive character of the form itself rather than to make the very simple and common sense effort to fill in one or two minor items of information that would tell the story just a bit more clearly.

Incidentally, if the "time" were shown on each one of the papers used there could never exist any confusion as to the specific lot in question.

Now let us go a bit farther—When the 30 rejected axles are returned to the maker, a Debit Memo No. 621, *dated*

June 24th may be issued by the buyer. A little later 30 axles to replace those returned will be delivered by the maker. They will be applied against the same order No. 621 and reported again on a Receiving Report No. 621, though the record in this instance will be dated perhaps June 27th.

This process can go on indefinitely. The idea that each separate step in the transaction must be dignified with its own special serial number is not only unnecessary but well-nigh ridiculous. If each paper tells its story clearly, how much better the plan than to wade into the typical chain of needless numbers. In the proposed plan each step is clear to anyone who reads; in the usual system no one can understand a single paper without referring to all the others.

FOR instance, if an inspector rejects an article he knows it will be returned to the supplier. There is therefore no real reason why he shouldn't then and there write the Shipping Order himself without delay. Certainly his reasons for the rejection are of interest to nearly everybody who comes into contact with those articles.

Were it not for our unfortunate loyalty to habit—nothing else, for we've lived so long with the idea that each form must be made in just a certain way and that it would be treason almost to break into the sequence of serial numbers—we might in the case just described, make at one operation, a Shipping Order, a Packing Slip, a Debit Memo, a record for the Purchasing Department, and also a copy for the Receiving Department, which will necessarily be on the lookout for the new axles in replacement of those rejected. The trouble is, we have become so accustomed to having our printers assign numbers to the forms we use that we simply can't imagine assigning simple, intelligible, logical numbers to them ourselves. We have already told how in our own business we adopt the customer's number as our filing reference in the filling of his order. Were every customer using the standard system of numbering his orders by the "calendar and clock" method, what a simple, clear, interesting thing every order would be.

THE attempt to separately identify purchase orders, as is the usual practice, is a good deal like expecting a bank to tag each separate dollar that one deposits.

Certainly when we go to a bank to withdraw these dollars, we do not expect to receive the identical pieces of money which we gave the teller.

Right here it should be stated that there can be no possibility of numbering two orders the same, simply because it is practically a physical impossibility for a typist or in fact anybody to write more than one order in a given minute. Thus if it is at all possible that more than one order might be issued to the same concern in a day, the first one would simply be numbered 621-801 and the next one, 621-802—meaning that they were both issued June 21st, but at one minute and at two minutes after 8 o'clock respectively, and even if more than one typist be engaged in writing orders the chance of both writing identical orders on the same supplier at the same moment is negligible. Neither is there any difficulty about filing, because each suppliers' orders are filed under his name only.

Another plan for reducing "needless numbers" in connection with the issue of "manufacturing orders," or Shop Orders as they are usually called, is under way in our own plant. We follow the usual practice of designating various parts of our product by "part numbers." From time to time we issue orders to make certain quantities of this or that to replenish our stock. It was formerly the custom to issue these orders under arbitrary serial numbers. Each called for a definite quantity. Naturally at times the shop might be working on more than one order at a time for identically the same part. This meant keeping records of the progress of each order, and the question as to the status of each order was apparently given more attention than the more vitally important question of "how many are there on order and how soon will they be completed."

For practical purposes it makes no difference how each particular order stands nor is it really necessary from a cost keeping standpoint, because in the final analysis the cost of any article is best determined by the total of labor, material, and overhead chargeable to it up to the end of a definite period.

We therefore use our "part number" as the serial number of the Shop Order, and simply date the order, which of course would be done in any system. Thus when we need 500 pieces of part "T6834" we issue "Shop Order No. T6834" for 500 and begin charging labor, material, and overhead to that number. So far we have had no trouble about segregating separate "lots," for if they do appear for any reason on the same date we simply show the clock hour on the document which may be the cause of possible confusion and the thing is solved.

The lengths to which such a numbering plan can be carried are without limit. It will work anywhere the "serial habit" exists.

Returning once more to the "multi-numbered" bolt problem it is obvious that after the original Purchase Order No. 41144 was issued, it should never have been necessary to issue another order No. 46876 at all in order to procure the entire quantity contemplated by No. 41144. Furthermore, if these same bolts were secured from several different sources of supply there is no logical reason why the same purchase order number should not be issued to each supplier. It could cause no confusion in the Purchasing Department, because each separate order would file in the name of the separate supplier; in the Receiving Department the goods would arrive identified by the documents of the respective suppliers.

In reality, the purchasing department records would be simplified, for, it would require the simplest sort of a "single entry" record in which the debits would consist of quantities ordered from time to time and the quantities rejected and returned to the supplier, while the credits would be the gross receipts. The balance would always represent the amount due on the order.

THE prevailing plan of issuing new orders to make up unfilled balances can only result in additional needless clerical processes and confusion. After all, the principal question in the procurement of material is not the condition of an individual order but rather the consideration of the total to be delivered, regardless of the particular scrap of paper on which the specific delivery be made. The attempt to separately identify purchase orders as is the usual practice is a good deal like expecting a bank to tag each separate dollar that one deposits. Certainly when we go to the bank to withdraw them we don't expect to receive the identical pieces of money we gave the teller.

It must be understood of course that the plan to number a shop order or a purchase order with the "number" of the article in question can be applied to *all* orders, for naturally many orders cover several entirely different kinds of material; in such cases the proper plan is to use the "calendar and clock" method.

Probably one of the most interesting results of the scheme is that the date and the hour very often help one to instantly recall some incident or circumstance that relates to the issue of the paper in the first place; the mere mention of the number has a significance, and tells a real and sometimes complete story that a lifeless, arbitrary serial number never could.

Without any idea of usurping the duties or the authority of a Purchasing Agent, it happens that in most concerns several different persons may really initiate purchases. If order forms in general were unnumbered, there could be no good reason why pads of such orders could not be given to such authorized persons who could fill in the description of thing wanted, even in some cases giving the name of the supplier, and send such orders to the Purchasing Agent for approval and formal signature, without going through the needless process of writing the typical requisition. The usual order-form contains all the data as to routing, terms, packing, marking, etc., anyway, which conditions apply to all purchases, and in reality are nothing more than "letters" with certain portions printed instead of typewritten.

The reasons for most systems of "needless numbers" are not hard to find. Some are the attempts to set up so-called "foolproof" methods. Others are the outgrowth of perhaps a sudden momentary demand for certain statistics the "manager" wanted one day—and has never wanted again—but the compilation has gone on just the same to anticipate a possible future request. Still others are the result of the natural growth of a business, calling for the subdivision of records or operations or departments, it being necessary to add help to do the job or to assign certain work to specialists.

Many systems grew up in the abnormal period of the war. The emergency was often met by the addition of untrained clerks in positions where the greatest speed could be gained by dividing processes into simpler operations within the mental range of the clerk. He simply became a machine to turn out so many bills or so many orders without any knowledge of, or sympathy with, the other steps in the general process.

As business and industry return to normal, as simplification in mechanical processes are necessary to the very existence of the whole structure, so must we return to a firmer foundation in office detail, not only to conserve our mental and our physical faculties but to retain a true picture of the thing we are really trying to accomplish and to gradually build up a personnel in office organization that will give us a generation of really competent people who are able to vision the forest rather than the lone tree.

In its final analysis a "form" is no more nor less than a letter in print. It is designed only for convenience or to save a certain amount of handwriting. The tendency seems to be however to make of it a thing of mystery, sometimes an impersonal thing, complicated and hard to read.

Let's make them a bit more human—give them a bit more life, more romance if you like—instead of creating a parchment of hieroglyphics that mean as little to the average reader as the mysterious carvings on the tombs of Egyptian kings.

Synthetic Woods for Industrial Purposes

OUR Berlin correspondent reports that Carl Leyst, a textile expert and chemist, has succeeded in developing a process for producing what he calls synthetic woods, from such materials as straw, alfalfa, esparto grass, rice straw, corn stalks, banana leaves and bamboo. He claims that these synthetic woods are capable of replacing such natural hardwoods as mahogany, beech, birch, lime and walnut. Efforts made heretofore in producing strong and resistant substances from the materials named necessitated bleaching of the raw materials, which rendered the processes too expensive, and, besides, the strength and homogeneity of the products left much to be desired. No bleaching of the materials is required with the Leyst process, and the finished product can be given any color from a bright yellow to a deep black, so that after polishing it has the appearance of genuine wood.

The synthetic woods produced in this manner are claimed to equal natural woods in most of their properties and to excel them in some; and, what is of great importance, they can be produced at lower cost than natural wood. The process seems to hold out special promise to countries in which no hard wood is grown.

Our correspondent was shown samples of synthetic wood made of unbleached straw, of which one side was polished, another showed saw tooth marks, another file marks and a fourth a ruptured section which clearly showed the wood structure. Smooth drill holes were also shown. After preliminary tests on this new material a statement was issued to the effect that this straw wood can be sawn, drilled, filed, planed and polished like good walnut wood, that it burns 30 per cent less rapidly than natural wood and can be made absolutely fireproof by a special process invented by Leyst. It can be glued like natural wood, can be molded, is heavier than water, has a specific electrical resistance of 300,000 ohms and is very little affected by atmospheric changes.

What renders the cost of production comparatively low is the fact that the expensive bleaching process is eliminated. It appears that the industrial application of the material is still in its very first stages, but if the claims as to qualities and cost of production can be substantiated there is no doubt that it will have a wide field.

In connection with automobile bodies it is suggested that these could be molded either in a single piece or in two or three large pieces that could be suitably fastened together. Such a body, it is claimed, could be given a color surface layer ¼ in. deep, as bright and lustrous as the ordinary varnished surface but far harder. For closed bodies the new material is believed to be particularly suitable, partly because it has strong noise-insulating (non-sonorous) properties. Other suggestions for the use of the new material are in molded road wheels, battery boxes, combined cowls and instrument boards, etc. A large established firm in Germany is said to have taken up the manufacture of the wood.

A GASOLINE motor railroad car of improved design has just been completed by the P. A. Thomas Car Works, High Point, N. C., for the Winther Motors, Inc., manufacturers of motor trucks at Kenosha, Wis., who built the chassis equipped with a four-cylinder 60-hp. motor of the Wisconsin Motor Co., Milwaukee, Wis.

This car was given a try-out on the Carolina & Yadkin River Railway between High Point and Thomasville, N. C., the results of which were declared to be wholly satisfactory. The car weighs six tons, carries sixteen passengers and has a baggage compartment. It will pull a trailer with a carrying capacity of about 40 passengers. Its maximum speed is 35 miles an hour and it is designed to take the place of small trains on branch lines, being more economical to operate and also more convenient.

New Departure Produces New Type of Bearing

Is intended especially for use in front wheels and designed to take both radial and thrust loads. Resembles cup and cone type, but has substantial races which resist distortion under heavy pressure.

THE demand for ball bearings of a type specially for installation in front wheels recently led the New Departure Mfg. Co. to make an extensive study of the conditions governing the design of this type of bearing. It was concluded that there are several reasons which necessitate a bearing of special design for the front wheels.

In turning corners the heavy side reaction, due to centrifugal force is taken between short bearing centers, inducing heavy radial loads, which are said to require specially proportioned raceways to prevent deformation. This, combined with a considerable thrust load, was concluded to make it advisable to employ a different contact angle from that usually found in the standard type of bearing. A new design of bearing has therefore been developed to overcome these objections and produce an installation which will, it is thought, give maximum mileage with no need of mechanical attention beyond the initial installation. A cut of this bearing is shown in Fig. 1.

The five points which governed the main dimensions of the bearing were found to be as follows:

1. The safe fiber stress in the spindle determines the size of the bore of the inner races of the bearings.
2. The overall length of the hub must not be so great as to project beyond the fender line. This determines the position of the outer bearing.
3. The distance from the axis of the king pin to the point of contact of the front wheel tire with the ground must be as short as possible so as to provide ease of steering. The fulfillment of this condition determines location of inner bearing.
4. The bearings themselves must be so proportioned as to safely carry any load which may be borne by the spindle and must be provided with relatively heavy outer race sections so as to carry road shocks with a minimum of circular deformation.

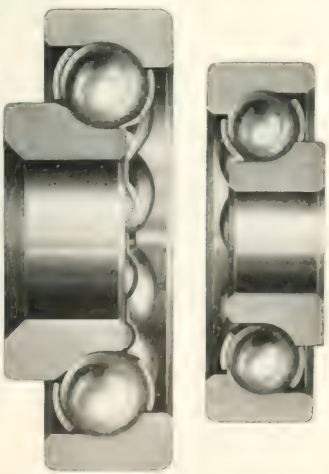


Fig. 1—The new type of New Departure bearing for front wheel applications

5. The bearings must be so designed that the wheel may be most readily mounted on or demounted from the spindle and at the same time admit of the most efficient dirt closures at the inner end of the hub.

Having determined these factors, a study was made of car weights in order to determine the maximum loads on front wheels, consideration also being given to the diameter of the wheels used. The information collected indicated that a division of the cars into six weight classes was desirable.

Fig. 2 shows the manner of installing the new type of bearings in a front wheel hub. The cone or inner race is so formed as to allow the felt dust washer to run on its surface, this surface being ground in order that there will be no danger of the felt being torn and rapidly worn out, as it might if a rough machined surface was left at this point. Experience has shown that the diameter at the contact points between the rotating felt washer and the stationary member should be as small as possible in order to reduce the velocity and consequent wear.

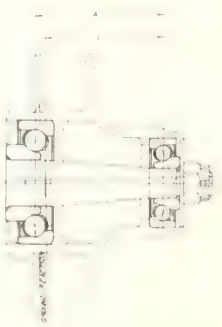


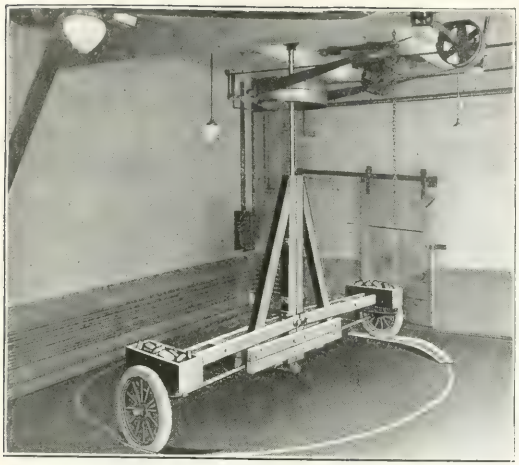
Fig. 2—Method of mounting bearing on front wheel spindle

The tongued washer under the castellated nut should be about one-eighth of an inch smaller than the outer diameter of the cup or outer race, so that in the event of ball breakage there will be no danger of the hub slipping off the spindle.

The maximum weight for a given wheel size on the front wheels of the cars is as follows:

Hub No. 1—30 in. wheel—1100 lb.
Hub No. 3—32 in. wheel—1300 lbs.
Hub No. 5—32 in. wheel—1500 lb.
Hub No. 7—34 in. wheel—1750 lb.
Hub No. 9—34 in. wheel—2000 lb.
Hub. No. 11—35 in. wheel—2500 lb.

The statement has often been made that a ball bearing is not suitable for frequently applied shock loads. In order to test this out, the machine shown in Fig. 3 was built. It consisted primarily of a vertical revolving shaft supporting two pivoted members at the extreme end of which were cast iron weights. These weights were mounted on two semi-elliptic springs and standard front wheel hubs were



mounted on the axles. The inner end of the axles were supported in cast iron collars at a distance from the springs equal to the spring centers of the average car, the weight on the springs being greater than that for which the bearings were recommended. This machine ran at a speed of 20 miles per hour around a circle whose diameter was 15 ft., there being two obstructions on the track. One had a rise of $3\frac{1}{2}$ in. and formed an angle of 20 deg. The object of this obstruction was not only to impose a shock load, but also to create a thrust load on the bearings similar to that obtained when turning the average corner of 140 ft. radius at 25 m.p.h. The other obstruction allowed the wheel to drop 2 in.

This machine is reported to have run continuously day and night for thousands of miles with absolutely no failure of the bearings. There was, however, continued spring breakage and, on the average, tires were worn down to the fabric at the end of 19,000 miles.

Fig. 3—Device used for testing the new bearing under heavy load. The track is formed to impose shock as well as thrust loads

A Resilient Motor Truck Wheel

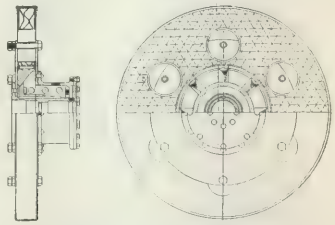
Springs in Hub Permit of Eccentric Motion of Wood Disk—Can Be Adjusted to Accommodate Various Loads

THE operating speed of motor trucks has been increasing in recent years but is limited by the shock-absorbing or cushioning qualities of the tire and spring equipment carried. Some manufacturers of medium-size trucks, from 1 to 3 tons, have gone to pneumatic tires, but the majority of these trucks continue to be fitted with solid tires with comparatively little resiliency. The need for better cushioning of trucks is indicated, on the one hand, by the introduction of pneumatic tires of the giant type, as already mentioned, and on the other by the recent development of a type of tire intermediate between pneumatics and solids, known as semi-pneumatics.

Some engineers see the solution of the high-speed trucking problem in some form of resilient wheel which will partly absorb road shocks before they reach the axle. Many forms of resilient wheel have been brought out, and they have been divided into three general classes, according to whether the resilient element is located in the hub, the spokes or the rim. The wheels might also be divided into classes according to the kind of resilient member used, steel springs, rubber cushions or pneumatic cushions.

A wheel with a steel spring in the hub is manufactured by the J. F. Davis & Sons Co. and is known as the Stopshock wheel. It is essentially a wood disk wheel, the wooden disk being provided with sheet steel armoring and mounted slidingly between two steel disks or flanges carried by the hub. Centrally within the wooden disk there is a steel cone, which co-acts with another metallic cone adapted to slide on splines on the inner member of the wheel hub. Within the hollow hub there is a coiled spring which forces the two cones together and causes the wheel to assume a position concentric with the hub or axle when there is no appreciable load on the wheel. The two flanges guiding the wooden disk are braced or steadied by bolts and spacer tubes extending through holes in the disk. When the wheel receives a shock, it will assume a position eccentric to the hub, and in so doing will compress the coiled spring. As soon as the shock has been absorbed the spring will force the wheel back into the concentric position again. A cushioning range of from 1 to $1\frac{1}{4}$ in. is obtained in this way.

At the outer end of the hub the spring bears against a plate which can be adjusted laterally by means of four studs, and thus the cushioning action of the wheel or hub varied. For instance, if a long trip were to be made under full load the spring could be adjusted to give its full range of deflection under shock with full load, whereas for similar trips without load the spring would be relieved of some of its pressure. For ordinary short trip hauls it would, of course, be hardly practical to adjust the springs to the load, although all four wheels can be adjusted in about 20 minutes' time. The action of the resilient hub can be nicely demonstrated by mounting a scriber on the hub flange and letting it scribe on a chalked surface of the disk. The scriber will clean a substantially circular space on the side of the disk of its chalk and the radius of this circle denotes the range of resilient action. The mechanism within the hub is lubricated with graphite.



Sectioned views of Stopshock wheel

Among the claims made for this wheel are that it permits of increasing the speed of trucks and that it saves the tires and economizes fuel. The smoother suspension makes the driving of the truck more pleasant, and it tends to preserve the goods transported. Side thrust seems to be well provided for, and driving shocks cushioned, yet the construction is simple.

Lewis Constants Determined for Long Addendum Gears

Method of obtaining value of constants for full strength formula. Long addendum pinions with small number of teeth materially stronger than standard pinions, but gears are weaker. Consequently long addendum principle is of value only in large reduction sets.

By P. M. Heldt

ONE of the methods of obviating large undercut in pinions with a small number of teeth—which has a tendency to weaken the pinion—consists in dividing the working depth unevenly between the addendum and the dedendum, making the addenum of the pinion greater. The practice of making the addendum equal to seven-tenths of the total working depth has been followed especially in bevel gearing, and this type of gear is known as the long addendum gear. To mesh properly with the pinion, the gear teeth are made with an addendum equal to seven-tenths. It appears that the values of the constant y in the Lewis formula for gear strength have never been worked out for this type of gear, and, therefore, although it is quite obvious that in the case of a pinion with a small number of teeth the long addendum tooth is stronger than the standard tooth, it has never been determined just how much stronger it is. These values, of course, are known for the standard form of tooth for pinions with any number of teeth, and equivalent values are also known for stub teeth.

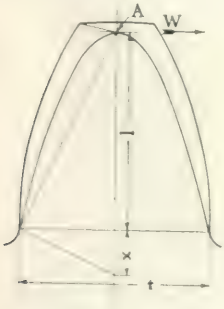


Fig. 1—Tooth outline of 18 tooth long addendum pinion

The Lewis formula is based on the assumption that the whole load on the gear is taken on a single tooth, that it is equally distributed over the whole width of the tooth, but that under the most unfavorable conditions it comes at the extreme outer end of the tooth flank. The tooth pressure is normal to the flank, and, therefore, makes with the center plane of the tooth an angle referred to as the pressure angle which in this type of gearing is usually equal to 14½ deg., though 20 deg. long addendum gears also have been made. At the center of the tooth the pressure therefore takes effect at the point A (Fig. 1). The tooth then acts as a cantilever beam, and use can be made of the rule that a cantilever beam loaded at the free end, in order to be subjected to uniform bending stress, if of uniform width, must be made of parabolic vertical section. Therefore, if we draw inside the tooth outline a parabola with its apex at A, its two branches tangent to the flanks of the tooth at points near the base, we get a parabolic, uniformly stressed beam of the same strength as the tooth. Then, designating the tengential load on the gear by W the distance from this point A to the line connecting the two points of tangency between the tooth outline and the parabola by l, the face width of the tooth by f, the thickness of the tooth at the points of tangency (evidently the weakest section) by t, and the working stress by S, we have

$$W l = \frac{S f t^2}{6}$$

from which it follows that

$$W = \frac{S f t^2}{6 l}$$

Now, by similar triangles,

$$\frac{t}{2} = \frac{x}{2}$$

and, therefore,

$$x = \frac{t}{4 l}$$

Substituting in the equation for W,

$$W = S f \frac{2 x}{3}$$

or

$$W = S p f \frac{2 x}{3 p}$$

and denoting $2x/3p$ by y we get

$$W = S p f y,$$

which is the Lewis formula. The above reasoning shows how the value of the constant y may be obtained from the outline of the pinion tooth.

The long addendum system is not a universal system and is intended only for sets with a comparatively large reduction ratio, such as is used in automobile rear axle drives. No definite lower limit for this ratio has ever been set. Since the gear has a greater dedendum than a standard gear, it is obvious that the gear or driven member is weaker than a standard gear of the same number of

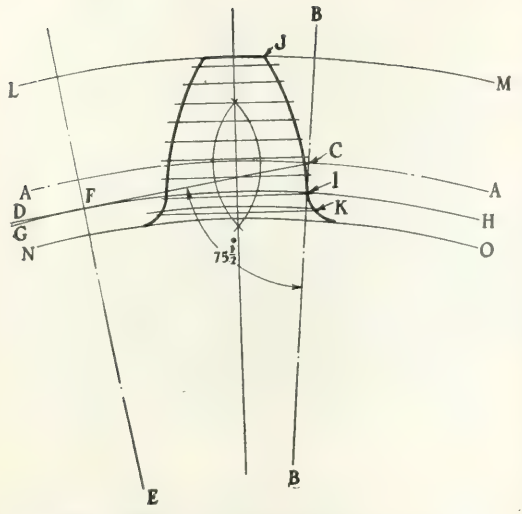


Fig. 2—Method of laying out tooth section for long addendum pinion

teeth, and if gear and pinion had nearly the same number of teeth, the gear would be weaker than the pinion and the set would be weakened instead of strengthened by the unequal division of the working depth between addendum and dedendum. The long addendum rack is identical with the standard rack and therefore has the same strength.

To those not familiar with the method of drawing accurate outlines of teeth of this kind the following description of the process may be of interest. Generally a diametral pitch of 1 is worked with, as this gives a tooth outline sufficiently large so it can be drawn with a fair degree of accuracy yet not too large to necessitate the use of unwieldy instruments. Let us take the case of a 12-tooth pinion, which evidently has a pitch diameter of 12 in. (Fig. 2). First an arc *A A* is drawn with a 6-in. radius, and a radial line *B B* through the center of this arc. The point *C* where the radial line cuts the pitch circle is the pitch point. Through this point is drawn a straight line making with the radial line an angle of 75½ deg., assuming that the tooth is to have a pressure angle of 14½ deg. Next a radial line *E F* is drawn from the center of the pitch circle to this pressure line so as to cut the latter at right angles. The point of intersection of these two straight lines, *F*, is a point in the base circle of the pinion, that is the circle from which the involute curve of the tooth flank starts. That portion *I J* of the tooth flank outside the base circle *G F H* is an involute curve, which is described by the end of a cord as it unwinds from the base circle. Evidently the involute meets the base circle at right angles.

How Tooth Flank Is Plotted

The lower portion of the tooth flank, *I K*, below the base circle, is plotted by drawing a rack with teeth of the same pitch, pressure angle and relative values of addendum and dedendum as the gear which is to mesh with the pinion, on celluloid or tracing cloth, with the pitch line clearly shown, rolling this rack with its pitch line on the pitch circle of the pinion so the rack tooth flank will be in contact with the involute portion of the pinion tooth flank, and marking the path described by the corner of the rack tooth on the pinion drawing by means of a pin. This constitutes the lower portion of the tooth flank, except for that portion corresponding to the clearance.

In the case under consideration the total working depth of the tooth is 2 in., of which seven-tenths, or 1.4 in., is addendum, and three-tenths, or 0.6 in., dedendum. The clearance is equal to 0.157 in.

Having completed one flank of the tooth the thickness of the tooth on the pitch circle is next laid off. This is equal to 0.5927 times the circular pitch. The circular pitch of a 1-in. diametral pitch gear is 3.1416 in., hence the circular thickness on the pitch line is

$$0.527 \times 3.1416 = 1.86 \text{ in.}$$

This distance laid off on the pitch circle gives the point of intersection of the opposite tooth flank with the pitch circle. Next the distance between the two points of intersection between the pitch circle and tooth flanks is bisected, and through the point thus found is drawn a radial line which forms the center line of the tooth. Then by drawing a number of intermediate circles or lines perpendicular to the tooth center line between the outside and bottom circles it is an easy matter to lay out the second tooth flank from the one already traced and the center line.

The addendum circle *L M* and clearance circle *N O*, together with the tooth flanks and fillet circles, give the complete tooth outline.

Drawing the Constant Stress Parabola

Next the constant stress parabola has to be drawn in the tooth outline, and this must be done by trial and error. Referring to Fig. 3, the point *A* on the center line of the tooth through which the line of pressure passes is first found. Then a point *B* on the tooth flank near the root is selected through which the parabola may be assumed to pass. A rectangle *A C B D* is then drawn with

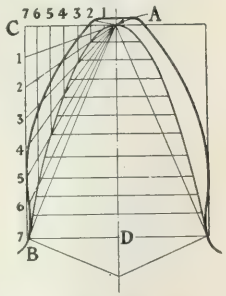
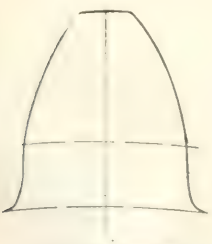


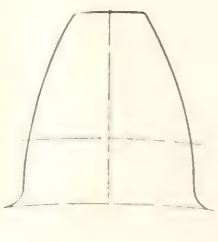
Fig. 3 — Drawing uniform-stress parabola inside tooth outline (8 tooth pinion)

the center line of the tooth as a base and point *A* and the assumed point of tangency of tooth flank and parabola as opposite corners. Sides *A C* and *C B* are divided into an equal number of parts, from point *A* diagonal lines are drawn to all of the division points on *C B*, while from the division points on *A C* are drawn lines parallel with the long sides, and the points of intersection of correspondingly numbered lines (starting from point *A* on the short side and from the outer end on the long side) are points in the parabola. The parabola is then traced, and if it is found that it does not form a good tangent to the tooth flank, another point of tangency, either lower or higher, is assumed and the procedure gone through with anew.

Tooth outline diagrams were drawn for long addendum pinions and short addendum gears with several different numbers of teeth and the values of y found for these and other numbers of teeth by interpolation. The results are

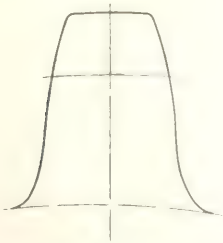


12 *tooth pinion*



24 *tooth pinion*

Fig. 4—Tooth outlines of long addendum pinion



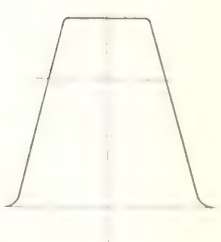


Fig. 5—Tooth outline of short addendum gear (48 teeth) and rack

given in the accompanying tables. It will be seen that within the limits covered by these tables, unless the gear ratio of at least 5, the teeth of the pinion will be stronger than those of the gear.

The benefits of the long addendum principle in certain cases is easily seen by comparing the Lewis constant for the same numbers of teeth for long addendum and standard teeth. Thus the value of y for a 12-tooth standard pinion is 0.067 and that for a 12-tooth long addendum pinion, 0.093. This shows a gain in strength of almost 40 per cent, but this gain is completely realized only if the long addendum pinion is used in combination with a gear of at least 68 teeth.

Values of factor y in Lewis formula for long addendum pinions with an addendum equal to seven-tenths the working depth.

No. of teeth	Value of y	No. of teeth	Value of y
8	0.085	14	0.096
9	0.088	15	0.097
10	0.090	16	0.098
11	0.0915	17	0.099
12	0.093	18	0.0995
13	0.0945	19	0.100
		20	0.101

Values of factor y for Lewis formula for short addendum gears with an addendum equal to three-tenths the working depth.

No. of teeth	Value of y	No. of teeth	Value of y
50	0.078	60	0.088
52	0.080	64	0.090
54	0.082	68	0.093
56	0.084	72	0.095
58	0.086	76	0.097

Heat Treatment of 1 Per Cent Carbon Steel

AN investigation of the effect of different heat treatments on carbon steel with a carbon content of 1 per cent (spring steel) has been made by the Bureau of Standards.

The points that were investigated cover the effect of quenching in different media; the effect of various oil-quenching temperatures; time of heating prior to oil-quenching; the time at temperatures above A_{cm}; the time at temperatures between A_{c1} and A_{cm}; the effect of tempering steel hardened in different ways, and the effect of time in tempering at a temperature slighly below A_{c1}. The following conclusions are arrived at:

1. The most suitable oil or water quenching temperature for steel which is subsequently to be tempered at relatively high temperatures is slightly above the end of the Ac. transformation.

2. With increase in oil quenching temperature for steel subsequently tempered at 538 C (100 F.) hardness, strength, and limit of proportionality increase and maximum values are obtained after quenching from 843 C (1550 F) which is coincident with retention of all but a small portion of the excess cementite. A higher quenching temperature results in decreased strength.

3. When this steel is subsequently to be tempered to produce tensile strength in the neighborhood of 120,000 lbs.-in., water quenching is to be preferred on account of a higher elastic ratio produced, always assuming that the size and shape of material is such as to allow drastic treatment. If higher strength is desired (which condition requires lower tempering); oil quenching from just above the AC transformation will give slightly better combinations of strength and ductility, but with lower elastic ratio than are obtained by water hardening.

4. A lower tempering temperature is required after water hardening than when cooling in oil from the same temperature in order to produce the same strength. This difference in temperature in general increases the higher the strength required (the lower tempering temperatures).

5. When samples are quenched in water and others quenched in oil and all so tempered as to produce the same strength, the water-quenched steel will have the highest hardness as determined by the Brinell and Shore methods.

6. While good combinations of tensile strength and ductility may be obtained by tempering at the higher tempering temperatures, the steel is brittle and has low resistance to impact. This is shown by the much higher combinations of strength and ductility obtained in tensile tests when the steel is ground to size after heat treatment and by the low Charpy and Izod values obtained in all cases.

7. Increased time at hardening temperatures results in increased hardness, strength, and limit of proportionality, and decreased ductility, as does rise in temperature.

8. Long-time heating just under the lower critical range results in a material softening of the steel, equivalent to a decrease of 40 per cent in Brinell hardness and 20 per cent in Shore hardness when the time at temperature is increased from 30 minutes to 5 hours. Short-time heating in this temperature range results in a softer steel than that air cooled from above the transformations.

Engine and Frame Numbers Not Easily Changed by Thieves

Many suggestions as to numbering methods which can be readily applied during manufacture of engines and car frames are summarized in this report. Non-alterable numbers are sought.

AN interesting progress report covering the subject of numbering car frames and engines has resulted from several months' work by the Passenger Car and Engine Divisions of the Standards Committee of the Society of Automotive Engineers. The purpose of the work has been to devise a method of numbering which will make it impossible for thieves to alter or obliterate numbers placed on the frame and engine of a vehicle without rendering the change readily apparent even to a person who is inexpert in detecting such fraud. On the other hand, the method of applying the number in the first instance must not be so difficult as to render it impracticable in regular production work.

The history of the Society's endeavor to find a tamper-proof numbering system is briefly as follows: About two years ago the New York Police Department approached the National Automobile Chamber of Commerce with the request that the Chamber get up some system of numbering that could not easily be changed by thieves. The N.A.C.C. referred the problem to the S.A.E. and the latter referred it to the Standards Committee by which it was referred to the Passenger Car and Engine Divisions. Meanwhile the National Board of Insurance Underwriters had become interested in the problem and offered a reduction in the theft insurance rate of 7½ per cent on cars carrying engine numbers of a system that might be approved by them, 7½ per cent on cars carrying frame numbers of a system that might be approved, and 20 per cent on cars carrying both engine and frame numbers of an approved type.

Raised Cast Numbers Not Satisfactory

THE problem was taken up by the Passenger Car and Engine Divisions and a preliminary report was made at the last winter meeting. The work has been carried on in collaboration with the Underwriters Laboratories, and the plan of casting raised numbers on the crankcase has been definitely turned down by the Underwriters. Following is a summary of the plans proposed to date: Casting numbers on the crankcase (not applicable to frames); use of expanded disks; casting a special alloy in the crankcase; using a checker board system; casting a small, thin fin on which numbers could be stamped, on the crankcase, so that the numbering fin could be broken off by the dealer and held for the purchaser; welding raised number plates to the frame; armor plate number plates riveted on, using two or more rivets which enter into the frame construction; embossing fairly large numbers deeply into the frame; punching or drilling small holes in the frame at such a place that it will not be weakened; insetting the number under a glass cover in a spring bracket or other casting or forging in the frame assembly (also applicable to engines); a thin plate with the number embossed on it held in a frame or riveted or blind-screwed to the car frame; an armored plate riveted down and a special seal of some sort placed over the rivets; case-hardened plugs or plates bearing the numbers fastened into the frame with blind screws or some similar device (also applicable to engine); a plate of Bakelite or some similar material over the numbers and fastened behind the channel as in the preceding plan (also applicable to engines); setting a series of nickel embossed plates somewhere in the frame or in the engine in such a way that they could not be removed without tearing down the engine or frame (the reason for the use of nickel being that it is not easily affected by the acetylene torch).

Samples of Proposed Systems

THE following suggestions have been actually embodied in the form of samples:

1.—A depression is cast in the front spring hanger and a series of thin nickel plates with perforated numbers is set in. The plates are held in position by the spring hanger rivets, the numbers showing through a slot cut in the web of the side rail. The nickel plates will not stand the heat of a torch. If necessary, these can be welded in.

2.—A heat-treated nickel steel plug with numbers stamped on circular serrations held in the frame side rail by a heat treated nut with set screw through it of which the head is broken off.

3.—Same as No. 2 except tool steel.

4.—Numbers and Bakelite cap molded on heat treated nickel steel plug which is held in side rail by heat treated nut with set screw through it with head broken off.

5.—Circular serrations put in side rail by frame manufacturer on which the car manufacturer would stamp the serial number.

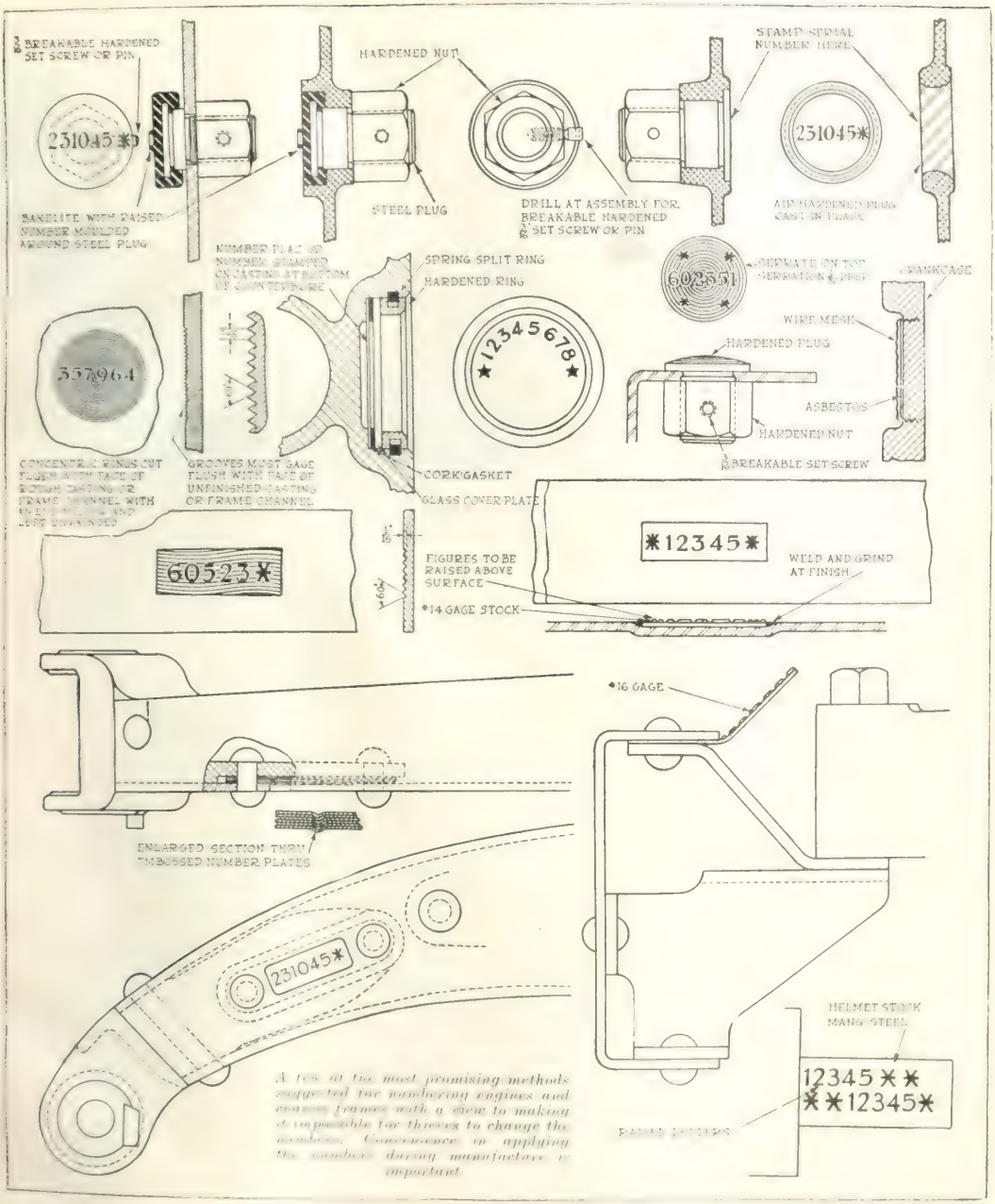
6.—Line waves stamped in side rail by frame manufacturer on which the car manufacturer would stamp the serial number.

7.—Tool steel plug held in wall of crankcase with heat treated nut and set screw through it with head broken off.

8.—Same as No. 7 except nickel steel, heat treated.

9.—Numbers and Bakelite cap molded on heat treated plug which is held in crankcase with heat treated nut with set screw through it on which the head is broken off.

10.—Numbers stamped on crankcase wall and a glass placed over the numbers. The glass rests on a cork gasket, and is held by a snap ring of liberal size which locks in a groove cut in the case. A steel ring pressed in place conceals the snap ring.



11.—A heat treated tool steel plug cast in the crankcase. A chill is placed across the plug so the heat will not soften the plug.

12.—A sample has been made showing how plug is to be cut for casting in crankcase.

13.—Nickel numbers cast in aluminum crankcase, the numbers being high enough to go through the wall of the crankcase and project about 1/8 in. on the outside.

14.—Same as No. 13 except through cast iron case.

A great many additional suggestions have come in recently and samples of the promising ones among them will be made up later. The ideas which have been embodied in samples are the ones which seemed the most practical among those received up to a short time ago.



The proposed Bear Mountain-Hudson River bridge

A New Highway Link Between the East and West

Bridging the Hudson at Peekskill to relieve traffic congestion in New York. A development of importance to the industry as a step toward offsetting an increasing cause of sales resistance.

HIGHWAY congestion in and around our large cities is producing a condition which is already being felt in the form of increased resistance to the sale of automobiles. The urban automobile owner who is not able to be on the road during week days now hesitates to start out on Sunday and holiday runs, as he knows that it is going to take him hours of time and put him to great inconvenience to get into the country or to nearby towns. Conditions cannot be much worse before he decides that it does not pay him to own and operate a car.

That is one phase of the matter. A more important one fundamentally, perhaps, relates to the development of highway transportation. With highways already crowded in the leading commercial centers, this development is going to be slow if radical steps are not taken to relieve congestion. It is not enough to divert through traffic to less congested roads within congested areas. And there is a limit to the possibilities in this direction, especially when the topography of the country is such that large rivers must be crossed and the only means of crossing is by ferries.

Ferries were adequate years ago, but they have become obsolete in handling present highway traffic and it must be recognized by all who are interested in promoting the use of motor vehicles, and in facilitating the movement of traffic, that a severe limitation has appeared which must be studied and conquered if the industry is to grow and expand in a normal way and commodities and persons transported most economically.

The traffic situation in New York City is representative of conditions in many other centers and an analysis of conditions there has a certain application to the question in general. New York City has the traffic of a big city with large outlying cities which feed to it, but coupled with it is the added disadvantage of being separated from large industrial centers, in fact from the entire western part of the United States by the Hudson River with no bridge south of Albany, 125 miles away. This, of necessity, throws all vehicle transportation between the two shores on the ferry system.

It is unnecessary to go into the troubles that this situation creates other than to say that it is not unusual at the height of week-end traffic for vehicles to wait from five to ten hours to get passage across. This entails extreme inconvenience to passengers not to mention the economic loss which occurs in the transportation of commodities by trucks.

The inadequate ferry service made worse by the fact that the ferries for the most part discontinue service at midnight or earlier has so tied up communications that private capital has undertaken to build a bridge and the Bear Mountain-Hudson River Bridge Co. has been organized to put the project through.

The structure will cost about $5,000,000. It will accommodate vehicular and foot traffic and will be approximately 55 ft. wide. There will be one span 1650 ft. long. Towers will be 400 ft. high and the bridge proper will be 150 ft. above high water. The western approach will be at Bear Mountain, five miles below West Point, and the eastern approach three and one-half miles above Peekskill.

The charter provides that it be a toll bridge for 30 years, at the end of that time it is to be handed over to the State. The right is given to the State to purchase at any time before the 30 years are up.

While the bridge is located some 40-odd miles from New York City, it will have a decided effect in relieving congestion and facilitating traffic. In addition it will permit residents of New England to visit upper New York State and the summering regions of the Catskills. It will provide a way to go south from New England without going through New York City and vice versa. Short-haul motor traffic will be greatly aided and this is a very important factor near large cities. A glance at the accompanying map will indicate the range of possibilities.

As has been said, tolls will be collected. These are under the supervision of the Public Service Commission. Present plans call for a charge of $1 for a touring car and 15 cents for each passenger; truck rates will be slightly higher according to tonnage capacity. Toll bridges and highways have always been considered more or less of a nuisance and their abolition has been sought, but it may be that we have come to a point where they are only a blessing in disguise.

Construction work takes capital. Funds from the public treasury are not always forthcoming and legislative action moves all too slowly. Part of this is due to lack of foresight in that the growing need for transportation facilities is not realized. The alternative would seem to be to attract private capital and the Bear Mountain-Hudson River Bridge is a good example.

Private capital naturally seeks a fair return on any investment and in fact must see the return before any construction work is attempted. In this particular it is interesting to note how the new bridge organization determined its possibilities.

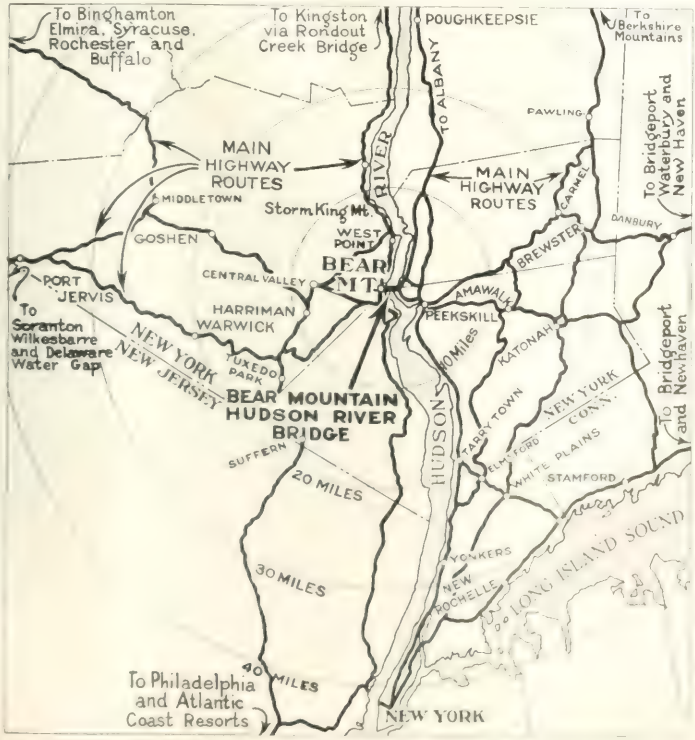
To estimate the amount of traffic that would use the bridge and from that the necessary toll charge to pay for the investment and yield a yearly return, traffic census was used. Census was taken on important nearby highways, New York City bridges crossing the East River, New York City ferries and more especially the Hudson River ferries handling the traffic which will in large measure be diverted to the bridge when finished. The excellent census made by the Connecticut Highway Department in cooperation with the Bureau of Public Roads was also used.

Bear Mountain-Hudson River Bridge Traffic Estimate

During *June, July, August, September and October*:	
50 Saturdays, Sundays and Holidays at 3000 cars per day	150,000
103 week days at 1500 cars per day	154,500
During *April, May, November and December*:	
38 Saturdays, Sundays and Holidays at 2000 cars per day	76,000
84 week days at 1000 cars per day	84,000
During *January, February and March*:	
90 days at 400 cars per day	36,000
	500,500

The final estimate for the Hudson River bridge determined from the various data collected by the builders, Terry & Tench, totals half a million motor vehicles for the first year (1924) and allows a 2 per cent yearly increase. This estimate is thought to be conservative, in fact one state highway authority predicts a million motor vehicles for the first year. In view of the fact that the ferry traffic increased 20 per cent in the last year, the yearly increase seems moderate. For in 1954 the traffic figure is estimated at 943,120. If the million mark should be reached the first year the conservativeness of the estimates and the value of the project will be unquestionably established.

To those who are interested in getting motor vehicles in the hands of operators and those who are interested in keeping them on the road once they are sold the problem of highway congestion has real significance. Sales resistance cannot easily be laid to this or that cause to a specific degree, but it is evident the resistance due to overcrowded roads is increasing and will continue to do so until the problem is effectually solved.



This map shows how the new bridge will relieve traffic congestion on important highways

10 Miles of New Road Sell 90 Cars in Alaska

National Forest Service survey shows definite relation between new roads and automobile sales. Eighty-six miles of road building will result in half-million dollar investment in cars in six small Alaskan towns. Double mileage trebles motor vehicle sales.

ROAD construction in the National Forests of Alaska during the last three years gives a striking concrete illustration of how good roads increase automobile and truck sales. In certain towns within the Tongass and Chugach National Forests of Alaska the construction of ten miles of new roads has resulted in the purchase of 172 new passenger cars. Past records indicate that throughout this area approximately 90 cars are bought for every 10 miles of road. Eighty-six miles of road construction will result in a half-million dollars being spent for cars and trucks.

A detailed study of the relation between road mileage growth and automobile sales in this National Forest region of Alaska has just been completed by District Forester F. E. Bonner at Juneau, Alaska. The results of his investigation are of value, not only for the actual information which they give, but chiefly because they are typical of conditions in other places.

The territories covered by the investigation are located on the southern coast of Alaska, the Chugach forest being farther north than the Tongass. The tabulation shows in detail a number of remarkable facts, some of which have already been emphasized. It brings out clearly the value to the automobile industry of an established road building program for the National Forests of Alaska and shows definitely how American manufacturers might profit from similar developments in other parts of the world.

FOR purposes of comparison, the number of miles of wagon roads leading from the six towns—Hyder, Petersburg, Ketchikan, Juneau, Cordova and Seward—are shown as they existed three years ago, or just prior to the time the forest service first entered upon a road building program. The number of passenger cars and trucks owned at that time are shown separately, and also combined.

In addition to these figures are also shown the number of passenger cars and trucks purchased during the past three years; and, finally, an estimate of the number of additional cars that it is predicted will be purchased by the time our present projects are completed. The present projects under way will be completed within three years, or by the end of 1924.

Of the passenger cars added during the past three years it is safe to assume that practically all have been purchased as a direct result of the forest service road building program.

Automobile dealers state that three years ago, with the then road mileage, the sale of passenger cars for pleasure purposes was practically at a standstill. As soon as the prospect of increased mileage was definitely known by the public, the sale of passenger automobiles began to increase at a rapid rate.

This fact is very strikingly shown as follows: Three years ago there were 51 passenger automobiles under license within the six towns, then having a total of 27 miles of wagon road. Since that time there have been added 26.55 miles of road, constructed from funds provided for road building within the Tongass and Chugach forests. With this increase in road mileage there has been an increase of 168 passenger cars, or an increase of 330 per cent.

IN other words, doubling the road mileage has more than trebled the number of passenger automobiles.

Of still more interest is the situation at Juneau. Three years ago there were 20 miles of road, with 38 passenger cars. Since then we have added 5.5 miles of road, and there has been added as a result 95 passenger cars, or approximately 19 new cars for each additional mile constructed. Stated another way—it is at the rate of 172 passenger cars alone per 10 miles of new road.

In the case of trucks (which include merchants' light delivery cars) it is believed at least 50 per cent of the new cars purchased are the result of our road program. There are many small merchants who have not felt justified in owning both a truck and a delivery car, and a family passenger car as well. Hence they have economized by purchasing a light car, which they use for delivery purposes during week days, and on Sundays, holidays and evenings, by adding a few board seats, they take their families and friends on a joy ride to points of interest reached by our new roads.

Three years ago there were 30 trucks in the six towns. To-day there are 117—an addition of 87. Assuming that 50 per cent of this increase is the result of our new roads, we have 43. This number of trucks added to the 168 passenger cars for the six towns gives a total of 211 cars of all kinds purchased as a result of our road building program—or at the rate of over 100 cars for each additional 10 miles of new road.

To complete the projects at present under construction will provide 32.55 miles. It is estimated that as a result 252 additional passenger cars will be purchased. It is also estimated that 56 trucks will be added. Of this number 50 per cent, or 28, will be added as a direct result of additional roads. This makes 280 cars of all kinds that will be purchased by the time the 32.85 miles are completed, or approximately 90 cars for each additional 10 miles of road.

It is believed that the valuation of cars is overly conservative. The valuation of $700 per passenger car and $900 for trucks given for Hyder, Petersburg, Ketchikan

and Juneau, with $730 and $950 respectively for Cordova and Seward. The latter figures are due to differences in freight rates. These low figures are used for the reason that many of the cars purchased heretofore have been light models, with a large percentage of Fords.

However, with improved roads, with better surface conditions, together with increasing mileage, there is a strong tendency to heavier and more expensive cars.

development of efficient and economical road building in the United States where the majority of his interests lie. But, in a broader sense, he is building for future sales by encouraging road development wherever possible.

It is well enough to talk about "the factors affecting sales," but cars and trucks run on roads, and without proper roads they will not be sold. This detailed study

Relation of Automobiles to National Forest Road Building Program in the Tongass and Chugach National Forests of Alaska.

(Compiled by Forest Service, D-8, Juneau, Alaska, June 15, 1922)

	TONGASS						CHUGACH				GRAND TOTAL	
	Hyder	Petersburg	Ketchikan	Juneau	TOTAL	Percent Increase	Cordova	Seward	TOTAL	Percent Increase	Both forests	Percent Increase
MILEAGE:												
Wagon road (three years ago (1919)	none	none	none	20	20		none	[illegible]	7		[illegible]	
Wagon roads built under the direction of F.S. and B.P.R. during last three years	[illegible]	5.1	4.25	5.5	21.85	109	1.7	[illegible]	1.7	[illegible]	26.55	[illegible]
Total wagon roads at present	[illegible]	5.1	4.25	25.5	41.85		1.7	10	11.7		53.55	
Number additional miles to complete projects now under construction	*none	none	5.25	15.0	20.25	49	4.5	[illegible]	8	146	32.85	64
[illegible] when present projects completed (1924)	[illegible]	[illegible]	[illegible]	40.5	62.20	149	6.2	18	24.2	200	86.40	164
PASSENGER CARS												
[illegible] ago	[illegible]	none	9	38	47		1	[illegible]	4		51	
Number additional passenger cars purchased since F.S. started its road building program	16	†12	32	95	145	309	3	[illegible]	[illegible]	575	188	[illegible]
Total number passenger cars at present	6	12	41	133	192		1	[illegible]	[illegible]		47	
Value:												
‡Approximate value of all passenger cars	$4,200	$8,400	$28,700	$93,100	$134,400		$2,900	$16,700	$19,710		$154,110	
Estimated number passenger cars that will be purchased by the time present projects are completed	25	10	70	125	230	120	10	12	22	88	252	111
‡Approximate valuation of estimated passenger cars	$17,500	$7,000	$49,000	$87,500	$161,000		$7,300	$8,760	$16,060		$177,060	
TRUCKS including light delivery wagons:												
Number three years ago	[illegible]	[illegible]	8	15	23		3	3	6		[illegible]	
Number additional purchased within the last three years	[illegible]	[illegible]	39	37	76	230	8	[illegible]	11	157	[illegible]	[illegible]
Total number trucks at present	[illegible]	[illegible]	47	52	99		12	6	18		117	
Value:												
§Approximate value, all trucks			$42,300	$46,800	$89,100		$11,400	$5,700	$17,100		$106,200	
Estimated number additional trucks that will be purchased by time present projects are completed	5	2	12	25	44	11	6	6	12		56	18
Approximate valuation of estimated trucks	$4,500	$1,800	$10,800	$22,500	$39,500		$5,700	$5,700	$11,400		$51,000	
CARS AND TRUCKS:												
Total number three years ago	none	none	17	53	70		4	[illegible]	11		81	
Total number present cars and trucks	6	12	88	188	294	110	13	[illegible]	25	100	[illegible]	157
Total number estimated increase, including present cars and trucks	37	24	170	238	565	94	22	17	54	70	644	
Total valuation all present cars and trucks	$4,200	$8,400	$71,000	$130,900	$223,500		$14,200	$22,460	$36,810		$260,310	
Total valuation estimated cars and trucks, including present number	$26,200	$17,200	$150,800	$249,900	$424,100		$27,300	$20,760	$48,060		$472,160	
POPULATION												
RATIO: Total number present cars and trucks to population	**287	870	2,458	3,468	6,982		855	653	1,508		[illegible]	
RATIO: Total number present cars and trucks including estimated increase to estimated increase in population, by time present projects are completed	8	40	16	10	13		36	15	23		14	

*Total mileage completed, but roads not yet in final condition for satisfactory car service.
†Figures include passenger cars and trucks.
‡Valuation passenger cars based on average of $700 per car for Hyder, Petersburg, Ketchikan, Juneau; on $730 for Cordova and Seward, a/c difference in freight.
§Valuation trucks based on average of $900 per car for Hyder, Petersburg, Ketchikan, Juneau; on $950 for Cordova and Seward, a/c difference in freight.
**Population Hyder increased 25%, all other towns increased 10%

During the past year a great many Buicks, Studebakers, Packards and other cars of this type have been purchased. By the time our present projects are completed there will be considerably over half a million dollars invested in automobiles of all kinds within the six towns.

The ratio of cars owned at present to the population of the six towns as shown in the last census is also given. These figures are very interesting in comparison to other localities in the United States.

In the town of Hyder, for example, there is one car for every 8 persons, a ratio about the same as that which prevails in the states of Ohio and Idaho at the present time. The ratio of persons per car in the town of Petersburg is 40 to 1, being the highest in the table. This same high ratio, however, still prevailed in certain Southern states only a year or two ago. At present there is but one car to 30 persons in Alabama.

The American automobile manufacturer is interested in seeing roads built in all parts of the world. It is immediately necessary that he take an active part in the

of a part of Alaska serves admirably to illustrate how this rule works out in a practical way.

AMERICAN automobile manufacturers have been advised by the Department of Commerce that their method of sending agents advertising matter to South Africa has resulted in a great deal of it being refused by customs officials because of improper marking.

Catalogs or price lists of foreign firms addressed to importers, merchants or manufacturers or public libraries and similar institutions, are on the free list when properly invoiced and no duty is collected. But it is the practice of practically all American firms to put a valuation on such advertising material; because of this the consignee must pay a premium in the nature of a customs levy on advertising materials, which in some instances he has not ordered, with the result that his feelings are ruffled. All catalogs and price lists should be marked "Catalogs and price lists, no commercial value," and if this is done, there will be no duty collected.

Exports of Passenger Cars, Trucks, Tires,

COUNTRIES	GASOLINE PASSENGER CARS						GASOLINE TRUCKS						PARTS
	Up to $800		$800 to $2000		$2000 and over		Up to 1 ton incl.		Over 1 to 2½ tons		Over 2½ tons		
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	Value
Europe													
Azores and Madeira Islands	2	$1,020					3	$1,269					
Belgium	357	131,580	28	$29,652	3	$8,025	180	48,932	1	$1,620			$9,477
Bulgaria													597
Czechoslovakia	3	1,243					1	364					239,332
Denmark	17	9,530	10	10,187					2	3,495			
Esthonia							9	2,293					487
Finland	17	7,124											136,866
France	43	21,918	6	7,000	7	23,761			1	1,620			1,430
Germany			4	3,935									
Gibraltar			1	1,017									
Greece	30	13,154	2	2,880	1	2,700	4	1,616					16,111
Iceland and Faroe Islands													150
Italy			2	2,939	1	2,500							774
Latvia					1	5,510							339
Lithuania													
Malta, Gozo and Cyprus Islands													374
Netherlands	47	30,367	26	26,798	4	16,143							4,083
Norway	397	90,388	21	19,560	2	5,392	60	17,526					8,706
Poland and Danzig	4	2,561											
Portugal			14	15,515	1	5,060	1	404					4,232
Roumania									3	3,306			39,124
Spain	66	36,114	68	82,831	7	22,423			4	4,692			16,358
Sweden	717	218,338	84	91,751	1	2,357	303	78,804					804
Switzerland			31	31,789	11	30,165							6,829
Turkey in Europe	13	3,922	1	953			6	2,064					
Ukraine									5	17,000			
England	391	216,101			9	34,934			10	10,463			268,205
Scotland	2	388											686
Ireland	2	600	6	5,700									3,396
Jugoslavia, Albania, etc.													35
North and South America													
British Honduras			1	1,168									208
Canada	584	333,329	685	831,266	74	213,016	35	26,242	61	83,714	40	$135,293	1,647,090
Costa Rica	1	750											887
Guatemala													974
Honduras	3	989					1	399					3,456
Nicaragua													84
Panama													5,169
Salvador	5	3,032	6	6,585			2	688					1,313
Mexico	3	2,172	9	12,313									68,298
Newfoundland and Labrador	509	222,016	120	121,311	5	14,223	111	35,372	14	27,021			1,565
Barbados			3	3,442									896
Jamaica	5	2,169											
Trinidad and Tobago	11	5,583	6	5,678			6	3,824	2	3,138			4,509
Other British West Indies	10	4,144							3	4,478			6,246
Cuba			1	1,595			6	3,020	1	2,200			1,997
Dominican Republic	79	36,059	19	23,733	15	35,839	11	3,892			1	2,241	64,741
Dutch West Indies	7	2,392	4	4,403			1	804	2	5,200			5,163
French West Indies	3	1,281											531
Haiti	1	700											2,014
Virgin Islands of U. S.	4	2,558											2,520
Argentina	2	788					2	804					510
Bolivia	100	63,583	47	49,753	14	45,553							197,639
Brazil													535
Chile	28	20,296	67	68,451	4	10,802					2	1,888	19,234
Colombia	6	2,184	1	1,421			4	1,616					10,205
Ecuador	5	1,944	1	1,477									4,075
British Guiana	2	828	1	1,000			2	808					1,878
Dutch Guiana	3	1,243											1,340
French Guiana	2	960							1	475			184
Paraguay													130
Peru	1	504											
Uruguay	9	4,200	2	2,069					2	2,000			3,902
Venezuela	30	9,522	3	3,791	1	2,727	15	6,060					11,474
Asia	28	14,755	9	11,341			2	808					9,604
Aden													244
Ceylon			2	2,021									1,852
China	27	20,122	5	4,433					4	10,250			6,019
Kwantung	1	500											383
Chosen	1	443											1,250
British India	37	25,003	15	14,663									14,005
Straits Settlements			4	4,786									5,246
Other Dutch East Indies													1,724
Portuguese East Indies													
Java and Madura													3,111
French Indo China													471
Hejaz, Arabia and Mesopotamia													725
Far Eastern Republic													269
Hongkong													2,120
Japan	1	735	4	3,823									
Palestine and Syria	164	85,020	10	14,400	2	5,887	117	50,319	6	18,815	5	13,335	31,137
Philippine Islands	117	52,644	15	18,286	6	11,311			1	1,500			17,965
Greece in Asia	17	11,884	1	1,863			1	750					42,977
Siam													57
Oceania	3	2,172									2	4,688	591
Australia	411	262,172	348	368,160	1	2,240	13	9,958	39	49,225	23	43,553	91,500
New Zealand	18	14,293	25	27,531			4	4,041	4	4,760	4	9,566	22,918
Other British Oceania	2	1,110											1,509
French Oceania													735
Other Oceania	3	1,770											351
Africa													
Belgian Kongo	16	6,183					16	6,464					5,664
British West Africa	3	2,172	1	972					5	4,431			12,733
British South Africa	76	52,923	121	115,434	3	10,560			8	11,352	9	11,490	44,724
British East Africa	5	2,924	1	1,234									681
Canary Islands	2	1,210	3	3,949			10	4,040					4,602
French Africa	7	2,833					1	404					1,740
Egypt	55	21,606					1	404					1,222
Liberia													
Morocco	3	2,172											1,369
Portuguese Africa	10	5,423					7	3,550	3	1,522			2,278
Portuguese East Africa	1	724	2	1,658									1,520
Spanish Africa					1	2,692							
	4,529	$2,098,067	1,856	$2,066,087	174	$513,820	935	$317,539	182	$272,577	86	$222,054	$3,160,448

Motorcycles and Aircraft for May, 1922

TIRES						MOTORCYCLES		AIRPLANES AND SEAPLANES		PARTS	COUNTRIES
Casings		Inner		Solid							
No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	Value	
											Europe
532	$7,946	57	$158			104	$29,007				Azores and Madeira Islands
4	170	8	31								Belgium
						23	4,848				Bulgaria
4,452	65,554	2,036	3,967	51	$1,341	95	27,517				Czechoslovakia
54	1,164	71	184	20	974	4	1,106				Denmark
253	3,736	281	1,934	10	217	2	539				Lithuania
2,367	27,835	25	52			15	4,356				Finland
						6	1,783				France
16	270	12	35			1	345				Germany
271	3,538	295	493			1	276				Gibraltar
266	4,239	277	520								Greece
490	7,707	22	93			117	35,293				Iceland and Faroe Islands
											Italy
150	1,806	308	418								Latvia
15	208	16	33			1	267				Lithuania
1,455	22,324	601	1,163	42	778	370	96,961			$20	Malta, Gozo and Cyprus Islands
2,704	48,686	1,989	5,271	76	2,325	52	1,425				Netherlands
14	306	12	20								Norway
1,268	18,884	277	385	47	1,578	12	3,268				Poland and Danzig
6	201	10	28								Portugal
5,092	72,206	3,382	6,448	262	7,642	126	33,268				Roumania
4,801	70,289	2,808	7,230	30	750	86	24,468				Spain
134	2,774	60	160			26	7,139				Sweden
357	4,271	248	392								Switzerland
											Turkey in Europe
36,755	367,886	13,750	20,064	511	11,058	110	29,349				Ukraine
46	561	36	125								England
1,107	15,812	1,040	1,788								Scotland
171	3,982	346	1,668								Ireland
											Jugoslavia, Albania, etc.
29	300	42	78								North and South America
7,366	133,794	6,757	14,548	833	28,012	89	20,437	1	$2,230	$8,135	British Honduras
82	1,252	66	231								Canada
95	2,480	99	275			2	590				Costa Rica
71	1,877	58	181								Guatemala
27	363	68	121								Honduras
74	1,819	430	697							5,431	Nicaragua
594	9,068	248	571	34	858						Panama
6,495	85,218	3,965	8,312	280	8,013	11	2,619			1,508	Salvador
93	1,742	74	159								Mexico
22	437	60	117	3	38						Newfoundland and Labrador
639	9,076	388	636	30	1,072						Barbados
394	4,896	294	559	21	424	3	765				Jamaica
76	868	79	191			1	246				Trinidad and Tobago
9,421	101,719	13,623	21,581	877	24,525	1	75			80	Other British West Indies
870	10,774	1,094	1,874								Cuba
24	392	77	179			1	301				Dominican Republic
216	3,334	115	301	14	570						Dutch West Indies
206	3,187	211	341								French West Indies
26	327			2	32						Haiti
7,895	92,231	10,197	14,494	20	627						Virgin Islands of U. S.
											Argentina
4,110	47,275	1,850	2,312	24	775						Bolivia
236	3,751	330	864								Brazil
483	8,985	510	1,243	10	271	1	150				Chile
350	6,657	291	691	4	200						Colombia
34	608										Ecuador
23	289	62	101								British Guiana
											Dutch Guiana
8	80										French Guiana
869	12,520	614	1,266	37	645	1	260				Paraguay
1,555	20,502	348	440								Peru
975	13,438	1,094	2,022	36	680						Uruguay
											Venezuela
56	715	36	78								Asia
60	865										Aden
259	4,613	257	1,124								Ceylon
3	100					13	4,475			54	China
4	66										Kwantung
350	6,306			291	9,609						Chosen
762	8,040	139	285	100	2,487	1	102				British India
74	761	32	52								Straits Settlements
											Other Dutch East Indies
1,527	23,054	525	706								Portuguese East Indies
32	350										Java and Madura
											French Indo-China
						1	184				Hejaz, Arabia and Mesopotamia
74	1,350	41	94			3	951				Far Eastern Republic
855	13,167	260	540	199	2,142	57	16,717	1			Hongkong
987	10,644	206	1,587								Japan
4,[illegible]	64,201	4,387	8,787	288	6,312						Palestine and Syria
											Philippine Islands
66	921	60	145								Greece in Asia
											Siam
2,[illegible]	47,395	1,111	2,465	244	6,348	[illegible]	56,647				Oceania
4,[illegible]	71,591	2,071	4,501	195	4,861	14	4,227				Australia
28	180	12	27	10	206						New Zealand
27	537	20	44	6	184						Other British Oceania
44	522										French Oceania
											Other Oceania
											Africa
[illegible]	5,542	670	2,026								Belgian Kongo
[illegible]	87,672	6,853	11,309	8	277	85	22,648				British West Africa
913	11,530	46	146								British South Africa
64	844	34	[illegible]								British East Africa
73	1,361	30	72								Canary Islands
138	1,841	4	[illegible]								French Africa
4	100										Egypt
136	3,873	[illegible]	712	107	1,873						Liberia
7	145	92	215								Morocco
2	155	3	6								Portuguese Africa
117	1,943	165	265	6	98	33	8,353				Portuguese East Africa
											Spanish Africa
131,573	$1,701,150	89,017	$162,318	4,727	$127,807	1,695	$453,495	1	$2,230	$15,228	

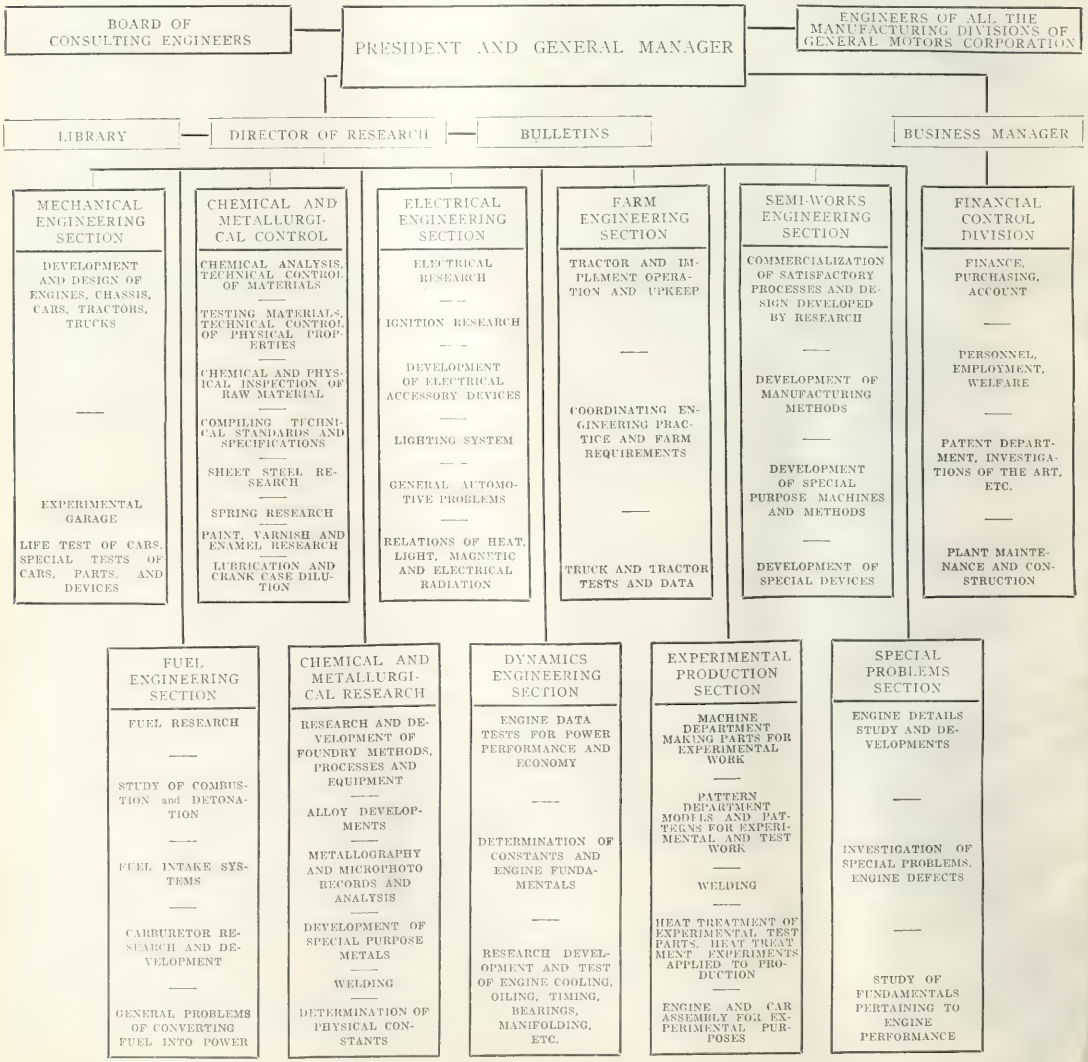
The Broad Scope of General Motors' Research

Here is another outline of the field of automotive research. New items shown in recently published chart.

HERE is a detailed outline of the research work which is being carried on by the General Motors Research Corporation at Dayton, Ohio. The general scope of this work has been known throughout the industry for some time, but this is the first specific outline that has been made public.

The chart is of special interest for comparison with the chart of Automotive Research Activities, the first outline of its kind, which was published in the Research Number contained certain items not covered by the General Motors' of AUTOMOTIVE INDUSTRIES on June 8. This previous chart activities, while the accompanying chart contains a number of items, notably the financial control division, not included in the AUTOMOTIVE INDUSTRIES outline.

A comparison of the two is worth while, as a complete outline, in brief form, of the field of automotive research is yet to be built up.





Factors Affecting Starting

Editor, AUTOMOTIVE INDUSTRIES:

A careful perusal of the editorial on Better Starting Facilities, in the April 27 issue of AUTOMOTIVE INDUSTRIES, would lead one to believe that the fuel supply was entirely to blame for cases of difficult starting. Why not blame the ignition for its share of trouble, Difficult starting, more often than not, is caused by the failure of the ignition in the first place.

Modern ignition systems leave much to be desired. The fiber block used on the interrupter arm is subject to rapid wear, causes excessive burning away of the contacts and necessitates their too frequent adjustment. The need of adjustment being many times the cause of difficult starting, all due to lack of proper lubrication for cam and block. This is especially true in damp weather, when a coating of rust will form over night on the cam, unless protected by a film of oil, and cause excessive wear on the block. To the operator is left the task of oiling, which he rarely does, or should he oil, frequently overdoes it. It should be possible to keep these parts oiled, including the interrupter arm pivot pin and bushing, by means of a saturated felt wick, fed from a reservoir filled from exterior of distributor housing.

Weak coils, poor wiring connections, leaky condensers, and bad switches all form a prolific source of trouble, for a weak spark will actuate a motor once started, but the best spark procurable is required to fire a cold, sluggish mixture of raw gas, in a cold, stiff motor, with a minimum of trouble.

Carbureters furnish their share of trouble, it is true, for carbureters are the favorite plaything of the average driver, who in time of trouble changes the adjustments to every conceivable position, whether it be at fault or not, whether they know how to set it or not.

It should be possible for a novice to remove a strainer from a gas tank, in case of stoppage, and to replace it without trouble; as placed now, they are usually inaccessible, even to trained mechanics.

A desirable improvement, in the carbureter choke arrangement, would be some form of automatic choking device operated by a thermostat and regulated by a compensator controlled by suction in intake manifold. The thermostat could be operated by the temperature of either the cooling system or the carbureter hot air pipe. This would remove the need of choking out of the operator's hands, and remove one more impediment to the easy operation of the motor car.

There are other things, too, that dissatisfy the average car owner, chief of which is the so-called oil pumping tendency of so many modern motors. As proof, consider the innumerable number of patented piston rings, each claiming to cure the defect, but no device, however artfully constructed, will remedy a defect in design without altering the design itself. We are too prone, though, to condemn the quality of present-day oils, when the blame really belongs to the designer.

But we are in a rut, the rut of believing the modern motor about perfect, and prefer to blame troubles to outside causes, but perfection is impossible, and the sooner we realize that and get busy and eliminate present imperfections the better. The modern motor itself is imperfect, and so long as we employ a throttle to govern its speed and continue to lose so many heat units to the exhaust, etc., it will continue so.

I firmly believe the constant compression type of motor will be the ultimate type; but it will never be perfected through the use of auxiliary carbureter or valves.

I would like to hear the views of others on these and kindred subjects; it would be for the common benefit.

ARTHUR LA FOUNTAIN.

Tractive Resistance of Roads

AT a conference called in Washington, D. C., July 14-15, 1922, by the Advisory Board on Highway Research of the National Research Council, consideration was given to the present state of research on tractive resistance of roads, and to the relation of the highway engineer to the automotive engineer in this field of research.

A committee was appointed to draw up a statement of principles, which report was discussed and adopted. The report included definitions of rolling resistance, air resistance and resistance of engine and transmission, and states that the present state of the art indicates that at low speeds up to 10 miles per hour, a traction dynamometer of the liquid pressure type, or a space-time recorder is considered best fitted for measuring rolling and air resistance. At higher speeds, a space-time recorder or a U-tube accelerometer is most satisfactory.

The following is a list of those who attended the meeting: Prof. C. A. Adams, Prof. T. R. Agg, Dr. H. C. Dickinson, C. R. Ege, H. S. Fairbank, D. C. Fenner, A. T. Goldbeck, Prof. W. K. Hatt, Major Mark L. Ireland, W. S. James, Pyke Johnson, Dean A. N. Johnson, Prof. W. E. Lay, Prof. E. H. Lockwood, Prof. C. J. Tilden.

More Cause for Worry in Coal Strike Than in Rail Walk-Out

The fundamental difficulties behind the coal strike are of long standing and of far-reaching effect. A temporary settlement of immediate grievances likely to have little effect on permanent stability. Rail strike causes are more superficial in character.

By Harry Tipper

THE railroad and coal strikes fields have been closely associated in the discussions in the public press and in the minds of most of the people, because of the intimate economic relation between the two. They are, however, quite different in their background, the reasons for the difficulty, and the relation they bear to the total industry in each case. The shopmen's unions in the railroad field are comparatively new. They have not carried any great grievance which would bind the men together in a thorough program of development toward their definite aims. The railroad shopmen have been paid at a scale which compares not unfavorably with the skilled workers in other metal trades industries. They have secured a great many privileges which do not require them to maintain the productive pace which other metal trade shops are accustomed to demand.

In fact, the conditions in the railway shops have become onerous from the standpoint of the cost of production. In some cases, the cost of doing the work in these shops represented twice the amount necessary to do similar work in shops where the ordinary productive pace and practice existed.

THE railroad strike and the coal strike have been closely associated in the public mind because of their similar economic effects.

The background of the two strikes is quite different, however, as Harry Tipper points out in this interesting discussion of these big industrial troubles.

This article gives a brief, concise picture of the bases of the two strikes, points out the differences between them, and shows the requirements of successful settlements in both cases.

Because this union was comparatively new and had not become consolidated by the development of important grievances, the leaders found it impossible to accept the rulings of the Labor Board without making an issue thereof. There was no real unanimity in the ranks of the strikers, although the strike vote was very heavily in favor of a walk-out if necessary. The older men in many of the railroad shops did not want to strike and this percentage in some cases reached 50 or 60 per cent of the total workers.

It is true that the railroads had contracted out for a good deal of the work which was ordinarily done in the railroad shops and in doing this, they had gone against the ruling of the Railway Labor Board which had insisted that it was against the regulations of the railroad to do this contracting on the outside. This contracting out, however, was almost inevitable in view of the extreme effect of the cost of doing the same work within the railroad shop in accordance with the railroad customs and union privileges, compared with the cost of doing the same work in other metal trade shops, where the unions have been more reasonable and the practice calls for a competitive position on production costs.

It was unfortunate that the railroads failed to make public the position they were in with respect to their repair and production costs in the shops and the reasons for their contracting on the outside.

As usual, the railroads have failed entirely to measure the importance of laying the cards on the table so that public opinion could be properly formed as to the merits of the issue. From the very beginning, the strikers have made efforts to draw the government into the case and each time the government has issued a statement, the leaders have delayed the negotiations which they were conducting with the railroads.

In the matter of the coal strike, however, the case is entirely different. The miners have had a number of grievances for a good many years, many of which are inherent in the present methods of coal production under the circumstances which prevail in the coal districts. Almost all these grievances relate primarily to a number of elements outside the control of the miner which prevent him from making enough money, even though the piece rate per ton is fairly high.

The work is too intermittent; it takes too long to get the attention of the foremen; the underground transportation systems are frequently handled without proper engineering consideration, and the records are almost negligible except for payroll purposes, so that the costs are not fully determined.

The general conditions in the coal mine provide a constant series of irritations to the miner in the interruptions in his work, the number of jobs which he must do, the lack of specific supervision, and other items to be found in practically no other business of so important a character. The operators, feeling their position to be sufficiently strong, refused to enter into negotiations for a new agree-

ment at the time specified in the old agreement which was about to expire, and in consequence the miners struck. The strike has now lasted about four months.

So far as it is possible to determine from the information available, the grievances which were really at the bottom of the strike, are not likely to be settled by the negotiations pending, even though the miners go back to work, as they probably will.

This general discussion of the conditions indicates that the two strikes are different in their character and in the background from which they spring. The railroad strike, when it is settled, need not disturb anybody because it is not due to a fundamental difference, and the conclusion of the strike is not likely to disturb the transportation situation further. In the coal industry, however, the fundamental lack of organization in the management and operation of the coal mines, must be tackled sooner or later and, until it is tackled with intelligence and energy, the present grievances will remain to disturb the future relations between the miners and operators regardless of the conclusion of the present strike, or the actual terms of settlement.

FOR this reason, the coal strike is a much more serious matter than the strike of the railroad shop men. The coal business is a basic industry. The comfort of living, all the activities of society, and industry, depend upon a continuous supply of coal from the mines. No single activity can proceed for more than a limited period without this supply. The inconvenience which we suffered during the war from the slight amount of coal rationing that was necessary, gives some little indication of the disastrous results of a prolonged interruption in the production of coal.

No industry demands from its position and importance so careful a consideration of its organization and management and the relations between the owners and the employees. Yet this industry, by the circumstances of its growth, and the precedents of its regulation, is organized in a haphazard manner which would not be tolerated in any other line of industry involving engineering considerations. There can be no stability in the coal business so long as these conditions prevail and the manufacturer of commodities can have no assurance that the coal required for his power will be forthcoming for any great length of time so long as the coal business is handled under the present methods of development and management.

THE progress of the matter furnishes a striking example of the futility of arbitration of a compulsory character, of government proclamation and military protection to assuage the results of acute differences between employer and employee. The absurdity of the attitude on both sides, particularly the absurdity of the operators in refusing to negotiate at the termination of the old agreement, is illustrated by an examination of the history of previous settlements.

Practically every general grievance has been settled over the conference table, either without a strike or at the end of an expensive interruption. Only one or two cases exist in the history where the men have unconditionally surrendered without negotiations, and these are not sufficiently important to affect the general case.

In some lines of business and in some establishments the owners have developed a method of negotiation with their own employees to the point where they can settle their own grievances. Except for these cases, the general grievances must be settled by the conference method. There is no escape from this necessity. Under these circumstances, the four months of idleness in the coal industry is a very scathing criticism on the leaders on both sides, because they refused to recognize the necessity of conference until idleness and the possibility of disaster demanded a reopening of the case.

The present indications are that the progress in the situation has induced the miners and operators to come together for negotiations with the prospect that a settlement will be reached in due course.

Door Lock Bevel Standards Suggested

AT the summer meeting of the Automobile Body Builders' Association, held at Detroit, Will H. Ritter, second vice-president and sales manager of the English & Mersick Co., called attention to the desirability of standardizing door lock bevels. He stated that during the past two years his firm had been asked to furnish locks with bevels ranging all the way from a right angle to 12 deg., two sizes called for even involving fractions of a degree.

The range in sizes, he claimed, places on the lock manufacturer an unnecessary burden and adds considerably to the manufacturing cost. Catering to individual ideas in lock construction tends to make a jobbing shop out of a manufacturing plant. To secure the necessary bolt throw with bevels widely different, three or four sets of patterns and tools are required for the bolts, cases, covers and other lock parts.

Mr. Ritter's firm during the past ten months brought out two new locks, and in doing so endeavored to establish convenient standards for bevels. Before the necessary tools were built the matter was taken up with three body engineers who are on Standards Committees. The discussions led to the conclusion that it would be a forward step to make closed body locks in two bevels, 6 and 9 deg. Given a tolerance of 1 deg. each way, these two sizes will fit doors with bevels of from 5 to 10 deg. inclusive. That is a 6 deg. bevel lock will accommodate 5, 6 and 7 deg. doors, and the 9 deg. bevel lock will fit 8, 9 and 10 deg. doors. Mr. Ritter expressed the opinion that all would appreciate definite standards on bevels. In placing the new lock with fifteen manufacturers, the two bevels of 6 and 9 deg. had proven entirely satisfactory.

For open cars a 5 deg. bevel lock, which will serve on doors of 4, 5 and 6 deg. bevel, was found satisfactory. A consideration of, and early action on, the proposed standard was asked of the Standards Committee.

A SPRING cover enclosing the spring from clip to shackle, which has been on the market abroad for three years, has recently been introduced in this country. It is known as the Wefco spring cover.

Underneath the invisible fastening a tongue of leather runs the full length of the cover, so that there is double protection throughout and the cover cannot wrinkle. Leather flanges or tubes on both sides of the straps grip the ends of the spring tightly when the cover is buckled up and prevent water, dirt and dust from getting in. The covers are laced with cable cord. As regards lubrication, before fitting the covers, the springs are smeared with a suitable grease, which requires about 2 lb., and this grease is said to last indefinitely.

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Trade Thrives Despite Strikes

RAPID progress is being made in the revival of trade and industry notwithstanding the complications resulting from the mine and rail strikes. Considering the disturbing effects of the industrial controversies now under way, the advance recorded in recent weeks has been phenomenal. It demonstrates the fundamental strength of the factors essential to permanent growth.

No academic discussion of the subject is necessary to prove the point. Car loadings are an unfailing barometer of business and those for the week ending July 15 when both strikes were in full swing, tell a mighty significant story.

Excluding coal, the loadings of all other commodities for that week totaled 783,573 cars. This figure has been exceeded in the history of American railroads only in the weeks of September and October of 1920 when loadings of miscellaneous freight established a new high record. Moreover, the figure of 783,573 is only 8295 cars, or about 1 per cent, under the total for the same commodities loaded during the week of Oct. 15, 1920, when the peak was reached.

No further evidence is needed to show the extent to which the United States has come back.

With these figures before them, automotive manufacturers may well feel complete confidence in the future.

A Time for All Things

THE attempt of some of the railroads to form "company unions" in opposition to the trade unions during the present strike furnishes another excellent example of how *not* to make employee representation plans effective. The same basic principles apply for the railroads as for similar industrial relations plans in the automotive industry, so that automobile executives can well learn a lesson from the present railroad dispute.

The success of any employee representation plan, regardless of its detailed mechanism, rests primarily upon the good faith of the management and the ability of the employer to convey the presence of that good faith to the employees. The plan must be installed with the fundamental idea of improving conditions for both employees and employer.

Past experience with such plans has made many workers suspicious. The plans have sometimes been installed purely in an attempt to break trade union power and thus render employees, in a given case, less powerful to fight economic battles with the management. In various ways these plans have been used to reduce the economic fighting power of the worker, rather than to provide an opportunity for true co-operation, which involves sacrifices and compromise on both sides.

Feelings of suspicion and anger are always at a white heat during a strike. There is probably no worse time at which to attempt to establish an employees' representation plan, especially when the strike consists of an economic battle between the trade union and the company. It would seem almost obvious in such a case that the primary object of the new movement was to reduce the power of the trade union and make it possible for the employers to have their way more readily.

All this is entirely beside the question of the right or wrong of the present controversy between the railroads and their striking employees.

The point is simply made that successful employee representation plans in the past have not been those established under the stress of strike conditions when the spirit of co-operation between management and men is almost entirely lacking.

A real desire for constructive co-operation is essential to the success of any such plan. Consequently, the best time to inaugurate such plans is when employees are apparently entirely satisfied.

Then the management cannot be accused of any ulterior motive in suggesting a co-operative plan of handling industrial relations. The management that is interested enough in industrial relations to work

with and install such a plan during times of labor contentment, indicates by that very fact that it has in mind broad ideas of constructive co-operation and mutual benefit.

These thoughts are specially interesting to automotive executives at this time, because of the comparatively quiescent state of labor troubles in the automotive industry.

Used Cars Still Problem

NOT so much has been heard for the past three months of the used-car problem, but it has not been permanently solved. An enormous number of new cars have been sold since the beginning of March and a very large proportion of them, especially those selling at more than $1,000, have been replacements. In almost every case there has been some kind of trade.

Conceding that a considerable number of those turned in were well fitted for the junk pile, there remain a great many thousands which will be good for a long time to come. Many dealers assert, in fact, that a surprising proportion of new-car sales were in exchange for vehicles which had been operated only a few months. This has tended to keep down dealer profits.

There seemed for a time to be an insatiable demand for used cars, but that demand is now falling off in some sections and dealers are complaining that their stocks are piling up. Many of them probably would not sob bitterly if they encountered greater difficulty in obtaining new cars for a while. They could then liquidate their used car stock.

Manufacturers who try to force on their dealers for the remainder of the year more cars than their territories can absorb readily will be making a mistake. No permanent advantage will be gained by trying to force the market. It is certain to be good enough, so there will be no reasonable ground for complaint.

Better Oil Pumping

ALMOST every new departure in design carries in its train a set of special difficulties. Thus the wide-spread adoption of pressure lubrication in recent years has brought back the bugbear of overoiling which had been practically overcome in connection with circulating splash lubrication. With this latter system the amount of oil thrown onto the cylinder walls depends only on the level of the oil in the splash troughs, the size of the dippers and the speed of the engine. None of these factors varies as the engine grows older and begins to show signs of wear. In a pressure feed lubricated engine, on the other hand, the pressure being maintained constant by the relief valve, the amount of oil passing through the bearings increases as the latter become loose. Therefore, whereas an engine with splash lubrication that oils properly when it leaves the factory is almost certain to continue to do so as long as the piston and rings are not unduly worn, this is far from being the case with the pressure feed lubricated engine.

To a certain extent the trouble can be cured by the provision of a scraper ring and of an oil groove and return holes in the piston. There is some difference of opinion as to whether a scraper ring at the lower end of the piston, below the piston pin, is of special benefit in this connection, some engineers holding that the rings at the top end have the same effect, and that the lower ring therefore is merely an extra expense and an undesirable addition to the reciprocating weight. However, there seems to be general agreement regarding the value of the oil return holes, and few engines are now turned out that are not provided with them.

There could be no better proof that oil pumping has given trouble on pressure lubricated engines under certain conditions than the general adoption of a pressure relief actuated by the manifold suction. When the throttle valve is nearly closed the amount of vacuum in the cylinder during the intake stroke is comparatively high, and more of the oil splashed onto the cylinder walls is drawn into the combustion chamber than would otherwise be the case. Although the provision of pressure control actuated by the intake vacuum tends to reduce oil pumping under conditions particularly favorable thereto, it does not overcome the effect of wear in the bearings.

The best remedy for the trouble mentioned would seem to be to reduce the pressure to which the relief valve is set as soon as excessive oil consumption and smoking are observed. The aim should be a constant rate of circulation for a given engine speed, and with the resistance of the oil passages through the bearings reduced by wear, the same rate of circulation can be maintained with a lower pressure on the oil. Manufacturers, however, are loath to instruct users to reduce the oil pressure relief valve setting, for fear this might sometimes be done when conditions did not warrant it, with disastrous results to the engine.

World Automobile Registrations

THE Automotive Division of the Bureau of Foreign and Domestic Commerce has just completed a survey of automobile registrations which confirms very strongly the figures first compiled and published by AUTOMOTIVE INDUSTRIES last February and published in revised form a few weeks ago. Further revisions will be made from time to time.

The Department of Commerce total is 12,530,416, while the revised figures given by AUTOMOTIVE INDUSTRIES on July 20 totaled 12,649,793.

The comparative closeness of the two figures, separately compiled, serves to check the accuracy of both counts. It is natural that the revised AUTOMOTIVE INDUSTRIES figures should be somewhat higher than the Department of Commerce count, since the former figures were more recent in many cases.

A continuance of such investigations will provide the American industry with a constantly fresh and reliable account of automotive progress in other countries and will permit more accurate marketing efforts in foreign fields.

Output in July May Exceed 200,000

R. R. Priority May Affect Production

Manufacturers Fear Curtailment of Steel Supplies—Strike Effects Uncertain

By JAMES DALTON

NEW YORK, Aug. 1.—Production of passenger cars and trucks for July probably will approximate a little more than 200,000, or around 75 per cent of the record figure of 288,000 established in June. Output of some companies will be practically as large as it was last month, but others are falling somewhat behind.

The expected seasonal decline in retail sales has become apparent, but it has not been sharp and is considerably less than the average for the last few years. Unless the situation is seriously complicated by the mine and rail strikes it is expected that business for the third quarter will approach 75 per cent of the second quarter. This would mean a somewhat larger output than in the third quarter of 1921, which was the best of that year.

Automotive manufacturers are not as much disturbed about their supplies of coal as they are about the effect on the steel industry of the railroad priority order of the Interstate Commerce Commission. They were forewarned of the miners' strike by their trade associations and laid in surplus supplies which are standing them in good stead. The priority order is something over which they have no control, however.

Output Hinges on Steel

If steel mills which supply automotive manufacturers are compelled to close or curtail their production sharply because they are unable to get coal or cars, the effect upon automobile output naturally will be serious. Car and truck manufacturers have their inventories extraordinarily well balanced and they are well covered by commitments, but if steel is not forthcoming they cannot continue indefinitely to turn out motor vehicles in large volume.

No serious complaint has come from the Detroit district of inability to obtain cars in which to ship finished

(*Continued on page* 242)

Business in Brief

NEW YORK, July 31—The evil effects of the coal and railroad strikes continue to cast a shadow over the business world, which is feeling the blight of mounting prices or a scarcity of fuel. Freight congestion in increasing.

Industry is feeling the congestion of shipments and the diminishing coal pile, especially in the metal producing plants which are located in the central west. This has resulted in more cautious buying, and although in some lines, where goods are needed for immediate use, there has been considerable activity, caused by the fear of a possible complete or partial blockade of production or shipment.

The coal situation has resulted in more blast furnaces shutting down and steel making operations have been slowed. The lack of fuel has caused more lake shipping to go out of commission, and the use of fuel oil has extended to many industries.

Woolen fabrics are active and orders numerous, while in New England the granite and textile operatives have returned to work. There is a heavy export demand for wheat, caused by the recent low levels, while the buying of materials by the farm implement men makes things interesting in that branch of industry. July's mail order buying exceeds that of a year ago. Some crops are good. Harvesting for winter wheat is nearly over and that of spring wheat has begun. Oats look well, and corn and potatoes are promising. Cotton is lower, based on better crop advances. Sugar has reached a new high.

Car loadings are the best of the year, nothwithstanding the strike. Not counting coal, they totaled 783,573 cars during the week of July 15.

In the stock market industrials and rails showed substantial advances and produced prices higher on the average than a week previous. Bonds were firmer, money easier and exchanges steady.

Bank clearings for the week ending July 27 aggregated $6,584,373,000, a loss of 6.7 per cent from the previous week, but a gain of 21.8 per cent over the same week a year ago.

Plants in Wisconsin Working Normally

Scarcity of Coal Only Thing Disturbing Automotive Manufacturers Right Now

MILWAUKEE, July 31—The lack of any favorable developments of a tangible nature in either the railroad or coal strike during the past week has created considerable apprehension among the automotive as well as other industries in this territory.

This fear grows largely out of the danger that may soon be encountered in securing supplies of fuel as well as some of the important raw or semi-finished materials manufactured at distant points. In other respects it is felt that receipts and shipments could be handled by motor truck, which already is being done to some extent.

Unless action comes quickly to effect a resumption of coal production and deliveries of fuel are speeded up, Milwaukee and northwest industries generally face the worst shortage of coal in history. Milwaukee is the distributing point for virtually all coal consumed in the north central states, and local docks have received so far this season only a very small part of the normal supply, which usually comes by great lake vessels. This shortage is due to lack of mining output.

No Decline in Activity

In the meantime production of passenger and commercial cars, units and parts and automotive equipment generally is going forward at a steady rate. There has been no loss and no decline in activity, save that the call for parts and equipment is less feverish. Demand, however, is well sustained, but now is largely on a contract basis, with shipping instructions more regular and definite. In the earlier months delivery specifications came with a rush at frequent intervals. Now it appears that the trade has settled down to an even basis. Manufacturing schedules are laid out for three to six, if not nine or twelve months ahead, and purveyors of parts and equipment have been enabled to lay out their production schedules on a similarly more definite basis.

Retail sales of passenger cars in July so far as records obtainable to-day tell the story, made a remarkably good showing in comparison with figures for the same month in previous years. There are few dealers who cannot show a gain ranging from 25 to 300 per cent over the sales in July last year. Generally speaking, sales were only a little below June.

Plants Keeping at Capacity Output

Volume Production to Hold in August

First Paring of Manufacturing Schedules Will Be Reserved for September

DETROIT, July 31—When compiled production figures for July will show that business in this month has maintained a very even pace, and though the rush of the second quarter of the year has generally subsided, there still is sufficient buying to keep factories at about capacity output.

Releases to parts makers at this time would indicate that August will continue volume output, and that the first definite paring of schedules will be reserved for September.

Output Below June

Several companies will show an increased output in July, but the majority will run considerably under the total for June. The companies showing gains are those which have been delayed by material shortage in the earlier months, or those which, in bringing out new models, were unable to get into volume production previous to this time.

Though the majority of companies have come abreast of requirements from dealers, there are a number which are from one to two months behind on deliveries of certain models. Packard is behind on all models of single six; Maxwell is behind on most models; Lincoln is two months in the rear; Ford and Dodge are behind on closed models particularly. Studebaker is behind on most models; Buick on sport and closed. Practically every company is enjoying a firm demand in all models.

Falling Off in East

Buying in eastern cities has shown a seasonal falling off, but it is holding up good in states in the midwest and is declared to be opening up brightly in some of the farming zones. Dealers in eastern cities are showing a desire to take all the closed cars they can get for the fall demand, this being especially true in the large Metropolitan districts. As a result some factories have been compelled to send most of their closed cars into this territory, though there is an insistent but smaller demand for closed cars throughout the entire territory.

M. A. M. A. CO-OPERATING

NEW YORK, Aug. 1—The traffic department of the Motor and Accessory Manufacturers Association has sent a bulletin to its members calling their attention to the fact that automobile manufacturers in the Detroit district are beginning to experience much difficulty in getting automobile cars in which to ship their finished products. As a measure of co-operation, members of the M. A. M. A. are urged to ship their products as far as possible in automobile cars so that they will be available in the Detroit territory for the shipment of motor vehicles.

POSTPONES PARENTI SALE

BUFFALO, July 31—Judge Hazel postponed the hearing on the petition to have the sale of the Parenti plant to the Hanover company declared void until Aug. 4 at 10 a. m.

Many Important Developments in the Electric Motor Car Field Soon to Appear

By A. C. DOWNING,
Vice-President and Sales Manager, Detroit Electric Car Co.

Detroit, July 31.

THERE are a number of developments in the electric motor car field which will soon be coming through. Most important is the development of a new type of storage battery which will be lower in price and more efficient than the present type.

This battery will in all likelihood be of an interchangeable type and will be rented rather than sold with the electric car proper. When it requires repair it can be removed and another battery rented, the change requiring only a limited time and not tying up the use of the car.

By renting the battery, the first cost of the car will be reduced to a considerable extent, and the new plan will also have the effect of permitting an owner to pay as he rides, rather than as now paying everything at one time. Bills for electricity, coming all at one time, have tended to limit the popularity of electrics, in that it makes them appear expensive to operate in comparison to gas cars where the expenditures are spread out.

There will also be wide changes in the types of bodies now associated with electrics. We are at present working out plans for a series of body types which will give to electrics the body lines of gasoline cars, without, however, the long wheelbase that gasoline cars have.

The development of a front wheel drive electric is an important step in our branch of the industry as it opens up a new field of possibilities. With it many changes can be made, and with the new storage batteries, increased speed and wider touring range will be obtained. The development of molybdenum steel also will have an important part in making the electric a more important vehicle in the automotive field.

With the new body types many changes will be possible. To this time the coach work of the electrics has been held to the very highest mark, and this is largely the reason why there have been no electrics in the medium price car field. Then, too, all electrics to this time have been of the enclosed variety, a higher priced vehicle necessarily than open models.

Among the new body types which we are considering are cars with victoria tops and also enclosed cars of the chauffeur driven variety, something there has never been to this time in electrics. We believe that cars of this type would have instant popularity in the Latin countries, and also in many countries where the gasoline supply is limited and high priced.

The economy of the electric vehicles is being demonstrated every day by commercial electrics working with gasoline commercial cars. Through these the popularity of electric passenger cars is rapidly growing among the class of people to whom economy of operation is an important consideration. As a town car, owner driven, it holds its largest measure of popularity in the large cities of the United States, and is replacing gasoline cars in many instances.

We have confidence that there will be an increasing market for electric cars as time goes on. That this market is not larger at this time is mostly the fault of the electric car manufacturer, who has not taken advantage properly of the possibilities for development.

American Steam Truck Contracts for Factory

ELGIN, ILL., Aug. 2—The American Steam Truck Co. of Chicago, manufacturer of the American steam passenger car, has signed a contract for the purchase of the plant of the Duty Motor Corp. here. The Duty company was established a year and a half ago to manufacture trucks here, but encountered financial difficulties and only a few trucks were made.

The plant has more than 22,000 sq. ft. of space and is said to be well adapted for motor car manufacture.

Studebaker Profits Bring Big Dividends

Regular Quarterly Declaration Made, with 6 Months' Sales Reaching $73,422,862.25

SOUTH BEND, IND., July 31—At their meeting to-day directors of the Studebaker Corp. declared the regular 1¾ per cent quarterly dividend on preferred stock and 4 per cent on common payable Sept. 1 to stockholders of record at the close of business Aug. 10, 1922. The directors decided to put the common stock on a regular 10 per cent basis and to pay extra dividends as conditions permit, hence the 4 per cent declared to-day covers the 2½ per cent regular quarterly dividend and a 1½ per cent extra.

The total net sales of the Studebaker Corp. and subsidiary companies for the past six months ended June 30 amounted to $73,422,862.25, and the net profits derived therefrom, with other net income, after reserves for increased depreciation but before income tax reserves, amounted to $12,686,763.07. Reserves for United States and Canadian income taxes of $1,530,362 reduced the net profits to $11,156,401.07. These net profits exceed the net profits for the entire year of 1921, $10,409,690.80, by 7.2 per cent and exceed also by 9.6 per cent the combined net profits of the first four years of the corporation's business, 1911 to 1914 inclusive, which amounted to $10,181,266.99.

President Erskine anticipates that the sales of the last six months of the year will approximate 75 per cent of the sales of the first six months. The company will enter 1923 well equipped to meet the expected keen competition. Additions to the South Bend plants and extensions of the plants in Detroit will give the company a production of 160 more cars per day than it now has. Then the combined plant capacity will be 600 cars a day or 150,000 per annum.

Industry Interested in M. A. M. A. Meeting

NEW YORK, Aug. 1—This year's convention of the Motor and Accessory Manufacturers Association at Buffalo, Sept. 13, 14 and 15, will be a real congress of the automotive industry. In view of the record-breaking production of cars and trucks, executives are eager to survey the trade horizon and exchange viewpoints with leaders in all branches of the business. The opportunity for this sort of discussion will be afforded at the various general sessions and departmental conferences at the convention.

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, will speak on "Trends of the Industry and the Outlook for 1923." The discussion following this address will be lead by A. H. D. Altree, vice-president of the American Bosch Magneto Corp.

A topic of timely interest "Integration and Mergers in the Automotive Industry," will be discussed by C. A. Dana, president of the Spicer Manufacturing Corp. Dana is an authority on this subject, because he has been a leading figure in several important consolidations during the last few years.

T. M. Simpson, credit manager of the Continental Motors Corp., will speak on "How Creditors Can Aid in Rejuvenating and Reorganizing Embarrassed Companies." One or two bankers of national reputation will address the convention on financial problems of the automotive industry. Several other topics and speakers assigned to discuss them will be announced later.

MASS. MAY LEGALIZE GREEN CROSS EMBLEM

BOSTON, Aug. 1—Massachusetts physicians have displayed an unofficial green cross on their cars for several years, believing that it gave them some leeway in traffic when on emergency runs.

Speeders and non-medical men have made use of the green cross, and the legislature will probably be asked in its next term to prohibit the use of such an emblem except by a duly registered physician and through the office of the Motor Vehicle Registrar.

Officials state that bearers of the green emblem have no better standing at the present time than those without the cross.

STEWART-WARNER EARNINGS

CHICAGO, July 29—The largest earnings in any quarter were reported by the Stewart-Warner Speedometer Corp. for the three months ending June 30. The quarter's earnings were $1,605,267, amounting, before Federal taxes, to $3.38 a share. This was more than annual dividend at the present rate of $3. Earnings for the first six months of the year were $4.65 a share, as compared with $1.37 for the first six months of last year. Officials of the company state that business is continuing good and that there are no indications of any material falling off.

THERMOID OPENS NEW BRANCH

KANSAS CITY, MO., July 31—A branch of the Thermoid Rubber Co. has been opened in the Lathrop Building, Tenth and Grand Avenues, with H. J. Campbell in charge. Mr. Campbell formerly was the Thermoid representative in the Middle West. He now assumes the title of district manager, and his branch will care for the sales in Missouri, Kansas, Nebraska, North Dakota, South Dakota, Montana, Wyoming, Colorado, Oklahoma, Arkansas, Texas and the northern portion of Louisiana. These states formerly were handled out of the Chicago office.

Coupe Passes Sedan in Ford Production

Demand for Closed Cars 201 Per Cent Greater Now Than in 1919

DETROIT, July 31—For the first five months of 1922 the Ford Motor Co. reports an output of 103,048 closed cars—44,413 sedans and 58,635 coupes. Based on this production for five months, it is figured that the Ford company will turn out a total of 247,308 closed cars for the year, or 201 per cent greater than in 1919.

It is only this year that the demand for the coupe has exceeded that of the sedan. In 1919 of the 700,000 passenger cars produced by Ford, 33,771 were coupes and 48,318 sedans; in 1920, of the 977,000 passenger cars, 75,948 were coupes and 109,487 sedans. In 1921, of 875,000 production, there were 95,682 coupes and 129,887 sedans. Estimating the total production at 1,000,000 this year, it is figured that 140,724 will be coupes and 106,854 sedans.

In a percentage way 11.7 per cent of the passenger cars in 1919 was closed; in 1920 it was 18.9; in 1921 25.7, while in 1922 it will be 24.7 per cent, it is estimated.

The demand for closed jobs is so great that the Ford company finds itself 100,000 behind in orders for this type, caused by inability to get the bodies fast enough. If this obstacle could be overcome, it is estimated by a Ford official that the sale of closed models for the year would be between 35 to 40 per cent of the total passenger car production, instead of about 25 per cent of the 1,000,000 passenger cars the company expects to turn out this year.

Milwaukee Raises Big Fund for Fokker

MILWAUKEE, WIS., July 31—Practically all of a $100,000 fund being raised by Milwaukee manufacturers and other business men to make a continental survey of aircraft possibilities in a commercial way has been raised. The survey will be made as the forerunner of the plans of the Milwaukee Association of Commerce to induce A. H. G. Fokker, the famous Dutch aircraft engineer and builder, to locate his proposed American plant in Milwaukee.

Immediately after the fund is raised a managing director and committee of five will be named by a nominating committee consisting of Charles F. Pfister, financier, Oliver C. Fuller, president First Wisconsin National Bank, and Clarence R. Falk, president the Falk Corporation.

The proposed investment in an aircraft manufacturing plant will be $2,500,000 and an additional $1,000,000 will be invested in an aerial transportation company.

Brill Bringing Out New Type Bus-Car

Pennsylvania Railroad May Add Vehicle to Its Equipment

PHILADELPHIA, July 31—Pennsylvania Railroad officials are experimenting with the latest type of gasoline-driven engine, with a view to adding to the road's equipment. The engine, manufactured by the J. G. Brill Co., is a combination locomotive baggage car and automobile bus. It is intended for use on branch and short-line railroads.

Leaving Broad Street station at 10 a.m., on a recent test, the officials were taken to Chestnut Hill and thence on the Cresheim branch to Whitemarsh. From there they returned to North Philadelphia and then over to the Bustleton road. If they decide to adopt the new type bus-car, it will be used on the Bustleton and Cresheim branches, upon which traffic is light.

28,000 Lbs. Weight

This invention, according to the Brill officials, is considerably more economical than an electric, or steam, motivated train. It can make 50 miles an hour and average from five to six miles on a gallon of gasoline. Like an automobile, it is operated with gear shifts, but has six speeds, instead of three. On a sharp grade the gear is shifted just as it would be in an automobile. The car weighs nearly 28,000 pounds and contains a four-cylinder engine of 68 horsepower.

The "scooter" used in the trial was one of several which are to be put into operation by the Brill company immediately on the Fonda, Johnstown & Gloversville line in New York state. It carries forty-one passengers. There are special compartments for baggage, similar to some types of interurban, or long distance, trolley cars. The motorman, or chauffeur, has a shrill motor horn and a special whistle. The cost of the car complete is $16,000.

It is claimed for it that it can be operated for one-fifth the cost of a steam train and it requires a crew of only two men.

New Model 890 Cole Marked by Features

INDIANAPOLIS, Aug. 1—Shipments are being made on the new series Cole 890 which, while not radically different from the former models, has many refinements and now is furnished with extra equipment that hitherto has been optional at an increased price.

An improved frame with large springs and modified suspension, together with an envelope manifold and a new carburetor are among the mechanical refinements of the car. Six wheels, with side mountings for the extras, is now standard, the buyer being allowed choice of wood, wire or disteel types. A new type Gemmer steering gear, with wood wheel without quadrants, is another detail that will engage the attention.

The body style has been refined and the external details of the job show many new ideas from the windshield to the rear curtain window that is 8 inches wider than the one on the former model. The price of the seven passenger job of the new series 890 is $2,685. The price of the former model was $2,785, including equipment.

Southern Territory Improving Steadily

ATLANTA, GA., July 31—A survey of automotive sales conditions over the Southeast from reports of Atlanta distributors evidences the fact that business has proven entirely satisfactory since the early spring, and that there has been a steady improvement from week to week to the present time in the sale of both new and used passenger cars and trucks. The latter business has been especially satisfactory as compared with the slack in truck sales the industry experienced at this time a year ago, and the outlook now is for increased truck demand, as every line of business and industry over the South has experienced notable improvement the past three months.

With cotton prices holding steady around a figure that insures the grower a decent margin of profit, there is a much better feeling among the farmers. Furthermore, other farm prices are satisfactory, and financially the southeastern farmer is in a better shape than he has been in more than two years. This is resulting in improved truck and tractor sales among the smaller dealers and a pick-up also in other automotive sales.

WESTERN RESERVE EXPANDING

MILLEN, GA., July 31—Officials of the Western Reserve Cotton Mills Co. of Georgia, subsidiary organization of the Mason Tire & Rubber Co., Kent, Ohio, advises that the plant has ordered several thousand dollars' worth of new weaving machinery, and that when installed the weaving capacity of the mills will be greatly increased. Evidence of good business in tire sales is indicated by the fact that mills are operating by day and night shifts at full capacity manufacturing tire fabric exclusively.

FORD MINE SHIPS FIRST ORE

DETROIT, July 29—The Ford Imperial mine in the Michigan Upper Peninsula began shipments of iron ore this week to the River Rouge blast furnaces. The mine was taken over by the Ford interests a year ago and has been under development since. The mine differs from others in the Michigan iron and copper fields in that the miners walk down and up stairs to and from work, instead of being hauled up and down in cages.

Railroads May Gain Control of Trucks

Possible Action of Massachusetts Commission Scares Commercial Vehicle Makers

BOSTON, July 31—The Public Utilities Commission of Massachusetts has announced that it will take up the question of motor transportation in conjunction with other such matters in September. The legislature this year passed a resolution to have an investigation made regarding the use of motor vehicles on the highways, and principally motor trucks. This was the aftermath of the failure of Commissioner John N. Cole to secure a big increase in fees on motor trucks and cars, and a gasoline tax.

Also veiled in the resolve is power to recommend that the motor trucks may be put under the jurisdiction of the Public Utilities Commission, and in a way be classed as common carriers. In that event the railroads would be able to exercise some control over the trucks.

Operation Has Difficulties

A couple of years ago an attempt was made to amend the law along these lines, and it was discovered that a joker in the present law prevents common carriers passing the lines of other such carriers at grade. That would mean bridges above or tunnels underneath every steam and street railway in the state, or the barring of trucks everywhere. It was killed. Now, if the Public Utilities Commission takes over the jurisdiction of truck operation there will be a lot of snags.

Therefore makers of motor trucks, the N.A.C.C., the N.A.D.A. and other bodies are expected to send all the data available about truck transportation to the commission at the State House, Boston, Mass., right away, and then arrange to be represented at the hearing on Wednesday, Sept. 27, next. Otherwise there should be no alibis if the railroads are well represented and have things their own way. Whatever the Public Utilities Commission recommends will have a good chance to become a law next year.

Establishes Pension System for Employees

PHILADELPHIA, July 31—The Electric Storage Battery Co. has approved a pension plan for its employees. A pension fund of $350,000 has been deposited with the Pennsylvania Co. A male employee who has been in the service of the company for thirty years is eligible for a pension. If his average earnings for the ten consecutive years of highest pay were $2,000 per year, his pension would be thirty times 1½ per cent, or 45 per cent of the average pay, or $900 a year. Other types of employes are cared for in proportion.

Experts on Exports Moved to New Jobs

General Motors Sends H. G. Zimmerman to Denmark—Promotion for P. F. Cooper

NEW YORK, Aug. 1—The announcement was made here to-day by the General Motors Export Co., that H. G. Zimmerman, who for some time has headed the Australasian division of the company, had left New York for Copenhagen, where he will act as district representative. P. F. Cooper, formerly district manager for the company at Wellington, New Zealand, becomes the new head of the Australasian division, which also exercises jurisdiction over South African sales, with offices here.

The movement of several other representatives of the company also was announced. W. J. Mougey, district representative at Singapore, and Paul Hughes, district representative at Colombo, Ceylon, have returned to the United States for a tour of the factories. A. Williams, district manager at Johannesburg, South Africa, will sail from New York on Aug. 5 to return to his station, following two months spent here.

Improving automotive conditions throughout much of continental Europe was reported to the company by L. M. Rumley, chief of the European division, who has just returned after a two months tour through the Scandinavian countries, Belgium, France, Spain and Germany. Rumley is of the opinion that the automobile market is showing itself to be one of the first in Europe to come back, and the company, which for some time has reported increased interest from the continent, looks for an improvement there.

In announcing the movements of its personnel, officials of the export company declared that most sections of the world were showing a business betterment, although it was said that Java yet had on hand some stocks of unsold trucks. Sales have quieted down somewhat during the summer months, as has been customary in other years, but with the approach of the spring and summer seasons in countries south of the equator, including Australia, South Africa, Argentina, and others, a good volume of business is expected.

Stevens-Duryea Plant to Be Kept Running

SPRINGFIELD, MASS., July 31—Harry G. Fisk and Frank H. Shaw, receivers for Stevens-Duryea, Inc., Chicopee Falls, have filed their inventory in the Superior Court here. The statement of assets gives as valuation under forced liquidation, $349,644, and fair valuation as a going concern, $1,242,437. Of the first-named total, $239,021 is in the plant property, $88,059 in cars, parts, materials, supplies and scrap and the balance in notes receivable, accounts receivable and cash on hand.

Receiver Shaw expressed the opinion that the plant should remain in operation, and said it was planned to continue the present production of six cars a week, with 220 men employed.

There will be no immediate reorganization, the receivers continuing their process of enforced liquidation with the expectation that a substantial dividend will be paid the creditors. It is guaranteed that there will be no price change on the cars before Jan. 1.

Dodge Makes Plans for Canadian Plant

DETROIT, Aug. 1—Plans for the erection of a Dodge Brothers factory in Windsor have not yet reached a point where the company will make an announcement of its plans or the extent to which it will go in a Canadian investment, but it is definitely determined that the company will build soon. The property obtained is at the west end of Windsor, an option having been taken on it about a year ago. The former owner was M. G. Campbell, manager of the Windsor branch of the Kelsey Wheel Co.

The system of incorporating certain Canadian made parts into the Dodge Brothers cars exported into that country will be continued for the present, the lease the company holds on the Canadian Pacific dock remaining, though subject to cancellation.

The new factory will provide for an all Canadian built car, it is understood, and will not be assembled from parts made in the Detroit plant.

Walker Refinancing Talk Again Revived

CLEVELAND, Aug. 1—The refinancing of the H. J. Walker Co., manufacturer of automobile engines, which has been the subject of several movements since the first of the year, has again become a live issue in local automobile circles.

The refinancing was about accomplished some months ago by the proposed merging of several companies, but the whole deal fell through when certain orders that had been obtained for Walker engines to keep that plant going at capacity were cancelled.

The refinancing has been revived lately. On Saturday, July 29, financiers and executives of Walker were in session several hours, but no announcement was made at the close of the meeting. Some of the strongest men financially in the city are back of the movement and it is likely that an announcement of the completion of refinancing plans will be made shortly.

DURANT CLOSING STOCK BOOKS

NEW YORK, July 27—Representatives of the Durant corporation have been informed that no more stock of Durant Motors, Inc., will be sold after August 5 to anyone at any price.

July Record Month in Tire Production

More Casings Made Than Ever Before in History of American Industry

AKRON, Aug. 1—July was the biggest month for production in the entire history of the rubber tire industry of America.

The Akron district alone during July turned out tires on a basis of 33,000,000 a year, July production here being in excess of 2,750,000 casings. On this basis of production and upon the basis of present tire requirements, these figures mean that at their present pace of production Akron district tire companies can meet practically the entire needs of the world.

With July's astounding production figure, tire output in the Akron area for the first seven months of the current year is estimated to have exceeded 11,000,000. Tire output was considerably less during the first three months of the year than during the following three months but from Jan. 1 steadily climbed, making conservative the 11,000,000 production estimate.

Daily production continues at about 107,000 tires a day here. This is a climb up from 85,000 a day six weeks ago, the increase in demand for tires which necessitated the heavier output coming at a time when practically all tire producing companies were "sitting tight" and were prepared for a seasonal slump in sales. But the falling off of sales failed to materialize when, according to all the laws of the industry, based upon a study of every year's ebb and flow of production, there should have been a diminution of sales.

Fabric on Wane

Whether this slump will come in August manufacturers now are not prepared to say.

Production rapidly is swinging to the cord tire. In fact the fabric seems to be on the wane, bearing out the predictions made by several of the tire industry's veterans. Manufacturers say the day is coming when fabric tires will be practically extinct. When that time comes, they say, with production concentrated upon the cord tire almost exclusively, new methods will be developed so as to permit a far lower price on the cord casing.

GERMAN SHOW CALLED OFF

BERLIN, July 16—Germany will not hold an automobile show during 1922. The show and race which had been announced for Sept. 25 to Oct. 3 has been definitely abandoned, because of strikes and the generally confused political situation.

Present plans call for a show in the spring of 1923.

More Pacific Coast Assembling Plants

Manufacturers Locating Around San Francisco Bay—Oakland an Automotive Center

SAN FRANCISCO, CAL., July 31—The automotive manufacturing and assembling industry is more active in the cities around San Francisco Bay than it has been at any time within the past five years. The Chevrolet Motor Co. of California has applied to the city council of Oakland for permission to close certain streets in order to provide more ground on which to erect extensive additions to its assembly plant, already the largest of its kind on the Pacific Coast.

The plan of the company, as revealed to the council, is for an expansion to twice the size of the present plan, with an expenditure of approximately $100,000 for building alone. The new unit will be used almost exclusively for construction of bodies for closed cars, to supplement the present shipment of these bodies from the factories in Cleveland and Detroit. The new unit, according to W. C. Williams, manager of the plant, will employ between 300 and 350 men.

Announcement also is made that the Associated Motor Industries, of which W. I. Ohmer of Dayton, Ohio, is chairman of the board of directors, will establish one of five assembling plants at Oakland.

Durant Oakland Plant Ready

The plant of the Durant Motors Co. at Oakland, on which construction work was started last November, and which has cost to date approximately $1,000,000, is ready to start production of cars, according to an announcement. The factory is located on an 18-acre site and is connected by three spur tracks with the main line of the Southern Pacific Railroad, with the spurs so placed that 20 cars can be loaded or unloaded simultaneously. There is a floor space of 300,000 square feet in the factory, and an equal amount of space can be added without interfering with active operation if, at any time, this addition becomes necessary.

The Indiana-Pacific Motor Truck Co. will erect an assembling plant in San Francisco this year, according to C. M. Menzies, of this city, who has charge of all territory west of Denver for that corporation.

J. & B. PETITIONS AGAINST RICO

PITTSFIELD, MASS., Aug. 1—J. & B. Mfg. Co. has petitioned the Superior Court for a temporary injunction to restrain the Rico Ignition Co. from advertising and selling coils, plates and bases made by the latter concern and described as master coils adaptable to any automobile. It is claimed that the device is an unlawful imitation of one manufactured by the petitioner. Both concerns are of Pittsfield, and the head of the Rico was formerly an officer and engineer for the J. & B. Co.

SALES BY M. A. M. A. MEMBERS FOR FIRST SIX MONTHS AGGREGATED $187,500,000

NEW YORK, Aug. 1—Sales by members of the Motor and Accessory Manufacturers Association for the first half of 1922 aggregated $187,500,000, as compared with $113,000,000 for the same period in 1921. Sales for June of this year were nearly double those of June, 1921. Business was almost on the same level as in May.

While business has been climbing upward there has been a sharp decrease in the volume of past due accounts. The total at the end of June, 1921, was $4,720,000 and at the end of last June it was nearly $2,840,000.

The following table shows the sales by members of the association the total of past due accounts and the total of notes held for all the months of 1921 and the first six months of 1922:

1921	Total Sales	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	$6,264,587		$8,099,727		$4 359,871	
February	10,408,962	66.15 Inc	6,717,165	17.07 Dec.	6,063,118	39.08 Inc
March	20,120,386	93.30 Inc.	5,603,992	16.57 Dec.	5,069,877	16.38 Dec
April	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc
May	26,781,350	.13 Inc.	4,505,176	15.64 Dec.	4,460,355	16.77 Dec
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec
July	23,096,214	1.68 Inc.	5,242,046	10.79 Inc.	3,690,154	7.90 Dec
August	23,397,640	1.31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec
September ...	23,141,891	1.09 Inc	4,358,545	.22 Inc.	3,677,500	5.24 Inc
October	22,053,327	4.70 Dec.	4,512,680	3.54 Inc	3,463,500	5.82 Dec
November ...	18,998,490	13.85 Dec.	4,352,000	3.56 Dec.	3,661,900	5.73 Inc
December ...	14,349,750	24.47 Dec.	4,220,450	3.02 Dec.	3,384,250	7.58 Dec
1922						
January	17,320,000	20.61 Inc	4,450,000	5.45 Inc.	3,146,000	7.02 Dec.
February	22,720,000	31.17 Inc.	4,070,000	8.57 Dec.	3,483,000	10.74 Inc
March	28 670,000	26.14 Inc.	2,890,000	28.86 Dec.	2,657,000	23.69 Dec.
April	33,830,000	18.07 Inc.	3,000,000	2.00 Inc.	2,500,000	1.5 Dec.
May	43,700,000	28.06 Inc.	2,900,000	2.75 Dec.	2,450,000	6.5 Dec.
June	42,000,000	3.85 Dec.	2,840,000	1.25 Dec.	2,320,000	5 Dec.

Chevrolet May Beat Production Record

NEW YORK, Aug. 1—Analysis of passenger car production figures for the first half of 1922 shows that Ford produced only about 40 per cent of the total, as compared with about 65 per cent in the same period last year. Fords output for the six months was about 375,000.

It is interesting to note that in the same period the Chevrolet Motor Co. produced approximately 100,000 cars. It now appears practically certain that Chevrolet will establish a record this year for the biggest production in history next to Ford.

The best previous mark was made by the Willys-Overland Co. in 1916, with a total of 140,000.

Work on Locomobile Plans Moves Forward

BRIDGEPORT, CONN., Aug. 7—Under Durant leadership and with Col. E. H. Havens at the head of affairs as general manager, the work of reorganizing the Locomobile plant here is proceeding rapidly.

No radical changes in design are contemplated by D. G. Roos, former chief engineer, who is at the head of the consolidated engineering and production departments but it is said that production will be speeded up. The factory has been turning out four cars a day and it is thought possible to increase this slightly. A possible increase in price also is being considered.

New Name Selected for Highway Board

WASHINGTON, Aug. 1—For the sake of simplicity and euphony, members of the Highway and Highway Transport Education Committee have voted by referendum to change its name to the Highway Education Board, it was announced here. No change in the personnel of the board or in its functions is contemplated, it was said. Dr. Tigert, who is United States Commissioner of Education, remains as chairman.

Fundamental problems involved in highway transport and highway economics are discussed at length by leading students from engineering and automotive fields in a new booklet now ready for distribution by the Highway Education Board.

Modification of truck design to fit the road, subsidizing of highway transport by the construction of market lanes, prediction of future traffic changes and economical types of roads are only four of nearly two score problems raised and discussed authoritatively in the bulletin.

SAMUEL H. CARPENTER DIES

LANSING, MICH., July 31—Samuel H. Carpenter, president and general manager of the Atlas Drop Forge Co., died suddenly last Friday. Although Mr. Carpenter had been ill for a time lately he had appeared to be improving in health. When the forge company was formed in 1906, Mr. Carpenter was general manager and three years ago he assumed the presidency. He also was a director of the Federal Drop Forge Co.

Japan's Activities Disturb Tire World

Belief at Akron Flowery Kingdom Is After South American and Australian Business

AKRON, Aug. 1—Foreign countries, more particularly Japan, are making a strong bid for rubber and automobile tire business in South American and Australian fields in direct competition with American export business to those countries. Whether or not they will succeed in giving American manufacturers and exporters sufficient stiff competition to wrest from America most of her export business will depend upon future developments.

Akron export experts of rubber companies in a recent analysis of foreign trade competition, say that Japan's activities in the rubber industry, cloaked with secrecy, are puzzling them. While tire production and sundry rubber goods production have been slipping in Germany, Japan quietly has increased her rubber manufacturing business, the Japanese importations of crude rubber having jumped from 1265 tons in 1913 to 22,500 tons last year.

Keen Competition Expected

The automobile registration in Japan has not increased sufficiently to account for this unusual consumption of rubber there, and American rubber exporting authorities say they look for keen Japanese competition within a short time, for the question upon their lips—and a question as yet not satisfactorily answered—is "What is Japan doing?"

Germany appears to be slipping insofar as the rubber industry is concerned. In 1913 Germany manufactured 1,300,000 automobile and truck tires. Last year Germany's tire production was a scant 1,500,000. In view of the heavy growth of the automotive industry since 1913 and the increased use of the automobile in eight years time, this is a substantial loss rather than a gain for Germany, with production based upon proportioned demand and possible sales.

U. S. Imports 45.6 Per Cent

To illustrate Germany's back sliding in the rubber business, Germany in 1913 imported 14.5 per cent of the world's total crude rubber output while the United States imported and consumed 45.6 per cent of the world's total output. In 1921 the German importation and consumption was 7 per cent of the world's supply as against 60.8 per cent consumed in the United States.

Germany's actual tonnage of crude rubber imported in 1913 was 16 525 tons, as compared to 20,725 tons last year. Thus, while the tonnage has slightly increased, the percentage of the total rubber supply has decreased materially.

French manufacturers, like all of France, waiting on the German reprisals, have been losing ground rather than keeping pace with the steady industrial growth of the world. French importations of rubber in 1913 were 5751 tons, as compared to 15,064 last year. American consumption of crude rubber was 53.092 tons in 1913 and 191,702 tons last year.

5-Passenger Phaeton Now Part of Reo Line

LANSING, Aug. 2—A new 5-passenger phaeton has been added to the Reo line. The chassis is the standard T-6, but the regular furnishings and equipment are considerably augmented. The price is $1,745.

The car is equipped with 32 x 4 in. steel disk wheels, and the body itself is of the semi-sport type. The body is somewhat narrower than the standard 7-passenger body and will comfortably carry four or five passengers. The finish is in dark blue, striped with ivory and the trimming is Spanish gray, hand buffed leather. The seats are so arranged that passengers sit low in the body in a comfortable position.

The top is of new design, with gray interior trimming, and the windshield has the lower half stationary. The upper half is arranged to swing in either direction. The windshield is fitted with side wings, as standard, these being in the form of heavy nickeled braces, supporting the entire shield, and making a more convenient means of attaching the side curtains. A cowl ventilator is standard equipment and aluminum molding is fitted at the back of the hood, where it joins the cowl at the body. There are seven polished aluminum guard bars on back panel of the body.

The headlights are of a new design with a nickel bail or handle and fitted with dimming lenses. There is a combination parking light and automatic stop signal on the rear.

Other standard equipment includes Moto-Meter, radiator cap with ball handles, clock, front and rear bumpers, aluminum step plates on the running boards, and radiator finished in nickel with polished front.

G. M. Gillette Quits As Tractor President

MINNEAPOLIS, Aug. 3—George M. Gillette, president of the Minneapolis Steel and Machinery Co., maker of the Twin City Tractor, has resigned, but remains a member of the executive committee and of the directorate. His successor has not been named. Gillette said that after 40 years hard work he would take a rest.

For 20 years he has been an officer in the company. Twelve years previous to his going with the Minneapolis company he was secretary and treasurer of the Gillette-Herzog Co., succeeded by the American Bridge Co.

Personnel Is Named of Star Motors, Inc.

Carroll Downes of Durant Becomes Vice-President and General Manager

NEW YORK, Aug. 2—Carroll Downes, vice-president of Durant Motors, Inc., and president and general manager of the Durant Motor Co. of Michigan, has been named by W. C. Durant as president and general manager of Star Motors, Inc., the personnel of which has just been announced. C. F. Daly, who also is assistant to the president of Durant Motors, has been selected as vice-president of Star. W. W. Murphy, treasurer of Durant Motors, will serve in the same capacity with the Star company, while Secretary H. F. Herbermann of Durant Motors will have the same title with Star.

Star common will be placed on the market for the first time on Aug. 10. It will be listed at $15 a share and sold in lots of from five to fifty under the Durant plan—no cash transactions, but a monthly installment system. It has not been announced as yet how many shares will be offered at the start, but it is expected the Star will have 50,000 shareholders before the end of the sale.

Flint Company Incorporates

DETROIT, July 31—Articles of incorporation of the Flint Motor Co., the formation of which was announced by W. C. Durant, have been filed at Lansing. The company, according to its statement, is to make a six-cylinder car at Flint, the price of which will be $1180 in the touring car model. The company will have 500,000 shares of no-par value stock to sell for not less than $10 a share. Preferred stock will total $10,000. The articles state that $10,000 has been subscribed and $1,500 paid in. The incorporators are listed as W. C. Durant, C. F. Daly, Carroll Downes, H. F. Herberman and W. W. Murphy.

R. R. Priority May Affect Production

(*Continued from page* 236)

products, but even if there should be a car shortage it would cause no great concern. The automotive industry has learned how to deliver its products on their own wheels under their own power, although it involves some inconvenience. It delivered nearly 80,000 vehicles in this way in March, 1920, when rail congestion was most acute.

The most disturbing factor in the present situation, therefore, is not lack of demand but the possibility that supplies of steel may be shut off. If steel comes through cars and trucks will go out. If there is a serious slump in production it will be the result of inability to obtain supplies of essential materials.

Men of the Industry and What They Are Doing

Switzer on Executive Committee

Maurice Switzer, vice-president of the Kelly-Springfield Tire Co., has been added to the executive committee of the advertising managers council of the Motor and Accessory Manufacturers Association. He has consented to speak at the Buffalo convention of the association in September on the "Anomalous Position of the Average Advertising Man." Switzer takes the stand that the position of advertising manager is one of the most important in any company and that the man who fills it should take high rank among the executives. Switzer went with the Kelly-Springfield company in 1914 to organize its advertising department and was elected a vice-president two years ago.

Henry Lord with Velie

Henry Lord, former vice-president and treasurer of the Moline Plow Co., has joined the executive personnel of the Velie Motors Corp. and will assume his duties Sept. 1. The nature of his work has not been stated. Lord was with the Moline Plow ten years and for six years was vice-president and treasurer. He and Mrs. Lord are on a motor trip to Plymouth, Mass., during August.

Weber Leaves Bankers Security

Fred A. Weber Jr. has resigned as assistant treasurer of the Bankers Commercial Security Co. of New York, one of the largest national automobile financing companies. He will leave Aug. 15 and will take a much needed rest before accepting one of the several offers he has under consideration. Weber was one of the organizers and the second president of the Automobile Financing Creditmen's Association of New York. He now is president of the National Association of Automobile Financing Companies. He went with the Bankers Commercial four years ago as credit man after serving for some time in the credit department of the Liberty bank which is now the New York Trust Co.

McNaughton Sales Manager

Announcement is made by the Hendee Mfg. Co. of the appointment of J. B. McNaughton as sales and advertising manager. McNaughton has been connected with the Indian organization for 14 years, the last three as sales promotion manager. A. A. Anderson of the same organization assumes the duties of assistant sales manager and E. W. Stack as assistant advertising manager.

McMillan with Kardex

A. G. McMillan has been appointed director of sales of the American Kardex Corp. He recently resigned as director of sales from the Mitchell Motors Co., Inc., and several years previously was with the Fairbanks Co. Paul C. Lott recently sales promotion manager for the Mitchell company has assumed a similar position with the Kardex company. Fred T. Yaeger, who was western sales manager for Mitchell, will manage the newly created automotive sales division for the Kardex organization.

Changes With Klaxon Co.

Campbell Wood, formerly representing the wholesale division of the Klaxon Co. in the States of Missouri, Kansas, Oklahoma, Texas, Colorado and New Mexico has become a sales representative of the motor equipment division of that company with headquarters in Detroit. T. B. McBride, recently connected with the Peden Iron & Steel Co. at Fort Worth, Texas, succeeds Wood. E. V. Scotford, previously of the advertising and sales promotion department of the United States Tire Co. is now acting advertising and sales promotion manager of the Klaxon company.

Promotion for Blakiston

Thomas B. Blakiston, who was formerly assistant general sales manager, has been appointed general sales manager of the American Hammered Piston Ring Co. of Baltimore.

Beaudette Leaves Company

Alpha J. Beaudette, a member of the O. J. Beaudette Co., has left the organization on accession of the Fisher Body Corp., the new owners, and will take a vacation trip to the Yellowstone with his family and his father, M. J. Beaudette, also a member of the company. A. J. Beaudette is considering several connections.

Delco Promotes Christopher

George T. Christopher has been appointed general superintendent of the Dayton Engineering Laboratories Co., being formerly assistant superintendent and production manager. He is a graduate of the Rose Polytechnic Institute. Christopher's special work with Delco was the operation of the manufacturing division.

Tinsman in Own Business

E. H. Tinsman, former comptroller of the Oakland Motor Car Co., has opened an agency for the Cadillac and Nash cars at Jackson, Mich. W. A. Sullivan, also formerly with the Oakland, in the advertising department, is associated with him.

Burke Quits Thomart

S. E. Burke sales manager of the Thomart Motor Co. of Kent, Ohio, has resigned from that organization.

Hardy on Vacation

DETROIT, Aug. 2—A. B. C. Hardy, president and general manager of the Olds Motor Works, is taking his fourth vacation in 30 years. He left for Pittsburgh Monday, where he will speak to a meeting of Olds Pennsylvania dealers, following which he will confer with President Pierre S. duPont of General Motors Corp. in New York.

Gilchrist Touring East

E. H. Gilchrist, general sales manager for the Westcott Motor Car Co. of Springfield, Ohio, is making a trip through the East visiting district managers and distributors in New York, Boston and other points.

Ackerson With Saxon

Charles Ackerson, formerly manager of the Precision Die Castings Co. plant at Pontiac, is now associated with the sales department of the Saxon company.

Stephens Organizes As Separate Company

FREEPORT, Ill., July 30—Establishment of the Stephens Motor Car Co., Inc., as a separate organization, although subsidiary to the reorganized Moline Plow Co., has been completed.

All production activities, including accounting, service and similar features, will continue in Freeport under direction of H. J. Leonard, for many years general manager of the company, who has been made vice-president in the new corporation. O. P. Robb, another vice-president and active many years in the sales and territory problems of the company, will be sales manager with offices in Moline, Ill., under direction of R. W. Leo, second vice-president. Robb succeeds C. Roy Clough, many years director of sales for the Stephens car. Preston Boyd, another veteran Stephens employee, is assistant treasurer.

Otherwise officers of the Stephens Motor and including the board of directors follow closely the official makeup of the Moline Plow Co.

NEW TRUCK COMPANY FORMED

GRAND RAPIDS, Mich., Aug. 2—United Motor Products has been incorporated here to build two truck models, one under 1 ton, the other from 1 to 2 tons.

The officers of the company are: F. T. Hulswit, president; Harry Green, vice-president in charge of finances, and G. R. Wilbur, vice-president and general manager. Hulswit is president of the United Light & Railway Co. of Grand Rapids. Wilbur for the last eight years has been with the Republic and Ruggles companies. A. G. Boone, formerly chief engineer of the Ruggles company, will be in charge of manufacturing and engineering production.

PRICES REDUCED BY MANY COMPANIES

Buick's New Prices Show $30-$220 Drops

Four Cylinder Touring Now $885 and Six Cylinder Touring $1,195

DETROIT, Aug. 1—The Buick Motor Co. announces new price reductions which range from $30 to $220 on all models. The four-cylinder touring car has been dropped $50 to $885, while the 6 five-passenger touring car list is lowered from $1,395 to $1,195. The seven-passenger is changed from $1,585 to $1,435.

There are two new models in the line, the four cylinder touring sedan at $1,325 and the six-cylinder touring sedan at $1,935. The changes follow:

Four Cylinder Models

No.	New Price	Old Price
34 Roadster	$865	$895
35 Touring	886	935
36 Coupe	1,175	1,295
37 Sedan	1,395	
38 Touring Sedan	1,325	(new)

Six Cylinder Models

No.	New Price	Old Price
44 Roadster	$1,175	$1,365
45 Touring (5-pass.)	1,195	1,395
49 Touring (7-pass.)	1,435	1,585
54 Sport Roadster	1,625	1,785
55 Sport Touring (4-pass.)	1,675	1,785
41 Touring Sedan	1,935	(new)
47 Sedan (5-pass.)	1,985	2,165
48 Coupe	1,895	2,075
50 Sedan (7-pass.)	2,195	2,375

Chevrolet Announces All Prices Reduced

FLINT, MICH., Aug. 1—Chevrolet Motor Co. has announced price reductions on its line of passenger and commercial models effective to-day. The following is the schedule:

Passenger Models

	Old Price	New Price
Model Superior Roadster	$525	$510
Model Superior Phaeton	525	525
Model Superior Utility Coupe	720	680
Model Superior 4-passenger Coupe	850	840
Model Superior Sedan	875	860
Model F. B. Roadster	975	865
Model F. B. Phaeton	975	885
Model F. B. Coupe	1,575	1,325
Model F. B. Sedan	1,575	1,395

Commercial Models

	Old Price	New Price
Model Superior Chassis	$525	$425
Model Superior Light Delivery	525	510
Model G. Truck Chassis	745	650
Model T. Truck Chassis	1,125	1,095

NEW OAKLAND LIST

DETROIT, Aug. 1—The Oakland Motor Car Co. has announced price reductions on all models ranging from $100 to $200 effective to-day. The company has brought its roadster and touring car to $975 and $995 respectively, thereby giving General Motors a six-cylinder car in the less than $1,000 class. The old and new prices follow:

Model	Old Price	New Price
Chassis	$895	$795
Roadster	1,120	975
5-pass. Touring	1,145	995
4-pass. Touring	1,265	1,165
2-pass. Coupe	1,285	1,185
4-pass. Coupe	1,685	1,445
Sedan	1,785	1,545

President George E. Hannum declared the new prices are predicated upon the ability of the company to sell a fixed or a given number of cars during the fiscal year. The 15,000 mile written engine guarantee will be continued.

Nash Motors Announces New Prices on Full Line

KENOSHA, WIS., Aug. 2—Price reductions ranging from $50 to $200, effective to-day, are announced by the Nash Motors Co. The biggest cuts are on the two closed jobs in the 6-cylinder line, and the smallest on the two open types in the 4-cylinder field. The new list is as follows:

SIX CYLINDER

	Old Price	New Price
5-pass. phaeton	$1,390	$1,240
7-pass. phaeton	1,540	1,390
Sedan	2 390	2,190
Coupe	2,090	1,890
Roadster	1,360	1,210
4-pass. sport	1 545	1,395

FOUR CYLINDER

	Old Price	New Price
5-pass. phaeton	$985	$935
Roadster	965	915
Coupe	1,485	1,385
Sedan	1,645	1,545
Cab	1,295	1,195
Carriole	1,350	1,275

HENDEE REDUCES PRICES

SPRINGFIELD, MASS., Aug. 1—The Hendee Manufacturing Co. announces a new schedule of prices on the Indian motorcycle. The prices are as follows:

	Old Price	New Price
Scout (non elec.)	$315	$250
Scout (elec.)	345	285
Standard (non elec.)	335	275
Standard (elec.)	370	310
Chief (elec.)	435	325

HARLEY-DAVIDSON LOWER

NEW YORK, July 31—Harley-Davidson Motor Co. has announced a price cut on its 1923 motorcycle models. Prices are as follows:

Model	Old Price	New Price
23-F	$335	$285
23-J	365	305
23-FD	360	310
23-JD	390	330

NEW PRICE FOR OLD RELIABLE

CHICAGO, July 31—The Old Reliable Motor Truck Co. has reduced the price of its model D 5-ton truck from $5,250 to $5,000.

Studebaker Makes General Price Cut

Reductions Announced on All Models Ranging from $70 to $300

SOUTH BEND, IND., Aug. 2—Substantial price reductions have been announced by the Studebaker Corp. of America on all its models, effective Aug. 1. The reductions range from $70 to $200 on the light sixes and $175 to $300 on the special sixes and $135 to $225 on the big sixes. The new schedule is as follows:

Light Sixes

	Old Price	New Price
Chassis	$875	$785
2-pass. roadster	1,045	975
Phaeton	1,045	975
Coupe	1,375	1,225
Sedan	1,750	1,550

Special Sixes

	Old Price	New Price
Chassis	$1,200	$1,000
2-pass. roadster	1,425	1,250
Phaeton	1,475	1,275
4-pass. roadster	1,475	1,275
Coupe	2,150	1,875
Sedan	2,350	2,050

Big Sixes

	Old Price	New Price
Chassis	$1,500	$1,300
Phaeton	1,785	1,650
Speedster	1,985	1,785
Coupe	2,500	2,275
Sedan	2,700	2,475

Chandler and Cleveland Both Revise Their Lists

CLEVELAND, Aug. 2—Price changes in both the Chandler and Cleveland lines were announced to-day. With the Cleveland the drops ranged from $10 to $100 and with Chandler from $20 to $300. The new lists are as follows:

CHANDLER

	Old Price	New Price
5-pass phaeton	$1,595	$1,495
4-pass. Chummy roadster	1,595	1,495
2-pass. roadster	1,595	1,495
7-pass. phaeton	1,695	1,645
Dispatch (open)	1,695	1,645
Royal Dispatch	1,795	1,745
Coupe	2,295	1,995
5-pass. sedan	2,395	2,375
7-pass. sedan	2,395	2,295
Limousine	2,995	2,895

CLEVELAND

	Old Price	New Price
5-pass. phaeton	$1,195	$1,095
Chesterfield	1,295	1,260
2-pass. roadster	1,175	1,085
Sedan	1,595	1,585
Coupe	1,550	1,495

MAKERS WATCH EFFECT OF REVISIONS

No Price War Seen as Result of Cuts

No Companies Will Face Possibility of Making Unsatisfactory Profit

NEW YORK, Aug. 2.—Financial interests appear to be much perturbed over August price cuts already announced by Buick, Studebaker, Olds, Oakland, Nash and Chevrolet. They seem to feel that these reductions will inaugurate a period of such competition that the companies may have difficulty in making a satisfactory profit.

There seems to be small basis for undue alarm on this score. Competition is not likely to be any more keen in the next six months than it has been in the past six and the price changes which have been made by the lines in closest competition do not alter their relative positions materially. All these reductions have been based upon expectations of quantity production and, unless all signs fail, these expectations will be realized, although it is improbable sales for the remainder of the year will be as large as in the first half. It is significant that the largest cuts have been made in the closed car field and that reductions on open models are comparatively small.

Plenty of Business

While competition will continue to be exceedingly sharp, there is small likelihood of anything resembling a price war. There seems to be enough business to go around and none of the companies proposes to operate at a loss. By increasing volume of production, they are cutting down their overhead and manufacturing costs sufficiently to offset any stiffening in material prices, except that which is of a temporary nature resulting from the mine and rail strikes.

Disregarding Chevrolet, which stands in a class by itself next to Ford, the keenest competition at this time is among Buick, Studebaker and Dodge. Close on their heels are Maxwell, Durant and the Nash, with Columbia, Oakland and Dort holding good positions.

Buick Led During Quarter

Buick led the race in the second quarter with Dodge fewer than a thousand behind and Studebaker about five thousand behind Dodge. Maxwell production in the second quarter was almost exactly half that of Buick. Durant and Nash were running neck and neck about four thousand behind Maxwell with Durant less than a thousand ahead of Nash. Columbia, with its new light six, is making an excellent showing and sales of Oakland are forging ahead. Overland, which is the closest price competitor of the light Chevrolet, made an excellent showing in the second quarter but turned out less than 45 per cent as many cars as its rival.

The following table shows the old and new prices, where changes have been announced, for the phaeton and sedan of the lines which now are in the closest price competition.

	5-pass. Phaeton		Sedan	
	Old	New	Old	New
Buick 4	$935	$895	$1,395	——
Columbia Light Six	985	——	1,395	——
Dodge 4	880	——	1,440	——
Dort	835	——	1,445	——
Durant 4	890	——	1,365	——
Maxwell 4	835	——	1 485	——
Nash 4	985	——	1,645	——
Oakland 6	1,145	995	1,785	$1,545
Studebaker Light Six	1,045	975	1,750	1,550

U. S. TIRE LOWERS PRICES

NEW YORK, Aug. 1—United States Tire Co. has announced price reductions of 10 per cent on cords and 15 per cent on fabrics, with the exception of Ford sizes which remain unchanged.

The new and old prices on the cords are as follows:

	Old Price	New Price
30 x 3½ cl	$19.00	$14.65
31 x 4 ss	30.60	26.45
32 x 4 ss	33.75	29.15
32 x 4½ ss	44.35	37.70
33 x 4½ ss	45.45	38.50
34 x 4½ ss	46.60	39.50
33 x 5 ss	55.25	46.95
35 x 5 ss	58.00	49.30

NEW FISK PRICES

NEW YORK, July 31—The Fisk Tire Co., Inc., has announced a price cut. Excise tax is now included in the list price. The new prices are as follows:

	Old Price	New Price
30 x 3½ Premier Cl. Fabric	$10.85	$10.65
30 x 3½ Non-Skid Cl. Fabric (oversize)	14.85	12.85
30 x 3½ Red-Top, Extra Ply Cl. Fabric (oversize)	17.85	15.85
30 x 3½ Non-Skid Cl. Cord	18.85	15.85
31 x 4 S. S. Non-Skid Cord		26.45
32 x 4 S. S. Non-Skid Cord	32.75	29.15
32 x 4½ S. S. Non-Skid Cord	42.50	37.70
34 x 4½ S. S. Non-Skid Cord	44.50	39.50
33 x 5 S. S. Non-Skid Cord	52.50	46.95
35 x 5 S. S. Non-Skid Cord	55.50	49.30

SAYERS LOWERS PRICES

CINCINNATI, OHIO, July 28—A price reduction affecting the whole line of Sayers cars has been announced by the Sayers & Scovill Co. The changes are as follows:

	Old Price	New Price
Roadster	$1,695	$1,645
Phaeton	1,695	1,645
Coupe	2,795	2,645
Sedan	2,795	2,645

Lower Prices Worry Detroit Factories

Reductions Likely to Cause General Holding Off of Buying August Production

DETROIT, Aug. 2—With production in July running just seasonably under the three record-breaking spring months, factories in the Detroit district are entering the month of August with considerable anxiety as to the effect of price reductions on the automobile market.

In the opinion of many, the reductions at this time will have the effect of causing a general holding off of buying which will slow up sales this month.

Going into August, practically all factories had a large number of orders ahead and were assured of operation on a nearly capacity scale. There is little hesitation in saying, however, that these orders are subject to heavy reduction under the influence of a price raid, and officials are keeping in very close touch with the situation so that schedules may be quickly altered to meet the rapidly changing conditions.

Holding Off on Cuts

There is a seeming tendency on the part of a majority of factories to hold off on price reductions until the effect of the early ones has been considered. Many factories undoubtedly would prefer to maintain their present price positions if it is possible to do it without the sacrifice of their production positions. This situation will not clear itself before the first ten days of the month, and meanwhile the industry will be in a very unsettled condition.

Ford, in July, came through with another record month, the production exceeding the 151,000 figure fixed, and August schedules have been fixed at approximately the same level. Ford domestic sales ran at approximately 135,000 cars and trucks and 10,000 tractors. The tractors showed a slight falling off. With the foreign sales it was said the total would exceed the 151,000 schedule fixed for the month.

Factory Output

Dodge operated at close to its 600 a day schedule for the month, piling up orders on its new utility coupe several months in advance of production facilities.

Maxwell operation was at about 50 per cent of its June total owing to manufacturing changes at the plant, which are rapidly being perfected and will permit the company to resume on a schedule of about 300 daily.

The Durant Lansing factory bettered

(*Continued on page 248*)

Car Exports Exceed All for Last Year

Motor Truck Shipments for First Six Months Reached Total of 5,762

WASHINGTON, Aug. 1—Passenger car exports from the United States and Canada during the first six months of 1922 reached the total of 45,215, a figure well in excess of the foreign trade for all of last year. Motor trucks, during the same period of this year, attained a total of 5762, against an approximate 8000 for 1921.

The half year figures were compiled here to-day as a result of the announcement by the Bureau of Foreign and Domestic Commerce of the export shipments from the United States during the month of June, following the announcement of the Canadian totals for the same month nearly a week ago.

7818 Car Sales in June

The June sales from the United States were 7818 passenger cars, the largest during any month of the year; 1121 motor trucks and parts to the value of $4,089,772. Each of these items, excepting motor trucks, was above the totals reached during the previous month of May, and the announcements show the improvement that has been made in the general position of the foreign markets for American automotive equipment.

Comparisons are as follows:

June	Passenger Cars	Motor Trucks
United States	7,818	1,121
Canada	2,267	170
Total	10,085	1,291
May		
United States	6,798	1,203
Canada	2,562	251
Total	9,360	1,454

Shipments from U. S.

The exports of passenger cars from the United States alone, which does not include the shipments of Buick and Chevrolet cars, to practically all parts of the world that are made from its Canadian plant by General Motors, attained the unexpectedly large figure of 31,028 during the first half of this year. For all of 1921 the total was 30 941. The comparison of truck shipments from the United States shows 4711 for the six months of 1922 against 7402 during the twelve months of 1921.

Similar comparisons cannot be made for Canada, as the figures for the 1921 calendar year are not available. The six months' shipments for 1922 show 14,290 passenger cars and 1051 motor trucks. The only comparable Canadian figures are for the eight months ending Nov. 1, 1921, which show 4402 cars and 576 trucks, or for the fiscal year ending March 31, 1922, in which 14,724 passenger cars were shipped from Canada. General Motors, it should be remembered, began the overseas shipments of its Buick and Chevrolet lines from Canada in November of last year.

British Exports Decline

WASHINGTON, Aug. 1—Automobile exports from Great Britain during June totaled £132,379. This represents a decrease in exports of 35 per cent over the month of May, and a decrease of 21 per cent when compared with June, 1921. During June, this year, the automotive division of the Department of Commerce has been advised 65 passenger cars were exported, representing 48 per cent in number and 53 per cent in value, compared with May exports.

During June there were 27 trucks exported, valued at £21,422—a decrease of 43 per cent in number and 22 per cent in value. Twenty-five chassis were exported during June, representing a decrease of 53 per cent in number and 49 per cent in value, compared with the month of May.

Exports, Imports and Reimports of Automotive Products for June, 1922, and for Nine Months That Preceded

EXPORTS

	Month of June				Nine Months Ending June 30			
	1921		1922		1921		1922	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobiles including chassis	2,372	$2,588,724	8,988	$6,652,549	102,028	$133,298 925	52,346	$42,899,200
Electric trucks and passenger cars	....	....	49	59,044	....	....	170	b233,905
Motor trucks and buses, except electric	418	531,234	....	....	17,598	29,511,955	2,727	a2,851,223
Up to 1 ton	....	....	780	271,038	....	....	b3,280	b1,346,488
Over 1 and up to 2½ ton	....	....	217	230.464	....	....	b1,039	b1,407,718
Over 2½ ton	....	....	124	284.777	....	....	b383	b917,788
Total Motor trucks and buses, except electric	418	531,234	1,121	786,279	17,598	29,511,955	7,429	6,523,217

PASSENGER CARS

Passenger cars, except electric	1,964	2 057,490	....	....	84.430	103,786,970	a13,708	a12,164,579
Value up to $800	....	....	5,285	2,528,098	....	....	b19,631	b9,374,459
Value over $800 and up to $2,600	....	....	2.278	2,539,677	....	....	b10,417	b11,542,452
Value over $2,000	....	....	255	739,451	....	....	b991	b3,060,588
Total passenger cars, except electric	418	531,234	1,121	786,279	17.598	29,511,955	7,429	6,523,217

PARTS, ETC.

Parts, except engines and tires (accessories)	....	2.211,528	*18,561,601	4 089,772	....	67,409,570	....	33,921,737
Station and warehouse motor trucks	51	40,642	17	14,532	573	341,473	158	165,378
Trailers	....	....	33	15,403	....	....	b266	b119,438
Airplanes	3	19,500	....	....	66	465,955	44	151,245
Parts of airplanes, except engines and tires	....	7,837	*29,545	12,242	....	194 440	....	96,190

BICYCLES, ETC.

Bicycles and Tricycle	....	74,691	1,368	12,056	....	3.497.720	....	481,034
Motorcycles	348	98,953	1,973	506,174	24,505	7,730,898	11,512	3,080,685
Parts, except tires	....	....	*204,985	155,865	....	....	*1,605,023	914,590
Gas engines	140	65,173	337	49,412	3.052	643,544	3,270	479,893
Traction engines (steam) except agricultural	....	....	8	6,104	271	478,419	29	57,168
Automobile engines	542	125,932	8,852	831,401	14,173	2,662,803	33,602	3,955,569
Aircraft engines	....	....	29	19,081	....	....	93	48,427
Complete tractors, except agricultural	35	119,124	28	9,674	19,996	19,792,327	178	266,954
Other internal combustion engines	586	68,595	817	164,169	14,462	2,485,218	4,927	693,760

IMPORTS

Automobiles	34	63,029	33	39,656	1,051	1,264,108	450	757,269
Parts, except tires	....	120,325	....	45,596	....	1,376,325	....	646.189
All other	....	7,182	....	7,369	....	457,919	....	225,374

REIMPORTS

Automobiles (free of duty)	518	911,785	121	191,654	3,622	5,789,163	2,762	4,345,686

a July 1 to Dec. 31, 1921.
b Jan. 1 to June 30, 1922.
*Pounds.

Willys and Overland Litigation Settled

Receivers of Corporation Agree to Accept $750,000 in Three Notes

TOLEDO, Aug. 2—Litigation between the receivers for the Willys Corp. and the Willys-Overland Co. in relation to claims and counter claims was settled in the Federal Court yesterday when all sides agreed to an order by which the Willys-Overland Co. paid to the receivers $750,000 in three notes. The Willys-Overland Co. also will pay counsel fees.

The intercompany accounts, which are limited to a balance of $167,197.43 owing to the Willys Corp. by the Overland company, and to a balance of $189,554.15 owing to the Willys-Overland on its own account and for the Willys Morrow Co. also, by the Willys Corp., will be ironed out by special master Curtis T. Johnson.

The settlement is in the form of three notes, each for $250,000 to bear interest at 4½ per cent and due serially May 31, June 30 and July 31, 1923.

Avoids Possible Delay

"The court believes that it has been profitable to both sides of the dispute to avoid litigation," declared Judge Killits from the bench. "The court has had a desire to go into the merits of the case, but great delay probably would have resulted with no better results."

The claims of the Willys Corp. against the Overland company grew out of the sale of common stock to the corporation in 1919, and a contract dealing with the development of the Chrysler six car.

The attorneys finally agreed that it would have been exceedingly difficult to prove fraud in connection with the stock transaction. The sale was approved by stockholders and, incidentally, President John N. Willys personally purchased a large block at the same time, evidencing good faith in the transaction.

The Willys-Overland claims totaling nearly $5,000,000 were based upon the expenditure made on the Chrysler six which it designed and developed. The Willys Corp. was to manufacture the car in its plant at Elizabeth, N. J., built at a cost of more than $13,000,000.

The settlement made yesterday practically is all based upon this contract between the two companies. The settlement practically divorces the two companies completely, with the exception that the Willys Corp. receivers still own a block of common stock in the Willys-Overland Co. representing almost a one-third interest.

No Change in Dealer Policy

TOLEDO, Aug. 1—The sale of the Willys-Overland, Inc., property at Adams and 14th Streets here to Gordon Mather, president of the Mather Spring Co. and director in the Willys-Overland company for approximately $400,000 is a part of the plan to liquidate the holdings of the company in real estate and other assets not used directly in the production of automobiles.

The proceeds of such sales will be used to cancel the bonded indebtedness of the company.

The branch immediately closed a long term lease on the property here, so that its operations and dealer policy will not be altered in the least. Vice-president C. B. Wilson is authority for the statement that no change in dealer policy is contemplated.

Some months ago a general move toward decentralization was made but large branches will be maintained as at present.

From time to time other properties of the company will be sold in accordance with the policy of debt handling announced when the bond issue was put on. Mather has purchased the property as an investment.

STRIKE HITS CHICAGO: MOTOR VEHICLES BOON

CHICAGO, Aug. 1—Motor vehicles provided Chicago's chief means of local transportation today following the strike of service lines and elevated trainmen which caused complete suspension of street car and elevated railroad service.

Large downtown department stores and other business houses used motor trucks and privately owned automobiles to bring their employees to work. Persons who drove their own cars usually arrived down town with all seats filled. Motor clubs have urged that all persons driving their own cars accommodate as many passengers as possible.

The first day passed with surprisingly little confusion and showed the possibility of the second largest city in the United States getting along with motor car transportation as a substitute for street railway systems.

ATLANTA OVERLAND SALES

ATLANTA, GA., Aug. 1—The Atlanta branch of the Willys-Overland Co. announces that Overland sales the past few months in the district covered by this branch have been more than 1100 per cent better than during the same period in 1921.

ERICSSON PLANT SOLD

BUFFALO, July 25—The plant of the Ericsson Mfg. Co., Buffalo, where Bosch magnetos were made, has been sold for $250,000 to Edward L. Jellinek at public auction, under orders from the United States District Court. The sale included the entire plant.

It is understood that Jellinek was acting in the interests of the Swedish stockholders of the company.

Stutz Control Goes to Guaranty Trust

Banks Buy in Ryan Stock at Auction at $20 a Share

NEW YORK, Aug. 2—Efforts on the part of Receiver Caffey to force the banks to offer Allan A. Ryan's Stutz stock at private sale having failed, the original plan of selling the securities at auction was followed out to-day. The holdings of the bankrupt financier were put on the block and were bought in at $20 a share by the Guaranty Trust Co., which purchased all but 1500 of the 134,414 1/3 shares that were offered, the sale of the Stutz property bringing a total of $2,686,286.06. The odd block of 1500 shares went to the Empire Trust Co. for $30,000.

Bank Held Majority of Stock

The Guaranty Trust Co., prior to the bankruptcy proceedings, held the big majority of Stutz stock which had been put up as collateral by Ryan. After the failure the bank announced it would protect itself by means of the auction block, an action that was participated in also by several other banks which held smaller blocks of Stutz stock. Inasmuch as this stock carried with it control of the Stutz company, and the last financial report of the company showed it to be a going concern and prospering, interest in the sale was keen indeed.

As yet the Guaranty Trust Co. has not decided what the next step will be. It is felt that the bankers will retain control and take steps immediately to increase production and sales. If this is not done, in all likelihood there will be a public offering of the shares. A definite decision will not be made until the bank has studied the situation.

Issue Financial Statement

Preceding the auction by several days, there was held in New York a meeting of the directors of the Stutz company, who issued a financial statement as of June 30, 1922, which shows total fixed assets of $4,400,089 as compared with $4,387,114 on Dec. 31, 1921, and total assets of $6,455,809 as against $6,553,809 on the first of the year. On the liability side of the ledger the figures read $25,530 as against $302,482 on Dec. 31, with a surplus of $4,473,351 and a reserve of $555,927 for depreciation. On Dec. 31 this surplus was $4,777,704 and the reserve $473,623. Cash on hand June 30 amounted to $148,468 as against $63,163 on Dec. 31. Accounts receivable totaled $256,148 as against $175,222 and the inventory was $1,507,450 as against $1,890,608.

In the way of liabilities $1,000,000 is charged against the capital stock; notes payable, $150,000; accounts payable, $243,062; accrued accounts, $33,467; reserve for depreciation, $555,927; surplus, $4,473,351.

FINANCIAL NOTES

Gray & Davis, Inc., directors, have completed plans for new financing involving the sale of $1,000,000 of 7 per cent first mortgage 10-year sinking fund convertible bonds, $750,000 of preferred stock and 20,000 shares of common stock. The bonds will be sold to a New York-Boston banking syndicate and will be convertible into common at $20 a share for the next two years, with conversion price rising two points annually to 30 at the end of seven years and continuing to maturity. The preferred stock which also will be convertible into common will be sold to a different syndicate. The sale of 20,000 shares of common stock to private interests for $250,000 has already been consummated. The stockholders will hold a special meeting to ratify the proposals and to increase the authorized capitalization from 180,000 shares of no par value common to 215,000 shares to provide for possible conversions and for the proposed sale of common. The new financing will give the company nearly $2,000,000 of cash and will make current assets stand about 3 to 1 to current liabilities.

General Tire & Rubber Co. has declared a regular 2 per cent quarterly dividend which will be paid the first week in August. The company has not passed a dividend since its formation eight years ago. Common stock is quoted at 200. The management reports the largest year's business in units and dollars in the company's history.

Pierce-Arrow Motor Car Co. for the three months ended June 30, 1922, reports a deficit, after interest and Federal taxes, of $11,766, against $1,400,550 for the same quarter in the previous year. The deficit for the first quarter of this year was $25,226. Operating income for the period, after allowing for maintenance and depreciation, was $348,855, against an operating loss of $828,866 last year. Interest, Federal taxes and other charges aggregated $360,621, against $571,684. Operating income for the first half of this year totaled $638,929 against the previous loss of $989,060. Interest, taxes and other charges for the six months amounted to $675,921, against $990,992, leaving a deficit of $36,992, against $1,890,052 last year.

Maxwell Motor Corp. has retired $1,750,000 series B notes due June 1, 1923, tenders for which were asked for recently. A large number of the tenders were at a premium and something less than $2,000,000 were tendered at par.

Mack Trucks, Inc., for the quarter ended June 30, 1922, reports net earnings of $1,315,634 after maintenance, depreciation and Federal taxes, as compared with $523,639 for the same period a year ago. Net earnings for the first six months aggregated $1,579,632, compared with $528,035 during the first half year of 1921. After the payment of preferred dividends the balance for the six months' period equalled 3.53 a share on the common stock. The balance sheet as of June 30, 1922, shows cash $3,811,317, contrasted with $3,464,743 in the corresponding period a year ago, and receivables $7,858,413, compared with $5,000,519. The accounts payable were $2,180,577 on June 30, 1922, and $1,822,878 on the same date last year. The company has no bank loans and no bonded indebtedness.

Fisk Rubber Co. reports earnings equivalent to 50 cents a share on 743,949 shares of common stock of no par value for the six months ended June 30, 1922, at which time the company had a surplus of $1,111,191, after interest, amortization, etc. The net profits amounted to $1,774,024. The previous surplus was $1,873,417. The balance sheet as of June 30 shows assets of $54,793,835 as compared with $60,604,317 in 1921. Cash is $3,682,748 as against $3,229,695 of the previous year. Inventories show a reduction of 20 per cent compared with a year ago and the company has no forward commitments at other than current prices. Stocks are sufficient only for immediate production. There was an increase of 23 per cent in net sales volume over the first six months of 1921 and the unit sales increased 85 per cent.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

DURING last week there was a continuance of easy money with increased ease toward the end of the week. Call loans covered a range of 3 per cent to 4 per cent, as compared with 3 per cent to 4½ per cent in the previous week. In time money the situation was practically unchanged. The rates remained the same as for the previous week: 3¾ per cent to 4 per cent for sixty and ninety days' maturities; 4 per cent for four and five months' and 4¼ per cent for six months'. The prime commercial rate remained at 3¾ per cent to 4 per cent, the same as for the previous week.

The railway and coal strikes, involving the idleness of nearly 1,000,000 men, are still the predominant features in industry and trade. As a result of the situation created there has been reported heavy buying of British coal, from 700,000 to 1,000,000 tons; the blowing out of more blast furnaces; the slowing down of steel-making operations and a rise in pig iron prices.

Car loadings of all commodities except coal during the week of July 15 totaled 783,573 cars. In the history of American railroads this figure has been exceeded only during the weeks of September and October, 1920, and is only 1 per cent below the total for the same commodities loaded during the week of Oct. 15, 1920, when the peak in transportation was reached.

On July 28 the Bank of Germany raised its discount rate from 5 per cent to 6 per cent, this being the first change since December 23, 1914. The general trend of discount rates the world over has been downward for the last few months. In some quarters this reduction by the Bank of Germany is taken to indicate a belated attempt on the part of the German Government to combat inflation, while the official reason for the increase in the rate is reported to be the excessive demand for business credit.

Last week Secretary Mellon issued a call for the redemption on Dec. 15 next of $1,000,000,000 4¾ per cent Victory Notes, about one-half of the total amount outstanding, and at the same time the offering of a new issue of four-year 4¼ per cent Treasury Notes was announced. This marks another step in the Government's program for distributing its short term debt.

Lower Prices Worry Detroit Factories

Reductions Likely to Cause General Holding Off in Buying—August Production

(*Continued from page* 245)

its production of 100 daily on the Durant fours, and will begin manufacture this month of the Star in addition to the usual total of Durants.

Dort continues on a schedule of 50 to 70 daily.

Buick, with its completely revised line, has set a schedule of 185,000 for the year, a monthly total of about 15,500. This total can easily be reached with additional facilities afforded by the former Scripps-Booth plant, which is to be the closed-car unit of the company. Under pressure, the company can build about 800 cars a day in its Detroit and Flint factories.

Studebaker is continuing at its capacity of 440 daily, having maintained this rate since early in February.

Hudson-Essex operated at the rate of 285 daily in July and plans to continue this figure in August. Hudson reports that its sedan is practically sold out for the balance of the year. The demand for its coach models continues to be a feature of its business.

Paige came through July with an output in both Paige and Jewett models of about 140 daily.

Hupp totals for the month maintained its 140 daily rate.

Columbia has increased its August total to 2000 after building about 1650 in July.

Oldsmobile maintained a schedule of about 100 daily through July, and a similar total was reached at the Oakland plant.

Chevrolet totals kept close to the 1000 daily mark reached by the company in the earlier months.

Reo resumed operation in July, after a two weeks' general vacation period, at a daily rate of about 100 cars and speed wagons.

Liberty continued on its schedule of 30 to 35 daily, and Rickenbacker kept up to its 25 daily total.

The companies producing cars in the higher priced field are continuing heavy production. Cadillac, with about 100 daily, is working at capacity, as is Lincoln, with a daily output of 30 at 35.

Packard total production continues on the 2000 monthly schedule, the single six being sold through to early fall.

Wills St. Claire is planning to add to its schedule of 25 daily.

FRENCH EXPERT COMING

PARIS, July 20 (*By Mail*)—Henri Perrot, the recognized expert in Europe on brake problems, and particularly on the use of front wheel brakes, will sail for America this week aboard the steamer "Paris."

Detroit Now Faced with Coal Shortage

Plants Dependent on Edison Company for Power Seriously Affected

DETROIT, Aug. 2.—Detroit is now working on what may prove to be a ten day fuel supply. Officials of the Detroit Edison Co. said this week that efforts to obtain adequate coal shipments have been unavailing and that unless arrangements can be made to get coal through at once, it may have to issue a rationing order within ten days.

The establishment of railroad priorities has not up to this time afforded relief, officials said, because of the number of priority applications which have been filled. Until the rights of the many applicants have been established delay will be encountered. Then, too, there is a shortage of cars for coal shipments which still further cuts down the possibility of adequate shipments.

May Be Without Power

In the face of the coal shortage, automotive factories which normally operate partly under their own power and partly on power bought from Detroit Edison are throwing the entire load upon the Edison company and are reserving their own fuel supplies for later emergency use. This action will mean only the shortening of the time that the company can give service and will deprive the plants entirely dependent on the Edison company of power at an earlier date.

Factories with independent power plants as a rule have sufficient coal to enable them to operate for from two to three months. If they are able to obtain parts and material they will be able to keep going through to that time if the coal and railway situations continue that long. Delays in deliveries of material are multiplying all the time. Many of the larger car and truck manufacturing plants are issuing questionnaires to their supply sources, asking information on how they are situated for continuance of operation, and what may be expected in deliveries for the immediate future, if the coal and railroad strikes prevail.

No Tie-Up in Deliveries

At General Motors offices it was said there were no actual tieups in deliveries of any kind yet, but that the situation demanded that orders be placed well in advance of delivery dates sought and then the shipments followed up closely.

Steel is being obtained in adequate quantities largely by reason of the fact that it was ordered far enough in advance to insure this. Large parts makers declare stocks of fuel and steel now on hand are sufficient for operation over a period of about 30 days.

Steel is coming through all the time, but deliveries are very slow. Priorities on railroad equipment have not had the effect of slowing up deliveries any more than was experienced in the time preceding the issuance of the priority order.

Conditions on the Canadian side of the river are more favorable for manufacturing than on the American side, but the railroad companies there are operating on a short fuel supply. Factories in the border cities can obtain hydro-electric power indefinitely. Coal is generally short but except for minor manufacturing operations it is not required.

Factories in other Michigan cities are better situated as to fuel supplies, most of them operating their own power plants and having considerable stocks of coal still remaining. Utility companies in many cities, however, are short and it is probable that much of the coal coming into the state in the immediate future will be consigned to the utility companies.

INDUSTRIAL NOTES

Liberty Mfg. Co., makers of an automatic tire pump, now occupying leased quarters in Des Moines, will establish permanent factory in Mt. Vernon if plans submitted to local investors are accepted.

Mastercrafts' Corp., Brattleboro, Vt., has been formed here to manufacture a new contrivance for cleaning automobile windshields. Contracts for the production of 100,000 of these have been awarded to a company in Elbridge, N. Y. Manufacture of the product here in Brattleboro is contemplated. The principal incorporator is W. E. Stellman, head of the Stellman Machine Shop, and the capital stock is $5,000.

Jig Bushing Co. of Pontiac is moving from its temporary plant to a new building recently erected for it on the Grand Trunk near the northern boundary of the city. Business of the concern is growing rapidly according to Emmet Paige, who is one of the owners. A new departure in its activities is grinding universal joints, a large contract for this work having been closed during the present week.

Hendee Mfg. Co. has received an order for 1200 motorcycles to be shipped to Australia. The plant is operating a full force, but has cut production 50 per cent by working each member every other day. A desire to keep every man on the payroll is taken as special evidence of the confidence felt in the coming demand for motorcycles.

C. H. Wills & Co. is contemplating an addition to its present plant at Marysville, Mich., to afford 104,000 sq. ft. more of floor space, in order to provide greater facilities for painting and trimming. At present the company is doing all its own painting of roadsters and phaetons. The Illinois Tool Co. plant, purchased by the Wills company, is now being equipped with $250,000 worth of machinery. This plant will augment its working force by 400 men.

INJUNCTION FOR APCO

PROVIDENCE, R. I., July 29—A temporary injunction restraining the Hudson Motor Specialties Co. of Philadelphia from alleged unfair advertising and false representations concerning the Apco Manufacturing Co. of Providence has been granted by Federal Judge Arthur Brown, following the hearing.

METAL MARKETS

Opinion is divided as to the extent to which the steel market will respond to the impairment of output caused by the sharply lessened coal supply and by the difficulties that have recently attended rail transportation. It is only natural that steel producers incline to the belief that their output has been considerably more interfered with than has consumption of their finished product. They have the advantage of statistical proof to back up their view, whereas the great diversity of steel consuming industries make it utterly impossible to calculate the inroads made upon steel consumption by the recent dislocation of the freight movement and the inadequacy of the coal supply. The slowing down of steel consumption can only be sensed, that of steel production can be figured. That there has been a slowing down of consumption is conceded by the producers, but there is naturally a disposition to minimize its extent. Indications, however, are not lacking that the pace at which steel is being worked up into finished products has slackened to practically the same extent as has the rate of steel mills' production. Automotive steel consumers whose eagerness for prompt shipments has been considerably greater than that of any other steel consuming industry have here and there pruned down specifications in accordance with revised production schedules. All in all it would seem as though what dent has been made in the output of steel has been offset by a corresponding diminution in consumption. Most of the steel mills have been far more extensively provisioned with coal than those who buy their product. It appears reasonably certain that during the aftermath of the coal strike and the other industrial disturbances the leading steel market interests will strive to maintain intact the prevailing scale of prices which in transactions with the smaller mills has already become strictly nominal.

Pig Iron.—Blast furnace interests are intensely bullish in their views as to the outlook and in support of their predictions of higher prices point to the not inconsiderable number of furnaces that have banked their fires for want of coke. On the other hand, many foundries manage to get along with less pig by the more liberal use of scrap in their melts. Moreover, runaway market conditions are obviated to some extent by the competition of imported pig, so long as prevailing tariff rates remain in force.

Aluminum.—Official returns give the stock of aluminum in bonded warehouses on May 31 as 3,011 tons. The general impression in the trade, however, is that there has been considerable addition to this amount in June and July when importations for which orders were despatched from here in May and June were landed. Holdings of aluminum in bonded warehouses a year ago were approximately 15,000 tons. All in all, the visible supply of aluminum of foreign origin in the United States is estimated to be about one-third of what it was a year ago. It is rumored in the trade that the Swiss producers have sold their output for an entire year to American interests at an agreed upon price, regardless of what rate of duty may finally be enacted into law. Importers of German aluminum stress the difficulty encountered in securing shipments. German export prices are not based upon cost of production plus profit but upon the market prices prevalent in the country to which the material is to be shipped.

Calendar

SHOWS

Aug. 26-Sept. 1—Toronto, Ont., National Automobile Show held in conjunction with the Canadian National Exhibition.

Sept. 4-9—Indianapolis, Automobile and Accessory Show in conjunction with the Indiana State Fair, Auto Show Building, under the auspices of the Indianapolis Automobile Trade Association, J. B. Orman, manager.

Sept. 23-30—New York, Closed Car Show, Grand Central Palace.

Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon, Coliseum and First Regiment Army.

FOREIGN SHOWS

Sept. 1922 — Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Associação Automobilista Brazileria.

Sept. 15-20—The Hague, Automobile Show.

September — Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.

Oct. 4-15 — Paris, Automobile Show, Grand Palais.

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 10 - Dec. 19 — Brussels, Automobile Show, Palais de la Cinquantenaire.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show, British Cycle Motors, The Tower, Warwick Road, Coventry.

November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

CONVENTIONS

August 28-Sept. 2 — Detroit National Safety Congress.

Sept. 18-23, 1922 — Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

Sept. 13, 14, 15—Buffalo, Lafayette Hotel, Annual credit meeting, Motor and Accessory Manufacturers Ass'n.

Strikers Will Man Food Truck Trains

WASHINGTON, Aug. 2—Railroad strikers in Washington will set a precedent which may have a far reaching effect upon the use of motor trucks during the transportation emergency. It was learned here to-day that the strikers had volunteered to operate trucks hauling fuel and food supplies in order that the public itself and their own families would not suffer from the tie-up of railroad lines. It is said that the committee representing the strikers in this territory have agreed to assist the Merchants and Manufacturers' Association in the establishment of truck trains to haul coal and provender from points in an extensive radius.

The question arises as to the action which national labor leaders may take in the event the proposed program of local strikers is carried out. The radical element among the union men may insist that the strikers refrain from manning motorized trains, inasmuch as the uninterrupted movement of essential commodities even on a smaller scale may have a tendency to break the strike.

A survey similar to that conducted during the war emergency has been undertaken by business men in order to determine the number of motor vehicles ready for service, whenever a complete tie-up of railroad lines is reached. The rejection of the Harding peace plan by railroad executives has brought relations of the strikers and employers to an impasse.

Anderson Brings Out Light Aluminum Six

ROCK HILL, S. C., Aug. 2—The Anderson Motor Co. is bringing out a new light aluminum six, the 5 passenger phaeton model of which is to sell at $1,195. The price on the Series 40 phaeton model is $1,650. A closed model will be put out later at a price that will be very little in advance of the phaeton model. The new model is shorter than the old one, having a 114 in. wheelbase. The engine is Continental, Model 6-Y. Other standard parts are Borg & Beck clutch, Salisbury front and rear axles and Westinghouse starting, lighting and ignition.

The springs are semi-elliptic and are 37 in. in front and 57 in. in rear with tapered leaves. The tires are 32 x 4 cord, and the weight of the phaeton model fully equipped is 2450 lb. The construction of the cowl and hood brings the body forward 4 in., which really gives the equivalent of a 118 in. wheelbase in actual body length. The top is clear vision with gipsy side curtains; upholstery is genuine leather

The headlights are drum type, and a Moto-Meter and Alemite system are part of the standard equipment. The car takes its name from the fact that the body is covered with aluminum on a framework of ash.

The previous line of Anderson models, known as the Series 40, is to be continued along with light aluminum six.

REPUBLIC ROAD BUILDER TRUCK

ALMA, Mich., Aug. 2—A new road builder truck has been brought out by the Republic Truck Co. This new truck is specially designed for road building purposes, having a 110 in. wheelbase and a turning radius of 15½ ft. It is equipped with pneumatic tires.

The body is mounted low to the ground, while about 40 per cent of the total load is carried on the rear axle.

WESTCOTT OFFERING NEW CAR

SPRINGFIELD, O., Aug. 1—Westcott Motor Car Co. has brought out a new 7-passsenger car known as the larger six equipped with the California type of permanent touring top and mounted on a 125 in. wheelbase. The standard chassis sells for $1,990. The model with glass sides in solid frame is $100 additional.

PISTON RING COMPANY FORMED

DETROIT July 26—The Pelton Piston Ring Co. has been formed in Detroit by E. H. Belknap, Carl H. Pelton, former secretary of the Maxwell-Chalmers companies, and Charles E. Pelton.

G. M. Report Shows Increased Earnings

NEW YORK, Aug. 2—The financial statement of the General Motors Corp. for the first six months of 1922, ending June 30, has followed the preliminary statement issued two weeks ago. The formal statement does not vary much in essential details except that the auditors have discovered more net earnings on the common stock than was reported in the preliminary statement. Whereas the common's earnings for the first six months were first reported at $26,839,-391, the formal statement gives these profits at $27,403,428.30.

The balance sheet shows total current and working assets as of June 30 to be $162,957,714.44 as against $179,214,-317.05 as of Dec. 31, 1921. Total current liabilities on June 30 reached $40,-232,450.98 as compared with $81,553,-967.17 on Dec. 31. The balance sheet in part is as follows:

Current assets, cash in banks and on hand as of June 30, 1922, $35,527,973.13 and on Dec. 31, 1921, $40,057,401.53; United States Government bonds on June 30, 1922, $4,528.04 and on Dec. 31, 1921, $5,228.04; marketable securities on June 30, 1922, $30,190.82 and on Dec. 31, 1921, $27,009.31; sight drafts against B/L attached and c. o. d. on June 30, 1922, $10,430,382.50 and on Dec. 31, 1921, $4,677,241.39; notes receivable on June 30, 1922, $3,278,178.44 and on Dec. 31, 1921, $4,794,978.99; accounts receivable and trade acceptances, customers and others on June 30, 1922, $18,620,956.32 and on Dec. 31, 1921, $18,944,844.09; inventories at cost or market, whichever is lower on June 30, 1922, $94,166,601.36 and on Dec. 31, 1921, $108,762,625.35; prepaid expenses on June 30, 1922, $898,-903.83 and on Dec. 31, 1921, $1,944,-988.35.

Current liabilities, reserves and capital are: Accounts payable on June 30, 1922, $22,184,843.18 and on Dec. 31, 1921, $15,640,429.41; notes payable Dec. 31, 1921, $48,974,996.29; taxes, etc., accrued not due June 30, 1922, $16,979,253.06 and on Dec. 31, 1921, $15,894,778.40.

AUTOMOTIVE INDUSTRIES
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Competition Brings Price Cuts; Sales Stimulated

Lower prices result from struggle for dealers and reduced production costs. They have not been brought on by overstocks or financial difficulties. Business for rest of year will probably be stimulated. Industry as a whole is in a healthy condition.

By James Dalton

CONSIDERABLE hysteria seems to have been caused in certain quarters by the August epidemic of price cutting.

The well-known "financial circles," always more temperamental than a prima donna, seem most concerned. They profess to see earnings menaced. Stocks of motor companies listed on the New York exchange have declined somewhat since the reductions were announced.

The financial wiseacres are shaking their heads gloomily. They don't seem able to understand the automotive industry. They thought it was doomed two years ago. They only recently woke up to the fact that it is operating at higher speed than ever before. Now some of them see another chance to play their favorite game of selling stock short after peddling graveyard rumors.

They are trying to find some deep, subterranean, mysterious reason for the August price reductions. Some say the manufacturers have huge surplus stocks of cars on hand which they are trying to sell. Even some people within the industry seem to accept this theory.

It probably is true that some manufacturers are storing cars, but the number is insignificant. It has had nothing whatever to do with the recent price cuts.

There is nothing mysterious or sinister about the present crop of price cuts. If other industries would take a lesson from automobile makers they would sell more goods. The present price cuts have no more significance than those which have gone before.

All these price readjustments have been the result of keen competition, but there is more than one kind of competition. In this particular case it is as much

THE stock market is a poor judge of automotive conditions. It is influenced by many factors that have nothing to do with a sound analysis of reasons for movements within the industry.

Wall Street has been inclined to view recent car price reductions as signs of imminent disaster.

The cuts mean nothing of the kind. They are simply in line with the general policy of manufacturing executives to cut prices every time production or selling economies make possible lower prices. This article gives a brief, clear analysis of the present situation.

a contest for dealers as it is for sales. There are not enough good dealers to go around. Naturally, a good many of the ablest dealers are in the organizations of the companies doing the largest volume of business. These dealers are in keen demand and they can get almost any terms they want.

WITH attractive offers coming to them from rival companies, they sometimes get a bit restless. It is to the advantage of the companies they now are serving, therefore, to keep them as contented as possible.

For example: The A and C cars are in the same general price class. They are both big sellers. The quality in them is about the same. The price of the A is cut and the price of the C is not. The C dealers are disgruntled. If any of them have been offered A dealerships they begin to nibble at the bait. Therefore, if the C does not meet the cut it may lose some of its good dealers. As a consequence it is very likely to meet the challenge and thereby try to keep its distributing organization in good humor. That's one of the reasons why price cuts are general in lines in the same general competitive class.

This isn't the first time General Motors has started the price cutting procession. It is not engaged in cut throat competition, however. It wants all the business it can get on a legitimate basis and it is perfectly legitimate to lower prices if you can justify the step by reducing manufacturing costs. That is what General Motors has done and is doing. Its financial report for the first half year shows that it is making an exceedingly substantial profit. At the present rate it soon will be able to resume dividends on its common stock. But the quoted prices of this stock have declined a little just because prices were shaved. That shows the "logical" mind of Wall Street.

General Motors is basing its prices on quantity production and careful attention to manufacturing expense. The fiscal year for the dealers in practically all its lines began August 1. The company expects these dealers to sell more cars the coming year than they have in the past year. That will mean a larger output with lower costs and therefore justify price revisions.

It may be said that Chevrolet, in its price group, is in a class by itself so far as volume of sales is concerned. That is true. But it is equally true that its nearest price competitor is running strong and rapidly regaining prestige. It is equally true that a new organization built up by a former high official of General Motors is building up a large dealer organization. Here again the dealer angle comes in.

The companies which are the largest producers in all classes are in much the same position as General Motors. They are not in business for their health. All of them have reduced prices sharply in the past year or so and they are still making substantial profits. They are not going to sacrifice any large part of these profits. They need no sympathy from Wall Street for they are abundantly able to take care of themselves.

Everybody in the automotive industry realizes that they are in a period of exceedingly keen competition and that it is going to last a long time. Those who don't have good dealer organizations are going to fall behind in the race. The same will be true of those who fail to meet price challenges. It will be equally true of those who do not keep up with the procession in the way of design and quality of their products. The public has become motor wise. Most of those buying new cars have had automobiles before and they know a good deal about them. They want to be shown. If they are not shown they will try a new car. That's the answer to price cuts.

Every cut since the depression began has been hailed in some quarters as a disaster. And yet the demand for motor cars appears to be insatiable. One reason why this industry has recovered from the slump more rapidly than most others is that it was almost the first to revise its prices and pass the reductions on to the public. The wisdom of this step can no longer be doubted. It has put the plants on a capacity basis.

Keen competition always is more or less cruel and the spoils belong to the strong. It undoubtedly is true that some of the weaker companies will be crowded out by the swift pace now being set. They lack the quantity production which will enable them to shave prices with profit by reducing manufacturing costs. It is nevertheless true that practically every company in the passenger car field has had an exceedingly good year and almost without exception they are in a stronger position than would have been thought possible six months ago.

It is undeniable than an epidemic of price cuts such as the one now under way is more or less demoralizing, temporarily, to sales for the industry as a whole. Lowered prices have seldom failed to stimulate business for those who made them, but many manufacturers are reluctant to climb on the band wagon.

THERE are strong indications that competition for dealers, as well as competition for sales, is having a large influence on the present general drop in car prices.

Big production companies are striving to keep their star dealers. Other companies are struggling hard to build up their dealer organizations.

There are not enough good dealers to go around at the present time. This is one important factor that is making the price cuts general in character. The dealer is the crux of the present merchandising situation.

The greatest demoralization in the past year and a half has been caused, however, by a price change the first of one month, for example, and then another within a very few weeks. Such tactics are foolish. Neither the dealers nor the public know where they are. Manufacturers should approach price changes on a scientific basis. They should know before they act how much they can chop off the prices of their products and then do all the chopping at once. There is no sense in doing half the cutting now and the other half a month from now. That has been the real basis for demoralization. It hasn't been caused by the original reductions.

THE present changes probably will have the result of lowering the sales volume for August, but this month normally shows a seasonal decline and if anything in any sense demoralizing has to be done now is the time to do it. If there are any more price revisions they should not be made until the time of the national shows. They thus will come in months when buying is at lower ebb than at other seasons.

These reductions are not going to ruin business for the rest of the year. The prospects are that they will stimulate sales. They should be over by Sept. 1 and the industry should be able to go on an even keel into the best fall selling season it ever has had—always providing, of course, that the mine and rail strikes don't upset things.

Automotive Legislation Must Be Met Fairly but Fearlessly

Automotive manufacturers have a direct personal interest in statutes which build sales resistance. They should be leaders in study of subject. Wise and just program is essential to success. Taxation, weight restrictions, road rules and insurance considered.

LEGISLATION is one of the most perplexing problems confronting the automotive industry. It has so many ramifications they are hard to follow and there are so many different views they are difficult to reconcile.

There should be little trouble, it would seem, in laying down broad general principles, but experience has shown that it is next to impossible for the industry to map out a definite program except at the expense of exhaustive study, interminable conferences and limitless patience. Even the industry itself seems unable to get together on certain phases of the subject.

Every automotive manufacturer has a direct personal interest in motor vehicle legislation even though it costs him no more to run his own car than it does any other motorist. Every additional tax and every unfair regulation tends to build up sales resistance and sales resistance means less business for the makers of vehicles and parts.

Motor vehicle legislation naturally groups itself into five divisions:

Taxation.
Weight and load restrictions.
Rules of the road.
Compulsory insurance.
Common carrier regulation.

No one will deny that legislative action is necessary along all these lines but it should be sane, scientific and just—not freakish, poorly digested and punitive.

THE average motorist is an average citizen. He doesn't expect his neighbors to pay his grocery bills and he doesn't expect them to pay his share of the tax burdens. On the other hand, the motorist doesn't expect to pay the household expenses of the non-motorist or his share of the cost of good government.

It doesn't follow that a family is wealthy just because it owns a car. But many state legislators can't get that viewpoint. Playing politics isn't confined to Washington. It's one of the most popular American pastimes and the game isn't always played fairly. That's what makes it difficult to fight unjust legislative proposals.

Legislators, regardless of their party, creed or color, are knit together by kindred ties and motor interests are not. That doesn't mean that all legislators play the game of politics unfairly but it does mean that they present a compact fighting front which it is difficult for inexperienced and unorganized citizens to pierce.

It is highly important, therefore, that opposition to unfair legislation by motor interests should be well organized. This opposition should not involve the "greasing of palms" or the maintenance of lobbies. Legislatures are not sacred and every citizen with a legitimate kick has a perfect right to invade their precincts.

Machinery for opposition to pernicious legislation has been provided by the Motor Vehicle Conference Committee, which is composed of representatives of the National Automobile Chamber of Commerce, the Rubber Association of America, the Motor and Accessory Manufacturers' Association, the National Automobile Dealers' Association, the Trailer Manufacturers' Association and the American Automobile Association.

THE Conference Committee has sub-committees in every State, composed of representatives of the same organizations. Most of these sub-committees are efficient and they have done highly valuable work. Motor interests are expected to concentrate their fire against evil legislation through these state committees. When it is felt that the subject is too important for them to handle alone, the Conference Committee always is glad to lend its aid either in the form of advice or the personal assistance of some of its members or representatives.

One complication at the present time is the fact that there has been a split in the A. A. A. This break in the ranks of the motorists themselves is particularly unfortunate in the field of legislation, and some plan probably will be worked out which will give all of them representation. The situation serves to emphasize the need for a single powerful association of motorists.

Automotive manufacturers can wield a potent influence in the field of legislation through their dealers and the users of their products. It is only natural that they should be looked upon as leaders. They have a selfish interest in the subject and they owe an obligation to the public to give it the thought it deserves.

The machinery for operating has been set up but it is of no value unless it is used, and used effectively. Conditions differ in every State, and most of the legislative problems are more or less local in their character. For that reason they must be considered in the light of State needs, but it is possible to establish certain broad, fundamental principles for the guidance of all states.

It is accepted as an axiom that users of motor vehicles should pay their fair share of the taxes and consent to reasonable regulation. Taxation and regulation should not be fought on general principles. Some bills are good, some are bad and some are just plain foolish.

All motor vehicle taxation should be based on the basic principle that the capital charge for the construction of

highways should be levied upon the public as a whole and the abutting property owners. They are the ones who benefit primarily. Every piece of property passed by a good road automatically increases in value. That is particularly true in rural sections.

The second fundamental principle is that the users of the highways should pay for their maintenance. By far the greater part of this burden naturally will fall upon the users of motor vehicles. Motorists and truck operators never have combated this principle seriously.

Accepting it as no more than fair that operators of motor vehicles should pay highway maintenance costs, the sub-committee of the Motor Vehicle Conference Committee in each State should make a careful study each year of the probable maintenance costs for that fiscal year, allowing a reasonable margin of safety. With the amount needed carefully established, motorists can be expected to consent without argument to taxation which will bring in the required sum but they will be fully justified in fighting to the last ditch any imposts which would add materially to this burden. Every motorist, as an individual, pays his full share of miscellaneous taxes, and there is no earthly reason why he should be penalized just because he owns a motor vehicle after he has met his proportion of the cost of maintaining the roads he uses.

This would constitute a simple program for the handling of taxation questions. If the combined motor vehicle interests of any State were to present it to their Legislature in a fair, unbiased manner, with all the data necessary to establish their claims as to the amount needed for road maintenance, they undoubtedly would be given due consideration. Motorists have become a political force to be reckoned with if they can present a united front.

There is no general agreement as to the kind of taxes which should be imposed to meet maintenance costs. Those who have given most thought to the subject seem to favor imposts on weight and horsepower or gasoline, or perhaps both. There is no especial objection to a gasoline tax in itself. In some cases it may be the fairest method of raising the needed funds. If it is proposed simply as an additional impost, however, without lightening any of the existing burdens, then there is sound justification for opposing it.

Weight and load restrictions make up one of the knottiest legislative problems confronting motor vehicle owners. The proposals are legion and each State legislator seems to have his own individual ideas. It is in this field that the most freakish bills are offered. Establishment of a uniform system is difficult because highways and traffic conditions differ in almost every State.

The subject has been attacked seriously, however, by the highway departments of the ten eastern states, and they hope eventually to establish a fair and sane code which will be fairly uniform. The highway commissioners in these states are working in close co-operation with the automotive interests and seem disposed to be entirely just.

Something like a uniform code is possible in these states, at least, because conditions in all of them are similar. It may be made the basis for a national code which would eliminate many of the complications and inconsistencies of the present badly scrambled mass of State laws. A considerable amount of literature is available on this subject and it can be obtained through the Motor Vehicle Conference Committee, whose headquarters are at 366 Madison Avenue, New York. It is a question well worthy of close study, especially by truck makers.

It should not be impossible to codify in a national way, in their broad aspects at least, logical rules of the road. They should be based primarily upon safety to the pedestrian, but this does not mean of necessity that they should make life miserable for the driver of a motor vehicle.

These rules of the road are bound up inextricably in the question of safety, accident prevention and traffic regulation. The ghastly toll of highway deaths and injuries is doing much to build up sales resistance. The National Automobile Chamber of Commerce has recognized the importance of safety promotion and is doing excellent work along this line, but it welcomes aid from all other branches of the industry.

There is no escaping the fact that sane and reasonable regulation of traffic is essential if the public is to be served and the vast majority of motor vehicle operators welcome wise steps in this direction. They object only to rules which add to their burdens while adding nothing to the promotion of safety. Speed maniacs, though of small percentage, are just as much a menace to other motorists as they are to pedestrians.

Compulsory insurance is a natural corollary of the growing demand for highway safety. Whether any form of it will serve the purpose for which it is designed remains to be seen. Certainly the bonding of taxicabs will serve only to enrich the bonding companies. In most cases, before a bond can be obtained it is necessary for the person seeking it to prove that he is responsible financially for the full amount it covers. So far as drivers are concerned it tends to make them more reckless instead of more cautious.

Some motorists are advocating State insurance, similar to compensation insurance, with rebates of any unconsumed portion of the contributions. This plan seems to be fairest to all the insured.

Common carrier regulation for motor vehicles transporting freight or passengers for hire seems to have developed as sharp a cleavage of opinion as any other phase of legislation. It was fathered in the first place by the railroads, which have contended that motor transport was not paying its fair share of taxes and that they were operating entirely without regulation. The arguments for and against it are summarized as follows in a recent pamphlet prepared by the Motor Vehicle Conference Committee:

WHAT are the fundamental principles which should underlie motor vehicle legislation?

Practically none has been worked out in a national way except the theorem that users of the highways should pay the costs of maintenance.

Taxation is a big problem and it must be met fairly but fearlessly. Only concerted action can prevent unjust imposts.

This is only one of many legislative questions.

Pernicious legislation is difficult to combat except by presenting a united front. A united front can be presented only if there is a definite program.

A definite program can be worked out only if the subject is considered from all angles. Wise action requires careful study.

Every automotive manufacturer has a direct personal interest in all phases of legislation. This article is designed to tell them some of the problems which must be attacked.

"Any discussion of state regulation of the motor vehicle when used as a common carrier would be incomplete without reference to the arguments for and against such regulation. In so doing, however, the opinion frequently expressed that railroad and trolley companies, as a result of the severe competition of motor transportation, are seeking state regulation as a means of killing off such competition, will be totally disregarded, and only such arguments recorded as are predicated on public welfare, sound economics and strict impartiality.

"WITH these premises, therefore, those who contend for state regulation say that such control is necessary:

"(1) Because motor transportation for hire is a public utility and as such should be regulated along with other public vehicles so that travelers and shippers by such means can be made sure of safe, prompt, regular, adequate, efficient and economical service.

"(2) So that, in all cases where motor vehicle common carriers come, or are likely to come, in ruinous competition with other common carriers, the state can step in and determine whether public convenience and necessity require such competition, and save, if desirable, the pre-existing agencies of transportation.

"(3) In order to shoulder upon the motor vehicle common carrier obligations, financial and otherwise, in return for the rights given it to operate for a profit over all or certain highways within a state especially so since the highways are built and maintained by the public. In some cases these rights take the form of valuable franchises which virtually grant monopolistic privileges over certain routes.

"(4) For the purpose of eliminating the irresponsible, so-called 'fly-by-night' companies and individuals who, while undergoing certain destruction for themselves, pull down with the ruin well-managed motor transportation agencies which render a real public service and are entitled to a reasonable return on their investments and a stabilization of their business.

"In objection to these arguments for state regulation of the motor vehicle common carrier, opponents of the proposition maintain:

"(1) That granted motor transportation for hire is a public utility, public interest can best be served by unrestricted competition and complete freedom from regulation in which none but the fittest can survive. This policy they contend will yield to passengers and shippers the maximum of results with the minimum of cost.

"They deny any analogy between motor vehicle common carriers and railroad and trolley transportation agencies, pointing out that the latter by virtue of private ownership of franchises, rights of way, road beds, tracks and terminals have an exclusive and monopolistic control over all transportation on their routes. Motor truck operators, on the other hand, even where granted a monopoly of transportation for hire over a certain prescribed highway or portion thereof cannot deny the use of that highway to others who wish for themselves or as private carriers to transport persons or property over those same routes.

"Finally, they point out that governmental regulation of rail and trolley common carriers came after these agencies had abused their rights and privileges and through pools, stifling of competition, exorbitant increase of rates, discrimination, stock watering, etc., made it necessary for the public in self-protection to subject them to control. By the very nature of the service these evils are impossible with motor transportation since the road is free to the use of everyone and motor vehicles the medium for transportation over the roads are quickly, cheaply and in unlimited numbers available for everyone.

"(2) Since the obvious outcome of the first argument advanced against state regulation is 'cut-throat' competition between various forms of transportation attempting to serve a certain territory and *per se* between the motor transportation companies themselves operating in competition over certain highway routes, the opponents of state regulation cannot escape the query whether they are willing to face the logical consequences of such a struggle. Without hesitation they answer that wherever rail, trolley or any other form of transportation for hire cannot stand up before a newer and better form, public interest demands that it should give way; likewise within that newer and better form of transportation, the rule should be survival of none but the most efficient and economical agencies. They are confident that even though such a policy may mean the destruction at times of more or less invested capital, as it did when rail and inland water transportation first came into acute competition, the final economic benefits to the community as a whole will many times compensate for the loss involved.

"(3) As for shouldering upon motor transportation for hire financial and other burdens which it should rightly carry, opponents of state regulation say that legislative bodies have not heretofore found it necessary to establish such control in order to determine the weight limits for motor vehicles used as common carriers; their registration fees and other charges; their liability to the public for injury to persons or damage to property, etc. If this is all that is involved it is not sufficient to warrant almost unlimited regulation in all other respects by a state agency.

"(4) Lastly, those against state regulation believe that the natural working out of economic laws will do more to stabilize the motor transportation for hire business than extensive interference on the part of governmental agencies of any sort. They feel that the proposition is paternalistic and will result either in discrimination in favor of one or more types of transportation, and against all the rest, or else that it will promote monopolistic advantages for certain motor transportation companies and that through it all the traveling and shipping public will pay the cost."

FEW persons in the automotive industry will gainsay the importance of a close and careful study of legislative problems. Some are inclined, however, to let the other fellow do the studying and the work. This attitude, if continued indefinitely, will be expensive for everyone concerned. The time has come when all branches of the industry must present a united front and work out a program which will be national in its scope.

If this work is to be successful, every person who manufactures, merchandises or uses any motor vehicle or any part of a motor vehicle, must have a hand in it and go about it in a spirit of fairness and justice to all.

French to Increase Benzol Production

A COMMISSION has been appointed by the Government to draw up a program for the production of benzol in France and the Colonies. This is in pursuance of the policy carried out for some time past in favor of creating a "national fuel," that is to say, the production of power alcohol and benzol in sufficient quantities to supply the whole of the home needs. At present France does not produce more than 800 tons of benzol a month, and Germany supplies France with about 2000 tons a month, which is largely used as a motor fuel by mixing it in equal proportions with gasoline. The forthcoming congress on a "national fuel" at Béziers is intended to give a further stimulus to the employment of alcohol for power purposes, and for more than a year past the Government has had in hand a bill to control the production and sale of alcohol.

Midwest Now Producing Passenger Car Engines

Design is similar in most respects to that used in truck engines but reciprocating parts are lighter in order to permit of higher speeds. Valve timing also altered. Oil pressure varied inversely as manifold depression. Burnished grooveless bearings are employed.

By J. Edward Schipper

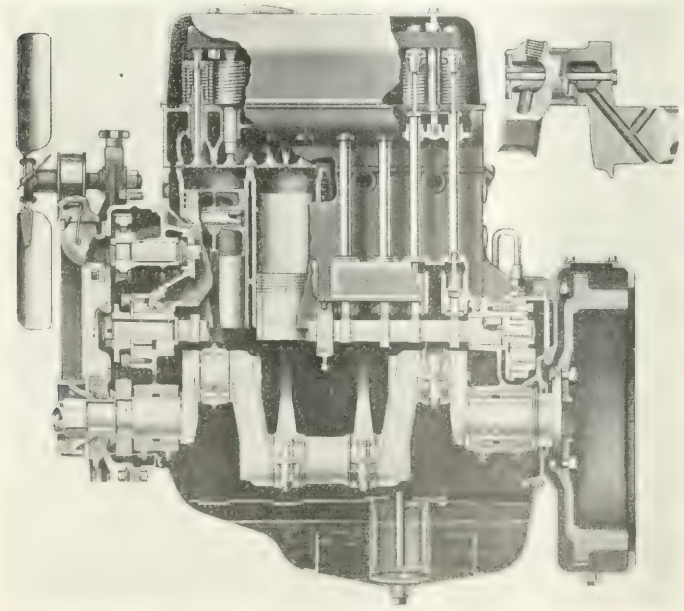
THREE engines developed and manufactured by the Midwest Engine Co. are now available for passenger car use. These engines, originally designed for truck use, have now been adapted to passenger car practice, only slight modifications having been found necessary. The three engines are known as Models 410, 411 and 412. Models 411 and 412 are 3⅝ x 5 in., with thermo-syphon and pump cooling respectively. Model 410 is a 3⅜ x 4½ in. cooled by thermo-syphon.

Probably the main change necessitated by adapting the engines to passenger car practice is in the reduction of the reciprocating weight. On the 3⅝ x 5 in. engine the pistons for truck use are of gray iron and weigh 2 lb. 5 oz. On this same engine for passenger car use, the gray iron pistons weigh 2 lb. and aluminum pistons, weighing but 1 lb., are also available. The piston pins for truck use are 5½ oz. as against 4 oz. for passenger cars, and the connecting rods 3 lb. 15 oz. for trucks as compared with the passenger car connecting rod weighing 2 lb. 14 oz.

On the smaller engine, Model 410, the size which is adapted to the high speed truck, the iron pistons weigh 1 lb. 6 oz. either for passenger cars or for trucks. There are, however, 11 oz. aluminum pistons available also on this model.

The bearings are exceptionally large and neither shims nor oil grooves are used. The clearances are from 0.003 to 0.005 in., providing for an oil cushion claimed to eliminate much of the internal friction found in engines using tight fitting bearings. The crankshaft in the 3⅝ x 5 in. model is 2½ in. in diameter and 2¼ in. in the smaller model.

Since the engine speed reaches 3000 r.p.m. on the smaller and 2400 to 2700 r.p.m. on the larger model, the high rubbing speeds, in such large diameter bearings, becomes something of a problem, but by making the bearings larger than the shaft, as above stated, and using no shims or oil grooves in the metal, excellent results are obtained. The bearings are burnished so as to eliminate any edge or surface which could possibly scrape or break the oil film. The oil is continually forced into the bearings in unusual volume and under high pressure when under load. It is claimed that the saving in the internal frictional losses has materially increased the engine output.



Sectional view of the Midwest passenger car engine

As indicated above, the engines are similar to the truck engines which were described in AUTOMOTIVE INDUSTRIES for Jan. 5, 1922. They are of valve-in-head type, the valves being operated by push rods enclosed in tubes, permitting the oil mist to rise from the crankcase and assist in the lubrication of the valve rocker mechanism. In the 3⅝ x 5 in. engine the valves are 1⅝ in. in diameter in the clear and the lift ⅜ in. In the 3⅜ x 4½ engine they are 1 9/16 in. in the clear and also have a lift of ⅜ in.

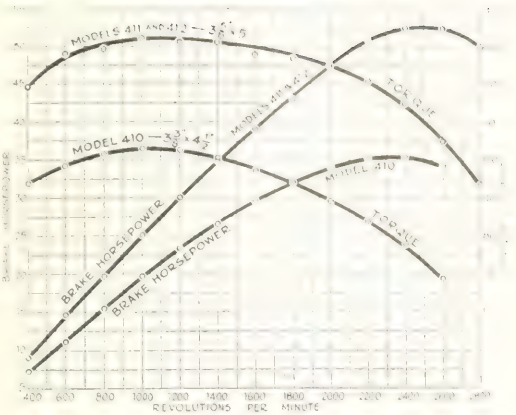
In both engines the cooling water is first conveyed direct to the exhaust valve seat through passages cored in

the cylinder head and block, thus maintaining the lowest possible temperature at the valve seats and valves. This is said to avoid warping or burning of valves, to permit of a free action in the guides and to help hold compression to a greater degree under heavy load conditions. A large volume of water is circulated around the head and cylinders to keep the temperature within such limits that high compression pressures are possible. In the two larger models the compression is 75 lb. per sq. in. in gage, and in the smaller model 80 lb. per sq. in.

The lubricating system is of the pressure type in which the oil is delivered to every bearing in the engine except the wrist pins, under pressure. The pressure is regulated in proportion to the load by means of a by-pass valve located over a groove around the front bearing, this valve being controlled by a spring and the vacuum in the intake manifold above the throttle. The crankshaft is drilled with a continuous passage for oil from the center of the front bearing to the center of the rear bearing. Oil is taken from the sump by a gear pump, and is forced into the circular groove around the rear bearing at which it enters the crankshaft. At all points in the revolution oil is being forced to all bearings. The oil, on reaching the front bearing, is allowed to escape into the gearcase cover from under the by-pass valve when the pressure is greater than 50 lb., or when the vacuum is greater than the spring tension, which normally holds the valves closed.

The lower side of the bottom ring is used to scrape oil from the cylinder wall and this oil is used to lubricate the piston pin. The sides of the pistons are relieved to permit of a large amount of oil for this purpose. The engines are entirely enclosed and dust is prevented from entering except through the carbureter. The breathing is done through the tubes enclosing the push rods, thus causing the oil vapor to circulate around the rocker arms.

The structural details of the engine follow quite closely along the lines of usual overhead valve practice. The cylinders are cast en bloc with a detachable head containing the valves and valve chambers. The upper half of the crankcase is cast with the cylinder block and a separate oil pan is employed.



Power and torque curves of the new Midwest passenger car engines

The camshaft is driven by timing gears of helical type. The oil filler is placed on the front end of the timing gearcase. The fan belt is driven by the pulley located on the end of the crankshaft. The oil pump is driven from the end of the camshaft. Valves are actuated by roller followers. Cams designed to promote silence are used in the passenger car engine. On the 3⅜ x 4½ in. passenger car engine the inlet opens on upper center and the exhaust closes at 5 deg. after top center, whereas on the truck engine the inlet opens and the exhaust valve closes at 10 deg. past upper center. The inlet valve is open for 225 deg. on the passenger cars and for 220 deg. on the trucks.

The performance curves of the two engines as adapted for passenger car use are given in the accompanying chart.

Tubular Spoked Steel Wheel

ORREL A. PARKER, who has long been active in the metal wheel and rim industry, has developed a new type of passenger car wheel as here illustrated. The tubular spokes are simply laid in a sand mold and molten steel is cast around them to form the hub. The hub part of the wheel is about 20 per cent lighter than that of a wood wheel hub of the same capacity, it is claimed.



Parker steel spoked wheel

An ordinary demountable rim is mounted directly on the spoke ends, and the complete wheel is said to be about 30 per cent lighter than a wood wheel of the same capacity. A 34 x 4½ (Mercer) wheel weighs 26 lb. from bearings to rim. A 32 x 4 in. wheel weighs 35 lb. complete from bearings to tire. The method of manufacture is said to be so simple that the cost of production is less than that of ordinary wood wheels. The wheel is manufactured by the Parker Wheel Co.

Automobile Being Made in Japan

JAPAN has become a motor vehicle producing country. The Jitsuyo, the first practical car of Japanese manufacture, is now being produced at the rate of fifty cars a month. The Jitsuyo, according to the Automotive Division of the Bureau of Foreign and Domestic Commerce, is the result of three years' work by an American engineer.

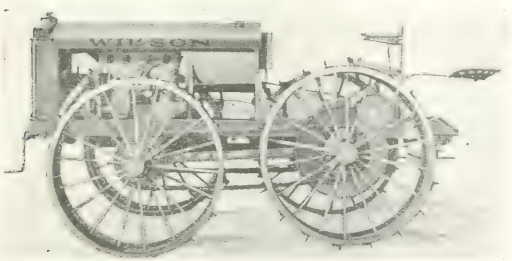
It is a two-cylinder, three-wheeled car with an air-cooled motor. It has a maximum speed of 30 miles per hour.

Wilson Tractor Has Novel Change Speed Gear

Drive has several departures from standard practice. Worm drive used. Engine is Weidely heavy duty type. Belt pulley located at rear end. The front axle is pivoted to the frame at the center.

A NEW four-wheel drive tractor is announced from Iowa, the product of the Wilson Tractor Mfg. Co. The same concern manufactures a novel form of road grader, and the tractor seems to have been primarily designed for road maintenance purposes, but it is also adapted for work on the farm. The principal departures from conventional design, apart from the four-wheel drive, have to do with the type of speed change gear and drive employed. Ordinarily the driver sits on an agricultural type of seat at the rear, but the machine can also be furnished with a line drive for operation from the implement.

The engine is a Weidely heavy duty type, with overhead valves, and is equipped to burn kerosene. Among the



Wilson four-wheel drive tractor

engine accessories may be mentioned a Kingston tractor model carbureter, Eisemann high tension magneto with impulse starter, and Perfex radiator. The engine is governed at 1000 to 1265 r.p.m. for drawbar work and the speed can be reduced as low as 500 r.p.m. for belt work. Cylinder dimensions are 4 in. bore and 5½ in. stroke, and the machine has a 12-20-hp. rating. It will be noticed that the engine sets practically directly over the front axle and the weight is said to be evenly divided between the four wheels when the tractor is pulling a normal load.

When we pass from the engine to the drive we immediately encounter departures from what may properly be described as standard practice. The change speed gear, which gives two forward speeds (1.5 and 3.6 m.p.h.) and one reverse (1 m.p.h.), is of the planetary type. In the literature of the concern claims are made to the effect that this does away with the chipping and breaking of gears experienced with sliding pinion transmission sets, but this assertion seems to be rather ill-founded when it is considered that on a tractor speeds are changed only when the tractor is at rest and the clutch, of course, out of engagement. When the tractor is operating on the high gear, which is the plowing speed, the planetary set is inoperative and therefore not subject to frictional loss and wear.

This change speed gear is combined in the same housing with the final drive to the rear axle which is of the double worm type, through one worm and spine combination to each rear wheel. From each rear wheel there is a drive to the front wheel on the same side through a roller chain. The connection between the engine flywheel and the transmission is effected by means of a cast steel hardened coupling packed in grease. In connection with the planetary change speed gear use is made of a clutch which seems to be a cross between a friction type and positive clutch, being claimed to neither grab in starting nor to slip in pulling. It is of the metal-to-metal type, runs in oil and holds the tighter the greater the amount of power transmitted.

An advantage claimed for the worm drive is that it furnishes an automatic braking feature. Whenever the driving clutches are disengaged the tractor is automatically locked in position by the non-reversible feature of the worm gearing.

Steering is effected by shutting off the power from the wheels on one side and driving the wheels on the other side, in which case the tractor will make a square turn, it is claimed. If it is desired to make a less short turn the power is not shut off from the inside wheels, but they are driven at a lower speed than the outside wheels. The front axle is pivoted to the frame at the center, so that the machine can readily adapt itself to unevennesses of the soil. Radius rods connect the ends of the front and rear axle on the same side, so that the chain tension is not affected by unevennesses of the soil.

The belt pulley is located at the rear end of the machine, as plainly shown in the illustration of the line drive. This is



Line drive device used on Wilson tractor

claimed to make it not only accessible but quite easy to line up with the driven machine. The drive to the pulley is through a pair of bevel gears of $3\frac{1}{2}$ per cent nickel steel with cut teeth, which are enclosed and run in oil, and the pulley shaft is rigidly supported by a liberal sized babbitt bearing and two thrust bearings.

Owing to the equal distribution of the weight of the tractor between the four wheels, the soil is not packed as much as with a machine of conventional construction and of the same weight. Twenty-five ball and roller bearings of well-known makes are used in the construction of the tractor. The four drive wheels are all of the same size, 40 in. in diameter with 12 in. face. The belt pulley is 8 in. in diameter by 8 in. face and at maximum engine speed gives a belt speed of 2650 ft. per min. The line drive designed for this tractor permits not only of starting, stopping and steering the tractor from the implement, but of changing the gear as well.

Cable Reports Show Improved Automotive Business in Spanish Speaking Countries

Better Industrial and Agricultural Conditions Aid Buying in South America, Spain, Portugal and Cuba

WASHINGTON, D. C., Aug. 5.—Cabled reports to the Bureau of Foreign and Domestic Commerce from its representatives in the various Spanish and Portuguese speaking countries reveal to what an extent the automotive lines are leaders in the general business revival now taking place. Sales have improved materially, in some localities reaching record heights and, with but few exceptions, continued gains are expected. A summary of the reports follows:

Havana, Cuba—In general, automobile dealers, especially those selling the lower priced cars, have no complaint with the present market and are encouraged over the prospects for the future. Inquiries for tractors during the past month have been frequent. Automobile imports for June show a slight falling off from those in May. Conditions in the United States delayed the arrival of one large shipment of automobiles ordered for June delivery. The number of cars entered in June was 98, compared with 113 in May, all from the United States.

Events of potential importance in Cuban politics and industry clarify the outlook for the fiscal year 1922-23 and predicate more satisfactory financial and economic conditions for this period.

Rio de Janeiro, Brazil—There is an excellent business in Rio de Janeiro and Sao Paulo on automobile lines. For the past few months a steady improvement has been noted in most lines of Brazilian trade. Good business has been done by the textile mills and most other domestic manufacturers and the exposition in connection with the forthcoming centennial celebration is becoming a strong factor in increasing buying here. The attempted revolution, which was quickly suppressed, had a slight effect on the exchange situation but, owing to prompt action by the Banco de Brazil exchange, returned immediately to its former value. The last Pernambuco sugar crop was the largest on record.

Lima, Peru—Import improvement has been especially marked in the automobile lines, due to the usual increase in the sale of cars, tires and accessories before the national holidays. The old stock of cars is practically exhausted, but importations will probably be small until the opening of the summer season in November. Dealers in automobiles and accessories have been quick to readjust their prices to a lower level with the improvement in exchange. This may be induced to some extent by the new tariff which is about to be introduced, reducing the duty on low and medium-priced cars.

Madrid, Spain—The agents for two American medium-priced cars in Spain report unprecedented sales in the districts of Andalusia, Madrid and also in Bilboa. Two hundred of these cars already have been sold this year.

Oporto, Portugal—There are now 342 trucks used in this district as against none prior to 1919, when practically all the hauling was done by bullock carts. French trucks number 167, German 108 and American 31. Large trucks are more generally used, as they are the best suited to the needs of the district, the roads being in bad condition and the country mountainous.

Montevideo, Uruguay—The general economic situation shows a noticeable improvement over conditions at the same time last year. The recovery has been gradual during the past few months, although considerable room for betterment is still left. The improvement is due primarily to the increase in exportation of the leading commodities at fair prices. Exchange on New York has been steady, not showing much fluctuation. The present quotation is 1.22 gold pesos per dollar, a remarkable contrast with the average of July last year of 1.65 gold pesos to the dollar.

Santiago, Chile—The gradual improvement in the general economic situation in Chile, consistently reported since the beginning of April, has been maintained during the past month and it is expected that the continued sales of nitrate for August delivery will bring increasing strength to the economic position. Purchasing by consumers throughout the Republic is reported to be on the increase but, notwithstanding this, merchants continue their policy of placing orders in moderate quantities. Another important factor which has served to strengthen exchange is the expectation that Congress will authorize a loan of 135,000,000 paper pesos.

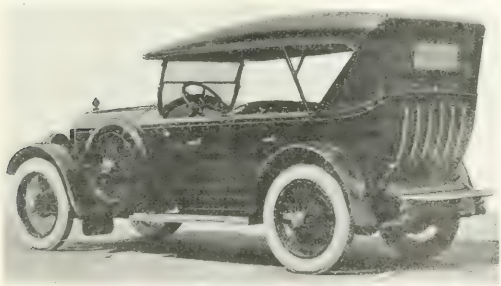
Buenos Aires, Argentina—A perspective of economic currents and changes in Argentina leads to the conclusion that the country is experiencing a slowly continued recovery. Trade with the United States seems to have reached a definite level, the average monthly value of imports from the United States for the first five months of the year being about $7,000,000 and of exports from Argentina to the United States about $4,500,000. The number of American salesmen in Argentina continues to grow and they are reported to be offering the usual credit terms. Exports of Argentine products for the year total 2,860,000 tons of wheat, 1,093,000 tons of corn, 563,000 tons of linseed, 65,000 tons of flour, as compared with exports during the same period last year of 1,450,000 tons of wheat, 1,377,000 tons of corn, 808,000 tons of linseed and 22,000 tons of flour.

Combined Inlet and Exhaust Manifold on New Cole

Other changes include in the design of chassis, stronger frame, new steering gear and modified carbureter. Lines of open bodies have also been changed. Spare wheels are carried each side of hood. Aluminum running boards and trunk rack added.

By Harlow Hyde

SEVERAL detail changes have been made in the design of the Cole chassis and many refinements and modifications are to be noted in chassis, frame, fuel and oil system and in the bodies of the new series. The frame has an additional center cross-member, and the



Three-quarter rear view of new Cole phaeton, showing body lines and the aluminum running board and trunk rack, also side mounting of spare wheel

front cross member has been enlarged and strengthened. Gusset plates have also been added at the rear of the frame.

There is a new Gemmer type steering gear with a change in control said to make steering easier. A solid walnut wheel with friction type controls is part of this assembly.

Side wheel mounting for two spare wheels just aft of the front fenders is now standard.

A leak proof packing gland has been added to the front and rear ends of the muffler.

A new type intake manifold cast inside and integral with the exhaust manifold is arranged to preheat the intake to 220 deg. Fahr. The new design is termed the "Envelope Manifold," drawings of which are appended. A new Johnson carbureter of the swing valve type has been adopted.

Excessive oil consumption is said to have been prevented by a redesigned crank-shaft in which the drilling is rearranged.

An additional two-piece piston ring has been added to control compression which is now held to + or — 2½ lbs. This is in addition to the two piece oil scraper ring. There are also two one-piece rings.

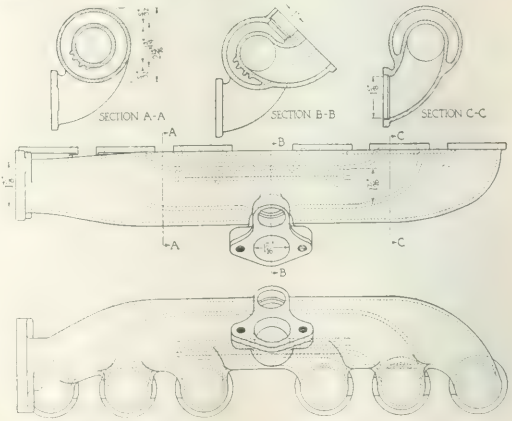
The rear axle gear ratio is now 4.7 to 1.

A new design of open body with beveled mold line which continues through the hood to the radiator is now used. The pressed steel dash is now built integral with the body. A cowl ventilator has been added, and the lower half of the windshield is now stationary making a water-tight connection with the cowl.

The running boards are of the three-quarter length type extending forward from rear fenders to the side mounted spare wheels. The board is of cast aluminum with molded rubber step covering. The fenders are of a new pattern for Cole and have a heavy crown. Forward fenders are provided with splash guards at the bottom. At the rear is an aluminum alloy trunk rack with body bars above of same material.

Door handles are off-set outside and have a new type of lever inside. New type curtain fasteners are employed and the rear curtain light is much wider than formerly.

Lamps are the drum type of design and are provided with universal mounting. Wire, wood or Disteel wheels are now optional on all models. The roadster top has been changed to the clear vision type.



Drawing of the Cole combined inlet and exhaust manifold designed to assist in vaporizing the charge

British Light Car Built Within Motorcycle Sidecar Limit

New Austin has overall length of 104 in. and width of 46 in., track 40 in., 42 m.p.g. guaranteed. Four-cylinder water-cooled engine used. Piston displacement 43 cu. in. Front wheel brakes design feature. Road clearance is 9 in. Weight 700 lbs.

By M. W. Bourdon

HAVING emerged, with fair prospects for the future, from its financial difficulties of last year, the Austin Motor Company, Birmingham, England, which is among the first half dozen of the largest automobile concerns in the country, has planned to produce next year a new model of dimensions unlike those of anything previously produced in Great Britain. Instead of entering into direct or intentional competition with the now almost innumerable light cars already on the market, the underlying idea of the new model is to cut into the field occupied by the higher-powered and more expensive motorcycle and sidecar outfits, which in England are still selling at £200 and over.

Austin—for Sir Herbert Austin himself is primarily responsible—has set out to give, at approximately the same price as the sidecar outfit (£225) a high-grade car in miniature which will have almost exactly the same desirable characteristics as the sidecar outfit but without the disadvantages.

First he took the dimensions of a large motorcycle combination and designed his "car" down to them; he has retained the overall width but has added 12 inches to the length in the production model.

The track is, therefore, 40 inches, the overall width 46 inches, the wheelbase 75 inches, the overall length 104 inches and the road clearance 9 inches.

Withing these dimensions he provides a body 40 inches wide inside with two separate and adjustable seats for two adults and a rear seat the full width which will take three small children, one adult sitting askew or, a couple of grips or other luggage. He encloses all the occupants in a folding top with side curtains that open with the doors, and so far as leg room is concerned for the front occupants it is ample for adults up to 6 ft. in height. The complete vehicle weighs just over 700 lb., which is about 25 per cent greater than the heavy side car outfit.

Fuel consumption tests have shown results up to 78 miles per imperial gallon on undulating roads with two adults aboard; for the standard production in unskilled hands a consumption of 50 m.p.g. will be guaranteed and this will probably be bettered by 20 to 30 per cent by ordinarily experienced amateur drivers.

As to speed and hill-climbing, the writer has personally tested two of the experimental vehicles and found them practically equal to the 8 h.p. outfit; 50 m.p.h. is possible on ordinary roads with far less discomfort than the motor cyclist experiences, and up a test hill of 16 per cent grade three adults were carried at 12-15 m.p.h. on low. The suspension is equal to that of the average light car, though the short wheelbase tends to increase the plunging effect which is already pronounced on the type just mentioned. The steering is, for the same reason, sensitive at the higher speeds and on certain classes of road surface, and in this respect it falls below the standard of the direct steering with long handle bars of the sidecar, though the periodic wobble from which the latter often suffers is absent.



New Austin car designed to compete with motorcycle side-car combination

It is regrettable that no drawings or illustrations of the chassis are available at the moment. But the following outline will show that the engineering details are in no wise startling in their design or arrangement.

The engine has a bore and stroke of 2⅛ x 3 inches, four block cast cylinders with a detachable head, side valves enclosed, roller bearing crankshaft with forced lubrication through drilled webs to the white metal big ends. Magneto ignition is used, thermo syphon cooling through a film type radiator (flat tubes) and a Zenith carbureter. Throttle and ignition control levers are over the steering wheel as usual, supplementing an accelerator pedal.

Engine, clutch and three-speed and reverse gear-set are of unit construction with a single plate clutch, ball bearing gearshafts and central gear shift. A long extension of the driven gearshaft is coupled to the single universal joint of the sliding pot type at the head of the enclosed propeller shaft, the latter suspended by a ball joint from a cross member of the frame. The rear axle is semi-floating with ball journals and ball thrusts, the final drive

being by helical bevels of 4.5 to 1 ratio. The other gear ratios are: middle, 8¼ to 1; low, 14½ to 1; reverse, 17 to 1.

Wire spoked detachable wheels are provided with a spare wheel and tire carried behind the body. The standard tire size is 26 x 2½, but 3 in. tires fit the same rims and will be provided if desired at a small extra cost. Electric lighting with gear driven generator will be standard, as will a mechanical seat starter. Steering is by worm and sector with adjustment for mesh. Springing is by quarter elliptic behind and tranverse inverted half elliptic in front. The H section front axle is stayed by a pressed steel triangulated member with its apex supported by a ball trunnion below a cross member of the frame. The latter is unusual in that it also is roughly triangular in plan, the side members being straight and narrowed almost to a point below the radiator.

Braking is on all four wheels, this being, therefore, the first British car of modern design to have front brakes. These are, of course, of the expanding shoe type, with all parts interchangeable with the back wheel brakes; they are operated by cables from the central hand lever, the pedal applying the rear wheel set, also by cables. In the case of the front brakes the cables run diagonally from the adjusting and compensating arrangement at the botton of the hand lever. No attempt is made to centralize the front wheel pivots or make the axis of the latter when prolonged coincide with the point of tire contact with the ground; as a result there is a slight pull on the steering when the front brakes are applied while rounding corners.

This miniature car can hardly be termed a good top gear performer; its 696 c.c. engine is intended to turn at fairly high speeds, developing its maximum (10 b.h.p.) at 2400 r.p.m. with its speed range limit approximately 3500.

It is intended that the gear-shift should be used, just as is the case with British light cars in general.

American Cars Dominate Rhodesian Market

Rhodesia poor 1922 market, considering small white population. High upkeep costs reduce truck use.

WHILE Rhodesia offers but a limited market for automotive products, it is a good market considering the small white population, the high cost of motoring, and the lack of good roads. Prospects for 1922 may be described as dull and it is doubtful whether the volume of motor car sales will approximate that of the past year, due to conditions existing in Rhodesia. The market for motor cars will not be materially broadened until higher and more remunerative prices are secured for cattle, corn, and base metals and minerals. The principal crop, maize, will be appreciably curtailed by the drought. Local distributors experience considerable difficulty owing to the tightness of money and necessity for bank guarantees. However, the American share of the total will probably be larger than in the past year, owing to lower prices and lower landed costs arising out of cheaper freight rates and better sterling exchange rates.

The territory of Rhodesia covers approximately 444,575 square miles, with a white population of only 36,573, the native population of 1,783,993 and the Asiatic of 1,250 not being classified at present as potential motor owners.

There has been very little competition against the American-made cars in recent years, the British makes being limited by high prices and their general lack of adaptability to the severe and rough conditions prevailing. Unfortunately, statistics of motor car imports are not shown by quantity or separately, being grouped with spare parts. The tables herewith give the figures available for the years 1918 to 1921, inclusive, by countries of origin.

IMPORTS OF MOTOR CARS AND PARTS INTO RHODESIA

Country of Origin	1918	1919	1920	1921
SOUTHERN RHODESIA:				
United States	£12,901	£32,105	£98,560	£54,750
Canada	3,856	16,893	21,370	26,528
United Kingdom	2,267	3,422	11,088	7,604
Italy	....	....	....	3,577
All Others	299	211	645	1,581
Total	19,323	52,641	131,663	94,040
NORTHERN RHODESIA:				
United States	1,188	2,536	3,713	6,959
Canada	509	1,110	1,734	1,243
United Kingdom	1,686	2,541	5,018	4,606
All Others	49	84	104	52
Total	3,432	6,271	10,569	12,860
Total Rhodesia	22,755	58,912	142,232	106,900

Combining the Canadian and American totals of imports into Southern Rhodesia, the percentage of imports that came direct from the United States or from branches or affiliated companies in Canada amount to 86 per cent in 1918, 93 per cent in 1919, 91 per cent in 1920, and 86 per cent in 1921. The decline in American imports during 1921 was due to the heavy imports of 1920 which were not fully absorbed. At the present time there are only reasonable stocks in the territory and the number of cars in bond is very small.

The market is not a large consumer of motor trucks owing to the prohibitive cost of upkeep, high cost of fuel, high wages for operators, and delays and costs of repairs due to the utter lack of good roads. Imports of trucks and parts into Southern Rhodesia totaled 1290 in 1918, 1912 in 1919, 12,472 in 1920, and 13,754 in 1921. Great Britain furnished most of the trucks imported, followed by Canada and the United States respectively.

The British motorcycle has dominated the field during the last two years, owing to its economy of petrol, a big factor in operating costs in Rhodesia.

According to statistics furnished by the Department of the Administrator, there were 1184 passenger cars and trucks and 403 motorcycles in Southern Rhodesia in 1921.

Supplies of petrol are good, the retail price in Livingstone being 48 shillings and in Bulawayo 44 shillings per case of 8 imperial gallons. To date no petrol substitutes have been marketed in Rhodesia. There are no transport restrictions, such as to weight of trucks or right-hand drive, although the latter is preferred and usually stipulated by dealers.

However, prospects for the future are not too bright. The increase in white population will probably be slow and gradual, while the improvements in roads and fuel costs will not be such as to lead to any immediate and appreciable increased demand for motor transport. The situation is further complicated by the fact that business is handicapped by the political problem involved in the question as to whether Rhodesia shall join the Union of South Africa or set up an independent self-government.

Factors Affecting Oil Consumption in Engines

Novel methods used in comparing consumption under various conditions. Effects of differences in piston and ring design are studied. Oil hole should be on the inside of the crank pin.

OIL consumption of automotive engines has been given far too little consideration by engineers engaged in the design of this unit. Consequently any authoritative data on this subject are worthy of careful study. Such data are given in a paper by A. A. Bull, chief engineer, Northway Motor and Mfg. Co., presented at the recent summer meeting of the Society of Automotive Engineers. An abstract of the paper follows.

The author states that the quantity of oil required to lubricate an engine, particularly the pistons and cylinders, is extremely small. Because the oil pumped to the combustion chamber is the chief source of oil consumption, much attention was given in the investigation made to learning what factors control oil pumping to the combustion chamber. That there is wide variation in oil consumption of heavy duty engines is indicated by Table 1, which gives the consumption per b.hp.hr. for various engines working, in most cases, under actual service conditions.

TABLE 1—OIL CONSUMPTION

Engine	Type		Oil Consumption, gal. Total	Per Hr.	Per B. Hp-Hr.
S	Tractor	20.0	9.7500	0.2630	0.01320
F	Tractor	18.0	3.7500	0.1100	0.00620
WB	Tractor	25.0	3.3800	0.0770	0.00370
C	Tractor	18.0	8.0000	0.2000	0.01110
C	Tractor	27.0	11.5000	0.3100	0.01150
AR	Tractor	30.0	15.5000	0.4420	0.01470
AR	Tractor	20.0	5.0000	0.1120	0.00560
RI	Tractor	16.0	4.3800	0.1330	0.00830
I	Tractor	20.0	8.0000	0.2670	0.01330
I	Tractor	16.0	4.7500	0.1490	0.00930
N_1	Truck[a]	37.0	0.4250	0.0850	0.00230
N_2	Truck[a]	38.0	0.0935	0.0234	0.00580
N_3	Truck[a]	27.5	.....	.....	.....
A	Truck	33.0	.....	0.1200	0.00364
A	Truck	35.0	.....	0.0500	0.00143

[a] Maximum dilution, 1.5 to 2.0 per cent.

In the case of passenger cars it is customary to give the oil consumption in miles per gallon and it is possible to get figures varying all the way from 50 to 2000 miles. At low engine speeds the consumption is negligible and it is sometimes possible to get more oil from the crankcase than was originally put in, but cars which exhibit this characteristic will usually show excessive oil consumption at speeds of 30 m.p.h. and over. An instance of this sort which indicates a fairly general condition is indicated in Table 2.

TABLE 2—OIL CONSUMPTION

Car No.	1	2	1[c]	2[c]
Number of Cylinders	8	8	8	8
Average Speed, m.p.h.	15	15	40	40
Total Miles Run	600	500	50	50
Oil Consumption[d]	0	0.5	4–5.75	11
Dilution per Gallon, per cent.	40	10	0	0
Oil Consumption, Excluding Dilution, miles per gal.	860	835	92	581

[c] Same cars on a speedway, at 40 m.p.h.

[d] The consumption for col. Nos. 1 and 2 is given in gallons, in ounces for col. Nos. 3 and 4.

Laboratory tests were the basis of some of the data given in the paper. Several methods were used in making observations in the laboratory.

1.—Obtaining the oil consumption under working conditions, properly controlling all of the factors involved.

2.—Measuring the quantity of oil pumped through the exhaust of individual cylinders.

3.—Studying the extent of oil passing the piston to the combustion chamber with the cylinder head removed.

Method 3 gives very good results when checking fundamentals and is related closely to the results obtained with Methods 2 and 3.

The author made an investigation of the variation of the side pressure of the ring on its groove, taking into account the gas pressure in the cylinder, the inertia of the ring and the friction between the ring and the cylinder wall. The ring clearance, of course, has an important effect on the oil pumping. With cast iron pistons there is no material change in this clearance as the engine heats up, and the wear of the grooves is usually very slow, but with aluminum pistons not only is the wear more rapid but the greater coefficient of expansion of aluminum as compared with cast iron tends to increase the clearance under working conditions. The use of oil return holes in the ring groove back of the ring is very beneficial when the ring has side clearance so that the oil has access to the space back of the ring. The variation of the side pressure of the ring on the wall of the ring groove for different positions of the crank pin is shown in Fig. 1.

The influence of ring thickness on side clearance has received considerable attention, particularly in connection with aluminum pistons. Reduction in ring thickness undoubtedly reduces the relative clearance, and the weight of the ring itself and, therefore, its inertia is reduced. The use of a considerable number of very narrow rings in a single groove is discussed, but from the results of tests the conclusion is drawn that four ⅛ in. rings in one groove are of no benefit from the standpoint of preventing oil pumping, as compared with the usual arrangement of rings.

It seems that a ring of two-piece construction capable of sidewise expansion is desirable. It is important, however, that there be sufficient radial pressure provided, otherwise the benefits of the side seal are lost.

Piston fit in the cylinder has an appreciable effect on the wear of the rings, on the sides as well as on the outer face. It is evident that the piston will rock in the cylinder to the extent of the clearance and that it tends to form a convex surface on the outside of the ring, completely destroying its oil-scraping efficiency. The continual sliding back and forth of the ring upon the seat wears the ring

groove very rapidly and is believed to be more responsible for wear than the pressure exerted by the ring on the groove because of its reciprocation. The author claims that the use of a fourth ring on the piston below the piston pin is of no benefit, as the function of an oil scraper is performed equally well by the other rings, though the lower ring has the advantage that it maintains its fit and condition much longer than the rings higher up. In this connection it is interesting to mention that a piston without any ring on it absolutely does not pass any oil, the piston sliding over the film of lubricant without disturbing it.

Plain rings change their position circumferentially in the cylinder and, if the cylinders are out-of-round, which is usual, due to unequal expansion and the like, considerable oil will be passed by the rings. It was evident in all the tests conducted that the location of the ring circumferentially is very important and, in duplicating results, it is necessary to pin the rings so that they cannot rotate. To illustrate the extent to which contact between the ring and cylinder affects consumption, the following comparison is submitted.

As a result of using separate cylinder sleeves, it was possible to obtain an ideal comparison. The pistons and rings remained undisturbed and new cylinder sleeves were used, the engine having seen considerable service. With old rings and cylinders, the oil consumption was 400 miles per gal. and with the same rings and pistons, but with new cylinders, the oil consumption was 150 miles per gal.

Summarizing the fundamental factors of the piston ring, we conclude that

(1) Drain-holes are essential
(2) An angular-faced piston-ring is beneficial
(3) Proper mechanical fit between the ring and groove is essential
(4) Oil relief-holes in the rear groove are beneficial when side-clearance occurs
(5) The slot in the rear is unimportant
(6) The number of rings is unimportant.

The author claims that the amount of free carbon in an oil has little effect on the carbon deposits in the cylinders

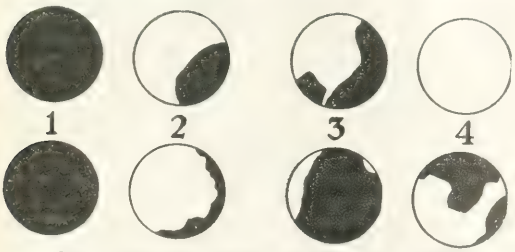


Fig. 2—Results obtained at 500 r.p.m. (upper row) and 1000 r.p.m. (lower row) in test engine. Black portion indicates how much of piston was covered with oil at the end of the test. Cylinders 1 and 2 had one ring with a side clearance of 0.005 in. while the other two had standard 3-ring equipment. At the lower speed piston 1 became covered with oil in 1 min. and in 0.3 min. at higher speed

and he also holds that the common belief that there is more carbonization with heavy than with light oils is unfounded. Higher speeds ordinarily increase the oil consumption materially, but this is not due to less efficient action of the rings as oil scrapers at high speed.

Trucks and tractor engines that operate a large percentage of the time at governed speeds are affected greatly in their oil consumption by the bearing condition. It is also true of passenger-car engines that a car will show a reasonable economy when operated at ordinary driving speeds and, while this economy may be more or less superficial as a result of the dilution that takes place, the same car running at higher speeds, where dilution does not become a factor, will consume unreasonable quantities.

A consideration of the oil discharge from the crankcase is naturally largely confined to the pressure feed system. Diagrams of crankpin pressure at 500 r.p.m. show that throughout the greater portion of the cycle the direction of the pressure is radially outward on the inside of the crankpin. At 1500 r.p.m. the pressure is radially outward except for an angular travel of 100 deg. during the expansion stroke. It is evident from curves of crank pin pres-

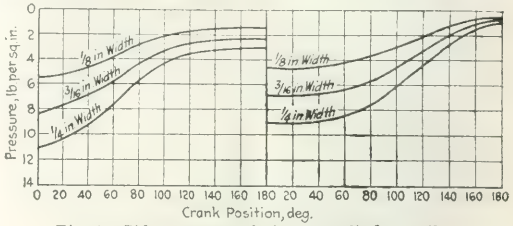


Fig. 1—Side pressure of ring on cylinder wall at various crank positions

sure with which the paper was illustrated that the pressure on the pin is concentrated chiefly on the inside, so the bearing clearance is on the outside. If the oil hole were located at the middle of the clearance arc, owing to the fact that the clearance increases with the wear of the pin, the oil pumping would be greatly increased as the engine reached an advanced state of wear, and for this reason it is best to locate the oil hole in a zone of continued pressure, preferably radially on inside of the crankpin.

It is interesting to note that increasing the load has the effect of establishing the bearing clearance in the vicinity of the oil-hole when located on the inside through a part of the expansion stroke and, consequently, it exercises a very favorable control on the amount of oil supplied in proportion to the load. From the standpoint of effective lubrication of the pin some arguments can be advanced but it would appear that better oil-film distribution is obtained with the inside location of the oil hole, the influence of centrifugal force tending to distribute the film around the bearing, while with the outside oil-hole the oil is immediately thrown from the bearing. Actual experience has proved that bearing failures at high speed are less pronounced with the inner location of the hole, and that dirt will not score the bearing so readily.

External oil leaks are in many cases responsible for excessive oil consumption and often occur at the higher speeds, leaving no direct evidence of the quantity actually lost in this manner. Fog discharged from the breather also has an appreciable influence. This is emphasized particularly where excessive crankpin discharge occurs and also in splash-feed-lubrication engines where light oils are used. Under the latter condition the oil becomes fogged quickly and, if accompanied by piston blow-by, oil vapor will be emitted from the breather.

Controlling the oil pressure in proportion to the throttle opening to effect proportionate lubrication and obtain satisfactory oil economy does not seem to exercise a definite control unless proper consideration is given also to the location of the oil-hole in the crankpin. It is clear that, at the higher speeds, with the increase in the throttle opening and consequently higher pressures, the crankpin discharge will be increased proportionately. It is feasible to use much higher oil pressures with proper oil-hole control which in itself constitutes a favorable argument.

State Laws Governing Motor Vehicle Lighting Need Uniformity

Study of tabulated motor vehicle lighting equipment laws shows wide divergence in state provisions. Louisiana, New Mexico, Oklahoma and Tennessee have no lighting laws. Wisconsin, most specific, approximates provisions found in Uniform Vehicle Law.

STATE laws governing motor vehicle lighting equipment have originated very much in the manner that the proverbial Topsy grew. The need for a uniform lighting system was not recognized until very recently, as the need for State regulation came about unequally in the different parts of the country with the growth in use of motor vehicles.

Improvement in lighting equipment has been a slow, steady growth, and it has brought problems with it with which State regulation has not kept up, but which must be now seriously considered. An examination of the accompanying table of motor vehicle lighting laws shows great divergence in State requirements; divergence so great that a motorist complying with the law in one State may be a serious offender of the law in a nearby State. In several of the southern states there are no laws whatever dealing with the matter of lighting equipment.

The vast number of motorists who travel over a number of states makes it imperative that uniformity in lighting laws be brought about. The benefits of such action would be manifold, among other things it would:

1. Tend to decrease accidents.
2. Standardize equipment.
3. Remove annoyance to inter-state travel.

Many states have taken aggressive action to overcome difficulties within their own particular territory. Ten states have gone so far as to establish the means for testing lighting equipment and stipulate that before lenses, anti-glare devices, etc., shall be permitted to be sold they must have the sanction of the State.

Uniformity Desirable

THE proposed Uniform Vehicle Law which has been endorsed by the Motor Vehicle Conference Committee has very carefully worked out lighting provisions. In connection with this tabulation of State laws it may be well to mention the provisions which have to do with passenger car and motor truck headlights. These lighting provisions are as follows:

a. "Front Lamps."—Every motor vehicle and tractor shall have at least two lamps of approximately equal candle power mounted on the right and left sides thereof, and every motorcycle shall have mounted on the front thereof at least one lamp.

Vehicles so mechanically constructed, governed or constructed that they cannot exceed a speed of fifteen miles per hour shall have front lamps capable of furnishing sufficient illumination to render clearly discernible on a level highway any substantial object 50 feet directly ahead and at the same time any substantial object 25 feet ahead and 7 feet to the right of the axis of such vehicle.

Vehicles which can exceed 15 *miles per hour except motorcycles* shall have front lamps capable of furnishing sufficient illumination to render clearly discernible on a level highway any substantial object 200 feet directly ahead and any substantial object 100 feet ahead and 7 feet to the right of the axis of such vehicle, and this provision shall be deemed to be complied with if the apparent candle power of the combined beams of the lamps as measured 100 feet directly ahead of the vehicle on a level surface and at a height equal to one-half of the height of the light source above said level surface is not less than 4800 and if the apparent candle power as measured 100 feet ahead of the vehicle and 7 feet to the right of the axis thereof is not less than 1200.

Light Adjustment

The lights of all vehicles shall be so arranged, adjusted and operated as to avoid dangerous glare or dazzle, and so that no dangerously glaring or dazzling rays from the lamps of any vehicle on a level road shall be projected at such an angle above the level as to enter the eyes of approaching drivers or pedestrians, and this provision shall be deemed to be complied with if the apparent candle-power of the combined beams of the lamps as measured 100 feet ahead of the vehicle on a level surface and 5 feet above the level surface does not exceed 2400 directly in front of the vehicle, and 800 at a point 7 feet to the left of the axis of the vehicle and at the same height.

NOTE—The candle power values specified above are those determined and recommended by the Illuminating Engineering Society and endorsed by the Society of Automotive Engineers.

The above provisions are approximated to a greater or less degree by many of the states. Wisconsin has the longest and most specific provisions of any state at the present time. It also approximates more closely the provisions in the Uniform Vehicle Law.

With the exception of Georgia, Florida and Texas, the lighting laws tabulated will remain unchanged through this year as the various state legislatures have already convened and adjourned.

Louisiana, New Mexico, Oklahoma and Tennessee are as yet without laws on the subject of head lamps and spot lamps. In every other State, regulations of one kind or another have been established.

There is a marked lack of uniformity in nearly all the provisions of the various States, while the regulations in many instances are very indefinite and likely to be misinterpreted.

The accompanying tables give a clear and brief picture of the present status of the laws on this subject throughout the United States.

State Laws Governing Motor

(Unless otherwise specified the laws apply to passenger cars and

Prepared through the

STATE	No.	HEAD LAMPS AND SPOT LAMPS				
		Color	Candle Power	Distance	Lenses	Dimming Devices
1 Alabama	2					
2 Arizona	2	White	None in excess of 32. Over 4 equipped with deflectors	No dazzling rays shall show more than 4 ft. above level of highway at a point 75 ft. from vehicle. Spotlights must not throw beams to left of center of highway		
3 Arkansas	2	White		Must reveal object at 200 ft.		
4 California	2		Measured 100 ft. directly in front of car and 60 in. above road level. Must not exceed 2400 apparent candle power	Objects must be revealed at 200 ft. Trucks proceeding not more than 15 m.p.h.—75 ft.		
5 Colorado	1			Clearly visible		Required on all vehicles
6 Connecticut	2	White or Amber tinted	Not in excess of 21 mean spherical	Visible for 500 ft. and objects must be revealed at 200 ft.		All lamps must be equipped with a device to prevent glare, which has been approved by the highway commissioner.
7 Delaware	2	White		Visible for 200 ft. and revealing objects at least 25 ft.	Reflectors on lights of more than 4 c.p.must permit no light to be reflected to left of axis, at a distance of 75 ft. ahead, nor more than 2 ft. above highway	
8 Florida	2			Visible at 200 ft.	Rays must not shine more than 4 ft. from ground at distance of 200 ft.	Must be applied when an approaching vehicle is 200 ft. away
8 Georgia	2	White		Visible at reasonable distance		
10 Idaho	2			Visible at 200 ft.		
11 Illinois	2	White or amber tinted		Visible at 200 ft.		Must be applied within 250 ft. of approaching vehicle unless equipped with an anti-glare device.
12 Indiana	2			Visible at 200 ft. and revealing objects at 150 ft.		Must be applied when another vehicle is approaching unless anti-glare device is used
13 Iowa	2	White or tinted, other than red	None in excess of 32	Visible at 500 ft. and revealing objects at 75 ft.	Reflectors on lamps of more than 4 c.p. must permit no light to rise 4 ft. above level 75 ft. ahead	
14 Kansas	2	White		Visible at 300 ft.		Must be applied when another vehicle is approaching unless anti-glare devise is used
15 Kentucky	2	White or tinted, other than red		Must reveal objects at 200 ft.	No glaring rays shall be thrown 3½ ft. above level 75 ft. ahead	
16 Louisiana						
17 Maine	2		None in excess of 32	Must reveal objects at 200 ft. if vehicle exceeds sneed of 15 m.p.h. If not must reveal objects at 50 ft.	Reflectors on lamps of more than 4 c.p. must permit no light to rise 4 ft. above level, 75 ft. ahead	
18 Maryland	2	White or tinted, other than red	None in excess of 32	Visible at 200 ft.	No dazzling rays to show 42 in. above road at 75 ft. ahead. Must have anti-glare device if over 4 c.p.	
19 Massachusetts	2	White, or yellow or amber tint	21 mean spherical	Revealing objects at 160 ft. Visible at 200 ft.	No headlamps permitted unless equipped with device to prevent dazzling rays	
20 Michigan	2			Reveal objects at 200 ft if speed of 15 m.p.h. is exceeded, otherwise 50 ft. Reveal objects 100 ft. at 7 ft. to right of axis.		Must be applied when another vehicle is approaching
21 Minnesota	2		None in excess of 32	Reveal objects at 200 ft.	No reflectors to be used unless anti-glare device is added	
22 Mississippi	2	White		Visible at 200 ft.		

Vehicle Lighting Equipment

trucks alike. A rear light is required on trailers or projecting loads.)

cooperation of the N. A. C. C.

HEAD LAMPS AND SPOT LAMPS

Regulation and Enforcement by State	Time Lit	Rear Lamps	Spot Lamps	Side Lamps	Parking Regulations
	½ hour after sunset to ½ hour before sunrise	1 red, to show number plate			Need not be lit if vehicle is standing in lighted street
	1 hour after sunset to 1 hour before sunrise	1 red, visible at a reasonable distance	Must not throw beams to left of center of highway or above level surface at distance of 100 ft. away		
	½ hour after sunset to ½ hour before sunrise				
State testing agents must examine all lighting devices before they are sold in the state. Two samples to be used. Manufacturers' fee for test, $50	½ hour after sunset to ½ hour before sunrise	1 red, visible for 500 ft., and constructed to illuminate license plate	Beams must not be raised more than 4 ft. from highway 100 ft. from vehicle	Not more than 4 c.p.	No lights required if objects visible 200 ft. away
	½ hour after sunset to ½ hour before sunrise	1 red, clearly visible and throwing white light on license plate	Must be turned off upon meeting another vehicle unless directed not to light left ¾ of road 30 ft. from car		
	½ hour after sunset to ½ hour before sunrise	1 red, clearly visible and throwing white light on license plate	Must not be used when approaching motor vehicle except rays strike ground not over 60 ft. in front and to right of axis of vehicle		One light at front on side nearest roadway and one light in rear. No lights if street is lighted to permit objects being visible 200 ft. away
All lighting equipment must be tested in state laboratories. Manufacturers' fee for test $10	½ hour after sunset to ½ hour before sunrise	1 red, visible for 200 ft., and throwing white light on license plate making numbers discernible at 25 ft.	Subject to head lamp restrictions		1 white at front left and 1 red at rear. Visible for 200 ft.
	½ hour after sunset to ½ hour before sunrise	One			
	1 hour after sunset to 1 hour before sunrise	1 red, throwing light on license plate			1 rear and 2 front lit while parked
	1 hour after sunset to 1 hour before sunrise	1 red and 1 white to illuminate license plate at distance of 100 ft.			
	1 hour after sunset to sunrise	1 red and license numbers must be legible at 50 ft.			1 front and 1 rear, unless municipalities designate lighted areas in which no lights necessary
	½ hour after sunset to ½ hour before sunrise	1 red, arranged to make license plate legible at 50 ft.	Must be turned off at approach of vehicle unless beams do not appear above ground at distance of 50 ft.		
State Highway Commission to test all devices submitted. Manufacturers' fee for test $25		1 red, throwing white light on license plate, making numbers legible at 50 ft.	Must not be thrown on left half of road and subject to head lamp restrictions		
	½ hour after sunset to ½ hour before sunrise	1 red	Rays must not be directed at approaching vehicles		
	½ hour after sunset to ½ hour before sunrise	1 red, visible at 200 ft.			Cities may designate well lighted streets, where parking lights unnecessary
	½ hour after sunset to ½ hour before sunrise	1 red, visible at 200 ft. Carried on left side	Must not shine 2 ft. above road at distance of 30 ft. (spot)	1 white on left side of all trailers	1 front and 1 rear, unless objects visible 100 ft. in each direction
State Board of Motor Vehicle Headlight Inspection to pass on all devices. Manufacturers' fee for test $25	When not sufficient daylight to render objects visible at 200 ft.	1 red, throwing white on license plate, making numerals visible at 25 ft.			
Requires use of anti-glaring devices. Manufacturers' fee for test $50	½ hour after sunset to ½ hour before sunrise.	1 red, so arranged as to illuminate license plate	Must not shine 2 ft. above road at distance of 30 ft.	Trucks and trailers must show green light at extreme left	Lights visible from front and rear
	1 hour after sunset to 1 hour before sunrise	1 red, visible at 100 ft. and make license numbers legible at 50 ft.	Focussed to right not more than 200 ft. from vehicle	Trailers 1 white at front left, visible from both sides	1 front and 1 rear
	1 hour after sunset to 1 hour before sunrise	1 red, throwing white light on license plate	Center beam must not strike highway at distance of 100 ft.		
	½ hour after sunset to ½ hour before sunrise	1 red, throwing white light on license plate			

State Laws Governing Motor Vehicle

STATE	No.	HEAD LAMPS AND SPOT LAMPS				
		Color	Candle Power	Distance	Lenses	Dimming Devices
23 Missouri	2	White	36 to 21, according to character of anti-glare devices	Visible at 500 ft. reveal objects at 150 ft.	Anti-glare devices must be provided. Cone of light must not rise above 42 in. from road at 75 ft. Objects to right must be revealed at 50 ft.	
24 Montana	2	White		Visible at 200 ft.		Must have non-glare or dimming device
25 Nebraska	2	White		Reasonable	Reflection on lights over 4 c.p. must not throw beams 42 in. above level at distance of 75 ft.	
26 Nevada	2	White		Reasonable		Must be applied when another vehicle approaching unless beams are not cast over 42 in. above road level
27 New Hampshire	2			Visible at 200 ft.	Anti-glare devices compulsory. Rays must not rise above 42 in. at 75 ft. ahead	Must be applied when approaching another vehicle
28 New Jersey	2	White or yellow tinted	None in excess of 24—except by special permit	Visible at 250 ft.	Light must not be projected more than 4½ ft. from ground	
29 New Mexico						
30 New York	2		Not to exceed 21 unless deemed proper by tax commission	Must reveal objects 200 ft. ahead and 10 ft. to each side. Visible at 250 ft..	Must be equipped with anti-glare devices so that no glare projects more than 42 in. above highway at 75 ft.	
31 No. Carolina	2				Reflectors must not throw beams over 42 in. above highway at distance of 75 ft. ahead	
32 No. Dakota	2				Reflectors must not throw beams over 42 in. above highway at distance of 75 ft. ahead	
33 Ohio	2 on pass. car, 1 on truck		None to exceed 32	Visible at 200 ft. and revealing objects at 200 ft.	Anti-glare devices compulsory. No light 3½ ft. above ground at 75 ft. ahead	
34 Oklahoma						
35 Oregon	2			Reveal objects 500 ft. directly ahead and 7 ft. to right at 100 ft. Vehicles traveling less than 15 m.p.h. 50 ft. ahead	Anti-glare device compulsory	Must be applied or else spotlight thrown to right in lieu of head lamps
36 Pennsylvania	2		None to exceed 32	Reveal objects at 200 ft.	Anti-glare or dimmers compulsory on lights of over 4 c.p. if equipped with reflector	Must be applied when another vehicle is approaching
37 Rhode Island	2	White		Visible at 200 ft.		
38 So. Dakota	2				Anti-glare device compulsory	
39 So. Carolina		White		Reveal objects 150 ft. ahead	Dimmers compulsory	Must be applied when approaching another vehicle
40 Tennessee						
41 Texas	2	White		Visible at 500 ft.	Glare prohibited	
42 Utah	2		None to exceed 32	Reveal objects at 150 ft. If speed does not exceed 15 m.p.h. 100 ft.	Reflectors on lights of more than 4 c.p. must not throw light above 42 in. from level at 75 ft.	
43 Vermont	2			Visible at 200 ft.	Reflectors on lights of over 4 c. p. must not throw light above 42 in. from level at 75 ft. ahead	
44 Virginia	1			Visible at 100 ft.		
45 Washington	2	White or yellow tinted		Reveal objects 150 ft. ahead	Reflectors prohibited on lights over 27 c.p. Anti-glare devices required on lights with reflectors over 4 c.p. Rays 42 in. from ground, 75 ft. ahead	
46 West Virginia	2		Not to exceed 32	Reveal objectsat 200 ft. ahead and 7 ft. to right at 100 ft.	Reflectors on lights of over 4 c.p. must not throw light above 42 in. from level at 75 ft. ahead	
47 Wisconsin	2		Shall not exceed 2400 c.p. at 150 ft. in front and 60 in. above	Reveal objects at 200 ft. Less than 15 m.p.h.—100 ft in front, 18 in. above level. C.p. must be at least 1200	Anti-glare devices compulsory	
48 Wyoming	1	White		Visible at 500 ft.		Must be applied when another vehicle is approaching

Lighting Equipment—Continued

HEAD LAMPS AND SPOT LAMPS

Regulation and Enforcement by State	Time Lit	Rear Lamps	Spot Lamps	Side Lamps	Parking Regulations
All anti-glare devices must be tested and classified by commissioner of motor vehicles. Manufacturers' fee for test $50	½ hour after sunset to ½ hour before sunrise	1 red, throwing light to make license plate legible at 25 ft.	No stronger than 21 c.p. Used only in emergency and subject to head lamp restrictions	Must not be more than 1 c.p.	1 front left and 1 rear
	1 hour after sunset to 1 hour before sunrise	1 red, to throw white on license plate			
All lenses must be tested by Department of Public Works. Manufacturers' fee for test $10	1 hour after sunset to 1 hour before sunrise.	1 red	Beams must go directly to ground at distance 30 ft. from front		
	1 hour after sunset to 1 hour before sunrise	1 red			
	½ hour after sunset to ½ hour before sunrise	1 red, visible at 100 ft., and throwing white light on license plate, making numbers legible at 50 ft.	Rays must go to ground not over 30 ft. in front	Trailers 1 white on left side. Visible at 200 ft.	
cle shall inspect all devices submitted	½ hour after sunset to ½ hour before sunrise	1 red, throwing white light on numbers, making them legible at 50 ft.	Prohibited for driving purposes	Trucks and trailers must show red lights at sides	1 white at front nearest center of road and 1 rear
Tax Commission will test devices. Manufacturers' fee $50. May appeal to U. S. Bureau of Standards	½ hour after sunset to ½ hour before sunrise	1 red, throwing white light on numbers, making them legible at 50 ft.	Subject to head lamp restrictions		2 front, 1 rear, visible for 100 ft.
	½ hour after sunset to ½ hour before sunrise	1 red, throwing white light on license plate			No lights necessary if standing in well-lighted street
			Light must not project above ground at 30 ft. ahead		
to test and adjust all devices. Fees in accordance with cost	½ hour after sunset to ½ hour before sunrise	1 red, throwing white on license plate	Must be thrown to ground at 60 ft. ahead and to the right when vehicle is approaching		
	½ hour after sunset to ½ hour before sunrise	1 red with white to show license plate	Beam must strike 6 ft. to right and not more than 75 ft. ahead	White at left front on trailers	
to approve devices. Manufacturers' fee for test $50	1 hour after sunset to 1 hour before sunrise	1 red with white to show license plate	Subject to head lamp restrictions. 42 in. from ground at distance of 75 ft.		1 red at rear
	½ hour after sunset to ½ hour before sunrise	1 red with white, making numbers legible at 50 ft.			
	1 hour after sunset to 1 hour before sunrise	1 red with white, showing license numbers	Rays must touch ground at 50 ft. ahead		
	From or after sunset to before sunrise		Must not be flashed on a car in motion		
	½ hour after sunset to ½ hour before sunrise	1 red, visible at 500 ft.			
	½ hour after sunset to ½ hour before sunrise	1 red, visible at 300 ft., with white, making numbers legible at 100 ft.	Rays must not be thrown more than 100 ft. unless swung 30 deg. to right		
	½ hour after sunset to ½ hour before sunrise	1 red with white light, making numbers visible at 50 ft.	Must be thrown to ground at 30 ft. if vehicle is approaching		1 at front and rear
	1 hour after sunset to 1 hour before sunrise	1 red, arranged to illuminate license plate			
	1 hour after sunset to 1 hour before sunrise	1 red, visible at 200 ft., and throwing white light to make numbers visible at 50 ft.	[illegible] 6 ft. to right and not more 75 ft. ahead when approaching another vehicle	1 white on left of trucks	
		1 red visible at 100 ft.		1 white on left front of trailers	
Industrial Commission to fix standards		1 red	Beam must strike ground 50 or more ft. ahead, except when [illegible] 30° to right or left, then no limit	1 white on each side of trailer	
	1 hour after sunset to 1 hour before sunrise	1 red, with white light, making numbers visible at 50 ft.	[illegible] and must not be thrown on approaching vehicles		No lights necessary if standing in well-lighted street

A New Process of Manufacturing Truck Wheels

A unique equipment for rapid production of wheel from rolled steel I-beams, developed by the Bethlehem Steel Co., is here described in detail. Punch and die work on heavy presses an excellent illustration of modern methods of working cold metal.

AN interesting example of modern manufacturing methods applied to one type of metal wheel is found in the production of the rolled steel truck wheel made by the Bethlehem Steel Company. This wheel is manufactured from a rolled steel I-beam by an unusual method involving a series of cold punching and forming operations.

This wheel is a spoked type and is punched and formed from an I-beam in such a manner that the spokes and felloe are integral, the spokes being formed from the web of the beam and the felloe from the flange. The ends of the felloe are brought into contact and electrically welded, making a one-piece, continuous felloe. The spoke-ends are so shaped as to "keystone" together on each side of a hub spacer.

The I-beam used in the production of this wheel is a special wide-flanged beam rolled in the Bethlehem Grey Mill. In rolling this type of beam the flanges and web are formed by coincident rolling operations. This is said to enable the making of wider flanges than can be economically rolled by any other method, and at the same time producing uniform quality of metal throughout the section, with an absence of internal stresses.

The beam used in making the rear wheel for a 3½-ton truck is 26-in. deep with a flange 10 in. wide, web 5/16 in. thick, and weighs 60 lb. per ft. The front wheel, being lighter and having fewer spokes, permits the use of a 15-in. beam with a 4¼-in. flange, a 5/16-in. web, and weighing 28 lb. per foot.

The machines used in manufacturing this wheel are so arranged that the I-beam starts at one end of the shop and, after passing through a series of progressive operations, emerges at the other end a complete wheel.

The novel method of making this wheel, as well as the simplicity of the operations, tools and dies employed, is shown by the accompanying illustrations. A point of importance in the economical production of these wheels is the small amount of waste resulting from the operations—the amount of metal punched out being only a small proportion of the I-beam.

The I-beam, cut to proper length, starts at one end of the shop. The first work is a blanking operation consisting in punching holes as shown in Fig. 1, thus starting the outline of the spokes. This is done on a single-acting straight-side punch, Fig. 2, by the dies illustrated in Fig. 3. The proper spacing of these holes is accomplished by an indexing device, (Fig. 4). The first holes having been properly spaced, the dies on the following presses bring the beam into correct position by means of indexing pilots.

After the blanking operation the beam passes through a coining press and die, as shown in Figs. 5 and 6, by which the sharp edges are rounded.

The next, or second blanking operation, finishes the outlining of the spokes, and, in so doing, separates the beam into two similar wheel structures, each of which produces a wheel. Fig. 7 shows the beam partially punched in this operation, and Figs. 8 and 9 illustrate the operation on the punch press, and the die which does this work.

Roller tables are provided at the front and back of each press to facilitate the handling of the beam. As each operation is performed the beam is pushed along these tables to the next press.

Each of the wheel structures produced by the second blanking operation is run through a press to stagger the spokes in the manner indicated in Fig. 10. By being staggered the spokes are spread apart at their hub end so that when the beam is formed to circular shape an opening is left between the spokes to accommodate the hub spacer. The same die, Fig. 12, which staggers the spokes also grooves them. The staggering and grooving operation is shown in Fig. 11.

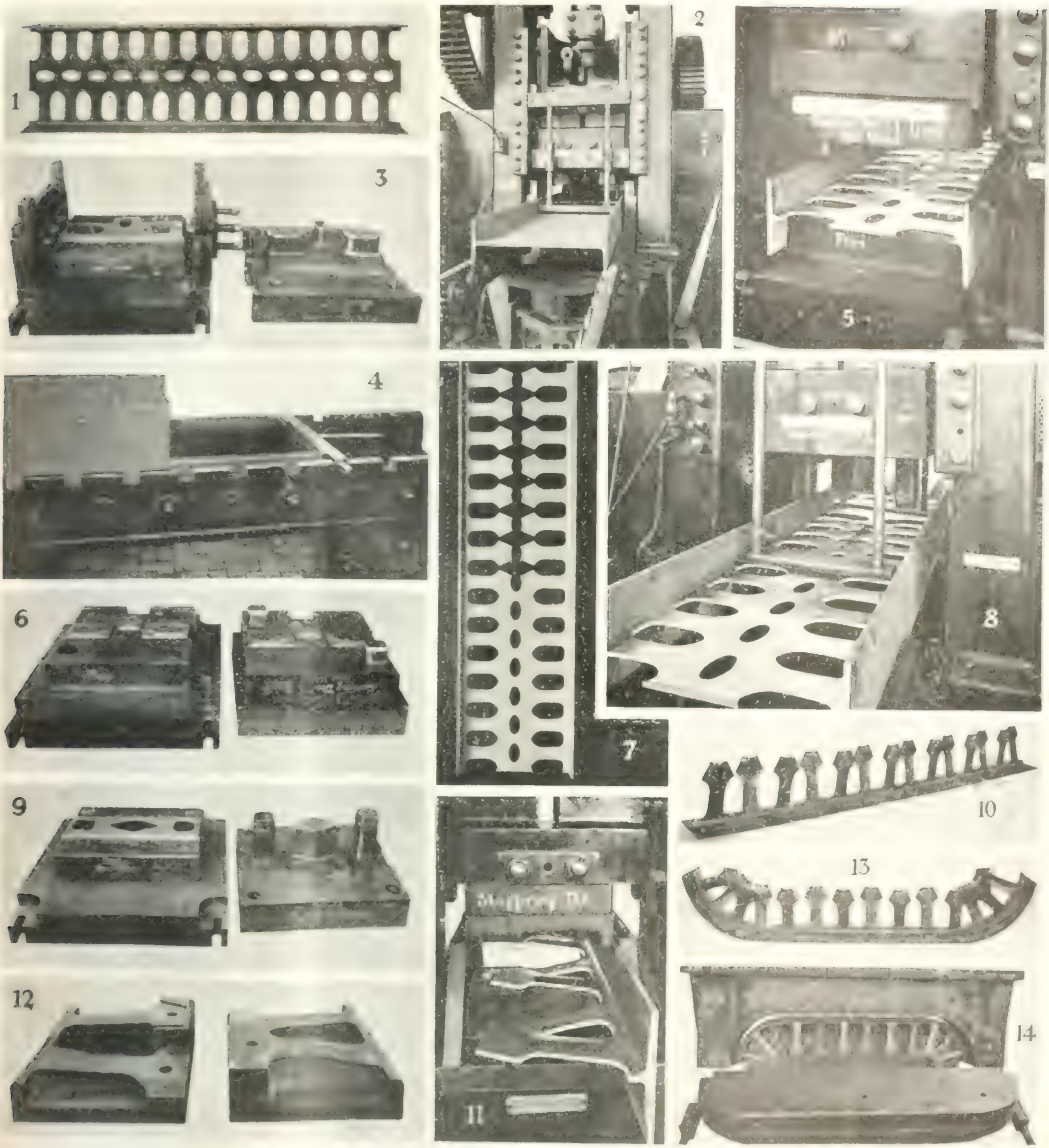
AFTER the spokes have been staggered, the wheel member is ready to be formed to circular shape. This is done in two operations. The ends of the beam are bent by the first operation to the shape of a quarter circle, as indicated in Fig. 13. Fig. 14 shows the first forming operation completed, with one-half of the die block dropped back to permit removal of the beam.

Before the second forming operation is started the hub spacer must be inserted between the inner and outer row of spokes. This is done by backing out half of the die block, Fig. 15 and putting the hub spacer on an expanding mandrel.

With the hub spacer in position, the wheel is bent by the second forming operation to circular shape, as shown by Fig. 16. The press in which this operation is performed (Fig. 17), is rather unusual in size, being 118 in. between housings and having a die space of 72 in. and a stroke of 36 in.

The I-beam at this stage has been formed up into circular shape. Two of the operations which follow are machine operations—simple boring and drilling jobs, which offer no difficulties in quantity production methods.

The felloe of the wheel is now welded, making the

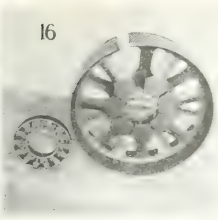


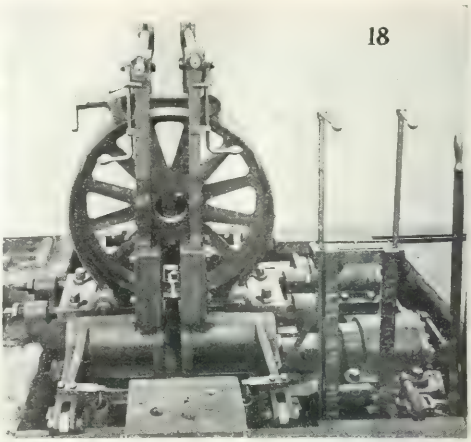
1—The I-beam after the first blanking operation. 2—The first blanking operation being performed. 3—Dies used in the first blanking operation. 4—Indexing device for spacing holes during the first blanking operation. 5—Coining the edges of the holes. 6—The coining dies used in Fig. 5. 7—The I-beam with the second blanking partially completed. 8—The second blanking operation. This divides the I-beam into two wheel members. 9—Dies used in the second blanking operation. 10—Wheel member after spokes are staggered and grooved. 11—Spokes are staggered and grooved in one operation on this press. 12—Dies used in staggering and grooving the spokes. 13—Wheel member after first forming operation. 14—First forming operation bends in the ends of the wheel member

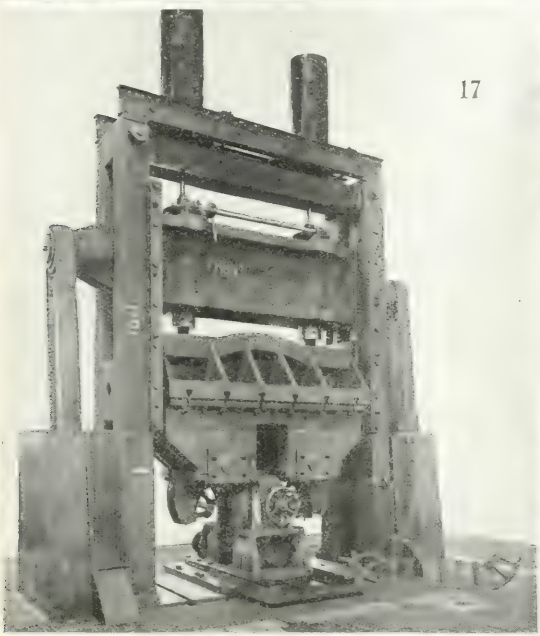
entire wheel an integral structure. This is performed on a special electric welder (Fig. 18), by the "flash weld" method and is the only operation on hot metal in the manufacture of the wheel. A set of powerful hydraulic cylinders exerts sufficient pressure at the joint to make a homogeneous weld. The flash left by the welding operation at the joint is removed and finished smooth.

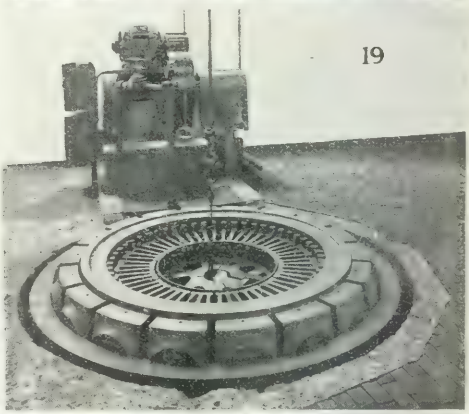
In order to round and size the wheel, it is placed in a hydraulically operated tire setter (Fig. 19), and pressure applied to the sizing blocks, which are limited in their travel by a stop ring.

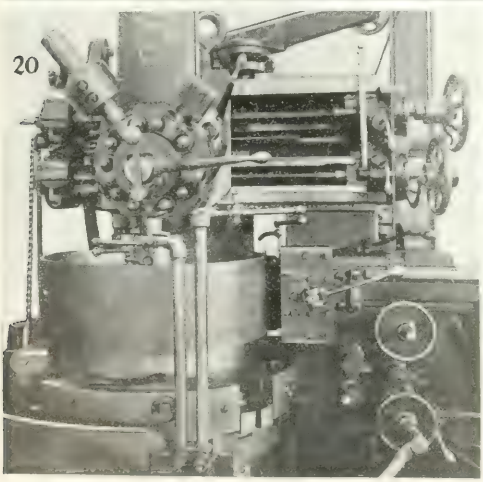


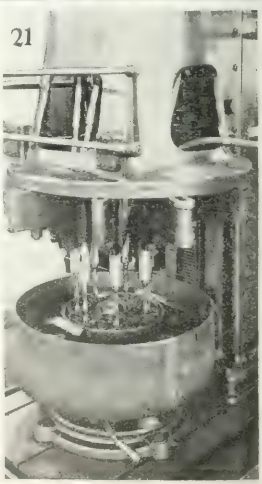


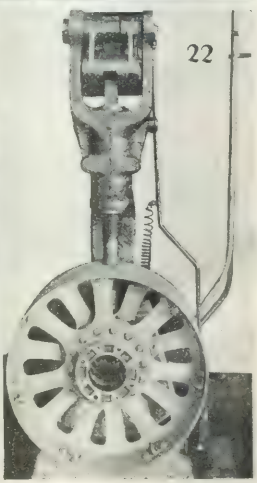












15—*The hub spacer is put into position on a collapsible mandrel.* 16—*Wheel member rounded to shape after the second forming operation, hub spacer between the spokes.* 17—*The second forming operation is done on a press which accommodates 72-inch dies.* 18—*Welding the ends of the felloe makes the wheel rim continuous.* 19—*Rounding the wheel to exact size in a hydraulic tire setter.* 20—*Boring out hub and hub spacer for the hub core.* 21—*Drilling hub core and hub on a multiple spindle press.* 22—*Riveting the chain hook to wheel.*

Up to this point in the manufacture of the wheel all the operations are on the I-beam itself, save for the inserting of the hub spacer, and these operations are the same no matter for what make of truck the wheel is to be used.

The next step makes provision for the hub core which is to be used with the wheel. This consists of boring out the hub and hub spacer on a vertical turret lathe to accommodate the particular kind of hub core to be used. From this it is seen that practically the only change in the entire series of operations necessary to fit the wheel for any make of truck is in boring out the wheel hub. At the time of boring the wheel hub, as shown in Fig. 20, the felloe is faced to proper width.

Provision is made for attaching the hub core and the brake drum by drilling a set of holes, as shown by Fig. 21, through the wheel hub and spacer. The wheel is then ready for assembly with hub core and brake drum; these are bolted on, the bolts extending through hub core, spokes, hub spacer, spokes on opposite side, and brake drum. The hub ends of the spokes have their sides shaped so as to "keystone" with each other, while the spoke ends have full circular bearing against the hub core. Each spoke is interlocked by bolts to the two spokes on the opposite side of the spacer, one of the opposite pair being half way ahead and the other half way behind the first spoke. This forms an interlocking keystone construction of exceptional strength.

When chain hooks are desired they are riveted through holes punched in the felloe, as shown in Fig. 22. The wheel is now completed, and after cleaning it free from all grease is painted for shipment.



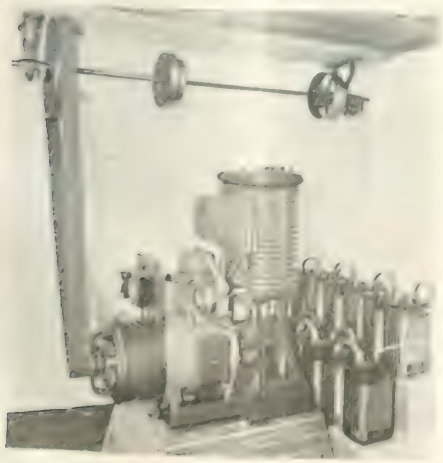
Fig. 23—Bethlehem rolled steel wheel as it appears when complete

In making a front wheel, the same operations as described above are performed, the only difference being in the shape of some of the dies due to the slight difference in the number and size of spokes.

New Stearns Farm-Lighting Plant

A FARM-LIGHTING plant of 1500 watts capacity, known as the Stearns De Luxe, has been added to the line of the Stearns Motor Mfg. Co.

It comprises a single-cylinder 3 by 3 in. engine with removable cylinder head in which the valves are located. The valves are actuated through rods at the side of the cylinder. A one-piece forged crankshaft is employed and is mounted in two large-size double-row ball bearings. The flywheel is inclosed within the crankcase and is mounted on a taper seat.



Stearns De Luxe farm lighting plant

Cooling is by the thermo-siphon system, a one-piece cast-iron tank being employed. The carbureter is a Schebler, and ignition is by a Bosch high-tension magneto. Either gasoline or kerosene can be used as fuel. When using kerosene the engine is first primed with gasoline for starting. There is a bypass chamber from the crankcase to the top of the cylinder head. Oil vapor passes through this bypass, oils the joints of the valve mechanism and then passes into the cylinder, where it is consumed with the fuel charge. It is claimed that when using kerosene this oily vapor keeps the cylinder walls constantly lubricated, so that the lubrication is not impaired by condensation of the heavy fuel. Lubricating oil is circulated by a gear pump.

The 32-volt generator is of the four-pole compound-wound type and is fan-cooled. Voltage, charging rate and engine speed are controlled by means of an electric governor.

Ordinarily the plant is used with a battery of 90 ampere-hours capacity, which is said to be sufficient for ordinary household purposes. The plant can also be run entirely without a battery or with a battery for starting only. Using the generator only, the output is guaranteed to be 1500 watts, and using the generator and battery together, 2000 watts. The equipment includes a Sangamo ampere-hour meter which at all times shows the exact state of charge of the battery. There are sight gages on the oil, water and gasoline tanks. The price of the plant is $395.

The Motorcycle Turns a Corner

Price cuts, rebuilding of dealer organizations, concentration on fewer models, and study of markets are recently built foundations for motorcycle progress. Turning point reached. Manufacturers change viewpoint during last two years and improvement follows.

By Norman G. Shidle

THE motorcycle industry seems to have turned a corner. Progress is likely to replace the retrogressive movement of the last few years. The foundation is being laid for constructive business building during the next decade.

This statement is made despite the steady decline of motorcycle registrations during the last five years; despite the fact that the 1921-1922 selling season just ended marked one of the worst years the motorcycle industry has had for some time, and despite the declining production curve of recent years.

A steady change of viewpoint has been taking place among manufacturing executives for the last two years. There was a time when most of the factories seemed to feel that open criticism of any kind was destructive to the industry. More interest was evinced in defending existing conditions and practices than in recognizing difficulties and seeking constructive remedies.

All this has changed. Recent talks with leading motorcycle executives reveal a strong tendency to face existing facts, to analyze conditions carefully, and to seek broad and permanent remedies for the ills of the business.

The whole industry is thinking hard about problems that were not admitted for discussion a few years ago. This fact alone constitutes a sound basis for the optimistic statements just made.

The motorcycle industry is far from being out of the woods, as is shown by the rather discouraging statistical data available regarding it. But the guns have been pointed in the right direction. Some good shots have already been made. Useful, effective ammunition is being gathered.

Specifically, the following trends are already evident, pointing to progress:

1. One big manufacturer has already made a detailed market analysis, has set quotas on the basis of this study, and is continuing work along these lines. Similar work is likely to be undertaken in other factories in the near future.
2. The idea of quantity production of a single model is replacing the old idea that every manufacturer had to have every type of machine for sale.

   This trend is not yet noticeable in the announcements of models by the various companies, but it will be noticeable in the amount of sales effort put behind the various models.
3. Prices have been materially reduced.
4. Definite efforts are being made to clean out inefficient dealers; to instill better merchandising methods into those remaining; and to add capable new dealers to the rolls.

A study of potential and actual markets has been much needed in motorcycle merchandising. Without it producers' estimates of market possibilities were 100 per cent guess work. Consequently, production schedules were difficult to set and dealer performance difficult to check on any accurate basis.

The sound and detailed analysis which has been made by one motorcycle company offers principles of procedure that could be applied in car and truck marketing as well.

Beginning with the 1922-1923 selling season which is just beginning, each of the large motorcycle companies will be found concentrating a large part of their sales effort on a single type or size of machine. This has always been the policy of the companies manufacturing lightweight machines, but it will be adopted from now on by some of the larger manufacturers. This will tend to decrease manufacturing costs, as well as selling costs, and will thus make possible lower prices. It will make for constructive rather than destructive competition.

RECENT motorcycle price reductions are a step in the right direction and are already having a favorable effect on immediate sales. Motorcycle sales are unquestionably affected by low-priced automobile sales. The comparatively high price of the motorcycle and sidecar outfit made sales difficult. There was a general feeling that motorcycle prices were not dropped low enough last year. Consequently, the present price drops have been anticipated for several months, both by dealers and riders.

Largely because of this fact, and partly because of other conditions, the motorcycle industry has not experienced a boom during 1922 as has the automotive industry in general. In fact there has been no noticeable increase in motorcycle sales during the last six months.

Since the price cuts have been announced orders have been coming through rapidly.

This price situation is probably responsible to a large extent for the decreased motorcycle registration noted in the midyear's figures published in AUTOMOTIVE INDUSTRIES of July 27. These figures showed that there were only 154,257 motorcycles registered up to July 1, 1922, as against 162,175 at the same time in 1921. This July 1 figure, moreover, was 53,673 less than the year end total for 1921.

Increased sales, due to new models and lower prices, may bring the 1922 total up to that of 1921 by the end of the year, although it is extremely doubtful if any material gain will be registered.

Motorcycle prices are probably down as low as they can go for some time. Material cuts have been made by every company. One company which has not cut its price recently, went to rock bottom when they cut a year ago. The others apparently did not.

Motorcycle prices are very likely, however, to go considerably lower in the future. This statement has no relation to immediate selling prospects. The general sentiment among manufacturers, however, is that prices should be lowered again if increased quantity production makes lower costs possible. Motorcycle manufacturers realize that price is one of their chief obstacles to sales, and the desire to cut prices to the lowest possible figure is practically universal.

Better Dealers Sought

EVERY motorcycle manufacturer is actively engaged in trying to improve his dealer organization. This great weak spot in motorcycle merchandising is very generally recognized and more or less thorough house-cleanings are in progress.

The manufacturers of lightweight machines are up against an even more difficult dealer problem than are the makers of big machines. The lightweight producer is forced by circumstances to make use largely of dealers who are also handling big machines. Unfortunately, many such dealers are motorcycle "bugs" of the dyed-in-the-wool sort who haven't much use for a small machine useful chiefly for personal transportation purposes.

It is easy enough to say, "Why not get exclusive lightweight dealers?", but there are innumerable practical difficulties in the way of such a move. Still an examination of the field indicates that some method will have to be devised whereby the sale of lightweight machines is in the hands of men who can devote a very large part of their time and enthusiasm to that type of vehicle.

The potential field for the lightweight is greater than for the heavyweight, but the merchandising ability needed to sell it is correspondingly great. The heavyweight machine will continue to be sold as a sporting proposition to the same type of person who has bought it in the past. This type of man is not a good prospect for the lightweight. New sales methods, new points of views, and a new selling atmosphere are necessary in this latter case.

Despite the fact that dealer organizations are being cleaned out and strengthened, there is a strong disposition on the part of motorcycle manufacturers to play fair with their dealers. Automobile makers can well take a leaf from the book of their motorcycle brothers in this respect.

Motorcycle dealers were well protected on the recent price cuts, many of them being notified four and five weeks in advance of the proposed reduction. Factories had planned their production so as to be ready for a slowing down for a few weeks preceding the cuts.

One big factory, for instance, began three weeks ahead of the price cut announcement to write to dealers who sent in orders for machines stating that these orders were being placed for the 1923 models, although that had not been requested, and stating that they would be billed at a lower price which would be announced later. The sales manager of this factory believes that he has made thousands of dollars in good will by this move—and he is probably right.

The remark made by the president of this factory is highly significant at this time. He said: "I would be *afraid* to load up my dealers with old models and then cut the price."

The basis has been laid for progress. A great deal of hard work and constructive thinking is necessary, however, if the tide is to be definitely turned in favor of the industry. The value of these recently instituted movements has not yet begun to take effect. Motorcycle registrations, for example, have steadily fallen off during recent years. Registrations since 1918 have been as follows:

1918	233,665
1919	233,386
1920	234,954
1921	207,930
1922 (6 mo.)	154,257

Production has declined considerably as well. The 1921-1922 production of the entire industry ran somewhere around 32,000. This indicates a rather unhealthy situation for the industry as a whole, for either one of the two largest factories are capable of producing the entire 32,000 if necessary.

REGISTRATION, production, and sales figures paint a discouraging picture of the trend of the motorcycle industry. If no other data were available, nothing but continued retrogression could be predicted for the two-wheeled motor vehicle.

But events are taking place behind the scenes. New policies are being adopted in the factories and in the dealer organizations. A new point of view is evident among manufacturing executives.

This article tells about the motorcycle industry as it is to-day. It is not merely a statistical analysis, but a real human story that takes into account plans and policies as well as past trends.

Since the production year of most of the motorcycle companies runs from August to August, it is a bit difficult to correlate the production with the registration and export figures. Assuming, however, that half of the 32,000 production was accumulated before Jan. 1, 1922, it appears that export business formed about 43 per cent of the total.

Export business shows signs of increase this year. The exports for the last three years are as follows:

1920	36,000
1921	11,000
1922 (6 mo.)	6,495

Domestic consumption has steadily decreased, however, the number of motorcycles actually sold in the United States last year being somewhere in the neighborhood of 20,000.

Rebuilding in Progress

THE most immediate benefits are likely to be felt from the price cuts which have affected all of the heavyweight and middleweight machines, together with one of the smaller jobs.

Foreign business should be stimulated for the same reason. More permanent growth in foreign trade, however, will be made by increased study of foreign markets and a betterment of foreign dealer representation along the same lines as domestic dealer organizations are being improved.

Nearly every motorcycle company is taking a more active interest in building up its foreign business on a sound basis. Machines are being shipped to every part of the world. Particular attention is being given to South America in several instances, manufacturers believing that this area offers a better market for American motorcycles than has been evidenced by past sales.

The motorcycle industry still has before it the task of rebuilding. The tide of affairs is still against it. But a foundation has been laid upon which progress can be built.

Automobiles on Farms Almost Equal Telephones in Number

Automobiles more widely distributed than telephones in 19 states. Thirty per cent of farmers in United States own cars, while 38 per cent have telephones. Three-quarters of Nebraska farms are equipped with automobiles. Mississippi low with 5.5 per cent.

FARMERS in 19 states consider an automobile more essential to their comfort and efficiency than a telephone. In these states, at least, the percentage of farmers who own an automobile is greater than the percentage of those who have telephones.

Automobiles are owned on about 30 per cent of the farms of the country, while telephones have been installed in 38 per cent. In the South Atlantic, Mountain and Pacific States, however, the automobile percentage exceeds the telephone percentage. These facts are brought out by the Fourteenth Agricultural Census of 1920, the results of which have just been published by the Department of Commerce.

A comparison of the use of the automobile and the telephone on the farm is particularly interesting, since these two units have probably done more than any others to make rural life pleasant, comfortable and efficient. The comparatively high percentage of automobiles registered in nearly every state gives new evidence of the utility value of the car in the eyes of the farmer.

The accompanying table shows, for example, that in three out of the nine groups of states included in the census, the automobile is more widely used by farmers than is the telephone. The percentage of the total number of farms having automobiles or telephones in these groups is:

	Automobiles	Telephones
South Atlantic	16.2	14.2
Mountain	37.6	25.6
Pacific	47.2	38.7

The 19 states in which the automobile percentage exceeds the telephone percentage are as follows:

New Jersey — Montana
North Dakota — Idaho

DIVISION AND STATE	Total Number of Farms	AUTOMOBILES: Farms Reporting: Number	AUTOMOBILES: Farms Reporting: Per Cent of All Farms	AUTOMOBILES: Number of Automobiles	FARMS REPORTING TELEPHONES: Number	FARMS REPORTING TELEPHONES: Per Cent of All Farms
United States	6,448,343	1,979,564	30.7	2,146,362	2,498,493	38.7
Geographic Divisions:						
New England	156,564	40,269	25.7	44,754	80,510	51.4
Middle Atlantic	425,147	149,598	35.2	164,939	189,344	44.5
East North Central	1,084,744	513,052	47.3	550,858	678,862	62.6
West North Central	1,096,951	631,631	57.6	693,032	762,442	69.5
South Atlantic	1,158,976	187,236	16.2	200,103	164,213	14.2
East South Central	1,051,600	81,830	7.8	86,141	196,692	18.7
West South Central	996,088	173,609	17.4	184,275	273,315	27.4
Mountain	244,109	91,698	37.6	98,727	62,503	25.6
Pacific	234,164	110,640	47.2	123,533	90,612	38.7
New England:						
Maine	48,227	11,686	24.2	12,569	23,632	49.0
New Hampshire	20,523	4,797	23.4	5,263	10,166	49.5
Vermont	29,075	7,611	26.2	8,172	16,752	57.6
Massachusetts	32,001	8,181	25.6	9,309	16,537	51.7
Rhode Island	4,083	1,198	29.3	1,395	1,685	41.3
Connecticut	22,655	6,796	30.0	8,046	11,738	51.8
Middle Atlantic:						
New York	193,195	68,003	35.2	74,753	91,973	47.6
New Jersey	29,702	11,731	39.5	13,695	9,484	31.9
Pennsylvania	202,250	69,865	34.5	76,491	87,887	43.5
East North Central:						
Ohio	256,695	119,511	46.6	128,384	159,478	62.1
Indiana	205,126	95,238	46.4	102,122	136,140	66.4
Illinois	237,181	125,586	52.9	139,090	173,572	73.2
Michigan	196,447	78,919	40.2	82,437	97,874	49.8
Wisconsin	189,295	93,798	49.6	98,825	111,798	59.1
West North Central:						
Minnesota	178,478	101,847	57.1	107,824	110,568	62.0
Iowa	213,439	156,081	73.1	177,558	183,852	86.1
Missouri	263,004	81,392	30.9	86,229	163,543	62.2
North Dakota	77,090	44,010	56.6	47,711	36,349	46.8
South Dakota	74,637	51,780	69.4	58,202	44,327	59.4
Nebraska	124,417	94,004	75.6	104,453	95,050	76.4
Kansas	165,286	102,517	62.0	111,055	128,753	77.9
South Atlantic:						
Delaware	10,140	3,693	36.4	4,014	2,763	27.2
Maryland	47,908	16,049	33.5	17,702	11,755	24.5
District of Columbia	204	50	24.5	58	67	32.8
Virginia	186,242	28,557	15.3	30,959	33,482	18.0
West Virginia	87,289	10,405	11.9	11,127	37,789	43.3
North Carolina	269,763	41,839	15.5	44,207	33,029	12.2
South Carolina	192,693	30,709	15.9	32,812	10,943	5.7
Georgia	310,732	47,173	15.2	49,841	29,861	9.6
Florida	54,005	8,761	16.2	9,383	4,524	8.4
East South Central:						
Kentucky	270,626	28,532	10.5	30,146	73,145	27.0
Tennessee	252,774	22,446	8.9	23,550	56,880	22.5
Alabama	256,059	15,906	6.2	16,592	38,407	15.0
Mississippi	272,101	14,946	5.5	15,853	28,260	10.4
West South Central:						
Arkansas	232,604	15,401	6.6	16,408	52,869	22.7
Louisiana	135,463	9,494	7.0	10,512	8,599	6.3
Oklahoma	191,988	49,017	25.5	52,063	71,613	37.3
Texas	436,033	99,697	22.9	105,292	140,234	32.2
Mountain:						
Montana	57,677	20,749	36.0	22,072	9,781	17.0
Idaho	42,106	16,651	39.5	17,646	13,837	32.9
Wyoming	15,748	6,180	39.2	6,705	4,449	28.3
Colorado	59,934	28,356	47.3	30,830	22,022	36.7
New Mexico	29,844	5,546	18.6	6,018	3,359	11.3
Arizona	9,975	4,534	45.5	5,082	1,638	16.4
Utah	25,662	8,246	32.1	8,657	6,295	24.5
Nevada	3,163	1,436	45.4	1,717	1,122	35.5
Pacific:						
Washington	66,288	27,626	41.7	29,792	27,952	42.2
Oregon	50,206	20,561	41.0	22,223	25,351	50.5
California	117,670	62,453	53.1	71,518	37,309	31.7

South Dakota	Wyoming
Delaware	Colorado
Maryland	New Mexico
North Carolina	Arizona
South Carolina	Utah
Georgia	Nevada
Florida	California
Louisiana	

A larger percentage of farmers own automobiles in Nebraska than in any other state. There, 75.6 per cent of the farmers have cars. Mississippi, with only 5.5 per cent of the farmers owning automobiles, has the lowest percentage.

The West North Central States comprise the group in which car distribution is highest on the farms, the percentage for these states being 57.6.

The East South Central group, including Kentucky, Tennessee, Alabama and Mississippi, is the lowest with 7.8 per cent.

Continuous Milling of Small Parts

A NEW milling machine for milling small automotive and other parts in quantity has been brought out by the Newton Machine Tool Works, Inc. It is furnished with a tub for coolant, but this is left out in the illustration in order to better show the controlling dogs used on the intermittent motion.

The table has two separate feed motions, the first being continuous for straight, continuous milling, and the other an intermittent feed and rapid traverse. The rapid traverse is 10 2 3 times faster than the feed for limited quantities or where the surface to be machined is of less area than the face of the casting toward the cutting tools.

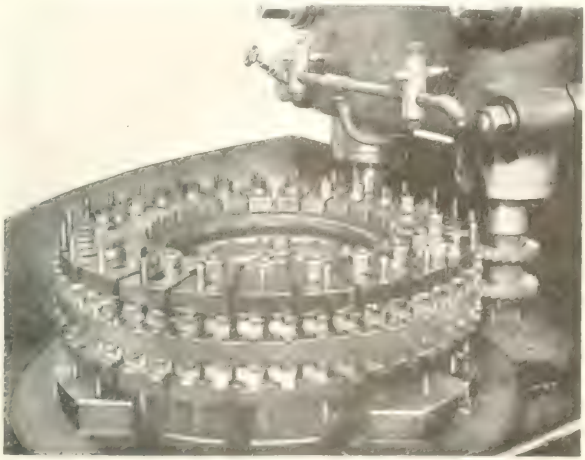
The table has a solid top, arranged for bolting and doweling the jigs; it has two bearings, one being an annular bearing, which reduces the overhang of the table to $\frac{5}{8}$ in. and is claimed to make twisting and buckling impossible. The table is rotated by fully inclosed helical gearing, the gearing, together with the table bearing, running in oil. The pinion operating the table and helical gear is rotated by a large-diameter worm and wheel, and backlash is claimed to be practically absent.

A lever is provided for disengaging the feed motion, and there is also a safety clutch of the overrunning type to prevent breakage in case of overloading or jamming. The table feeds may be varied by means of pick-off change gears. The table saddle is made adjustable on the base, so that the table can be properly positioned with relation to the cutters.

The spindles are provided with taper ends, with face key, Morse taper hole and draw-in bolt; they are supported between bearings and driven by hardened steel gears that are fully inclosed and run in oil. The sleeve in which the spindle is confined provides an individual end adjustment for setting cutters of 2 in., with provision for clamping after the sleeve is located.

The motor for the electric drive is located on top of the machine, and the drive is through the pick-off change gears. The machine has been used for machining such automobile parts as bearing caps, valve lifters, connecting-rod cap bolts, motor end shields and gear shifter yokes. On the gear shifting yokes the production is 216 per hour, both a roughing and finishing cut being taken.





(Left) Newton continuous milling machine. (Above) Set up to rough cut and finish gear shifter yoke forgings at rate of 216 per hour

States Plan to Bar Unsafe Trucks From Highways

Ask aid of manufacturers in formulating ordinances to exclude trucks with inadequate brakes, weak axles and faulty steering gears. Committees of S. A. E. and N. A. C. C. now studying the subject. Something along lines of building codes may be formulated.

AS traffic congestion increases accidents usually become more numerous. It is natural that the various State governments should take action to prevent such accidents as are preventable by insisting upon the use of safe equipment. Both cars and trucks can reasonably be expected to have adequate brakes, safe steering gears and axles which are not subject to failure under conditions which may result in blocking the highways, if not in more serious consequences. Some States already have statutes which give the police or administrative authorities the power to refuse to issue licenses for vehicles which are unsafe, and thus prevent their use on the highways; but such provisions are seldom enforced for the reason that the line of demarkation between a safe and an unsafe vehicle is not well defined.

For this reason the Conference of Motor Vehicle Administrators, an organization of various State authorities charged with enforcing State laws relating to automotive vehicles, has requested the National Automobile Chamber of Commerce to formulate some sort of code, test or formula which will become the basis for determining when a truck is unsafe and thus serve as a guide for ruling against the use of unsafe vehicles. State authorities are desirous of co-operating with reputable manufacturers in the matter, but will no doubt take it into their own hands if they fail to secure the desired assistance, in which case the industry is likely to suffer much inconvenience, if it does not actually lose much business which would otherwise come to it.

Inasmuch as the matter involves engineering considerations in its solution, the N. A. C. C. has requested the help of the Society of Automotive Engineers, which called a meeting in Detroit recently to discuss the subject. This meeting was attended by a number of prominent truck engineers and executives, including D. C. Fenner of Mack Trucks, Inc., who is chairman of the N. A. C. C. Truck Committee; F. A. Whitten of the General Motors Truck Co., who, as chairman of the Truck Division of the S.A.E. Standards Committee acted as chairman of the meeting; A. K. Brumbaugh of the Autocar Co.; A. J. Scaife of the White Co., and H. E. Derr of the International Harvester Co.

Fenner stated that A. L. McMurtry, consulting engineer of the Connecticut State Department of Motor Vehicles, who is especially active in matters of this character, is particularly desirous of finding a means of keeping off the highways trucks assembled from odd parts or scrap, or homemade trucks converted from passenger cars and often equipped with inadequate brakes and steering gears much too weak for the loads imposed. In one case a truck of this character was found to be operating with one set of brake shoes missing. It was found to have been taken from a junk yard after brake parts had been removed, and therefore had no adequate means for effecting a quick stop. The Connecticut law makes it possible to refuse a license to such a vehicle, but the courts might not accept the judgment of a single engineer if the matter was brought to them for decision, consequently the desire to have a definite rule backed by the experience of engineers in the industry.

STATE and other authorities are bent upon decreasing road accidents. One step in this campaign is to rule off the road vehicles, especially trucks, with inadequate brakes, unsafe steering gears and weak axles.

They have asked automotive manufacturers and engineers to assist them by devising rules which will exclude unsafe trucks, especially improvised trucks assembled from junk parts or made over passenger cars used as trucks with excess loads which the brakes are not designed to retard.

Some States already have enacted legislation giving the authority to enforce regulations of this character and may be more or less arbitrary in formulating them unless the industry embraces the opportunity for co-operation which is now offered.

Brumbaugh expressed the view that the States have come to the Society with a quite reasonable request for some sort of "yardstick" by which the safety of a vehicle can be measured. A rating formula has been suggested, but one which is fair to all concerned and is still adequate to exclude unsafe vehicles is extremely difficult to devise. He therefore suggested that a code, which would be similar in a general way to building codes now very generally used, be formulated, this to include some kind of retardation test for determining the adequacy of brakes.

In this connection it was stated that building codes sometimes work unnecessary hardships, although they are applied in restricted localities, while such a code governing the safety essentials of trucks should be of such a nature as to lend itself to general application throughout the country. It was pointed out, however, that a lack of uni-

formity in statutes governing the use of trucks had already caused much difficulty for manufacturers, and that it is consequently better to assist in devising a logical code or other means of regulation than to leave the matter to the chance legislation of numerous local governments. Recommendations of the Society in this connection would presumably find a very general acceptance.

Whitten, in discussing the proposal that formulae be adopted, called attention to the complications which arise from overloading and high speed on roads in poor condition. These make it difficult to arrive at suitable factors of safety. For this reason, if formulæ are to be adopted to indicate allowable stresses in axles and steering gear, for example, it may be necessary to consider static loads only, and in that case there might be question as to the value of the formulæ in relation to practical service conditions.

One suggestion made was to the effect that manufacturers might be required to register capacities, strength of materials employed and the maximum stresses to which the parts in question are submitted, but it is evident that it would be difficult to check information of this character, especially in view of the fact that the strength of the materials used and the effect of heat treatment upon the strength cause considerable variation.

In connection with the subject of brakes, it was pointed out by Scaife that, with the new 20-in. base tires which are being put out now, especially for bus service, it is a difficult matter to apply a brake drum of adequate dimensions without increasing the tread of the vehicle and the distance from the spring seat to the central plane of the tire. There was some criticism of the tire manufacturers for deciding upon this course without first consulting the truck manufacturers as to the effect it would have upon the design of chassis upon which such tires are likely to be employed.

It was finally agreed that a sub-committee should be appointed to consider the whole matter and report back. The committee appointed consists of Messrs. Brumbaugh, chairman; Scaife and Fenner.

Vim Truck Announces New Light Models

THE Vim Motor Truck Co. is placing on the market a new ½-¾-ton truck. This will be fitted with two types of body, the open express type being designated Model F and the closed panel type, Model D.

The chassis will have 108-in. wheelbase and be powered by a 4 x 5-in. block-cast engine with three-bearing crankshaft. Main and crankpin bearings are 2 in. in diameter. Inlet and exhaust manifolds are integrally cast to assist in fuel vaporizing.

The frame has a maximum depth of 5 in., is 160 in. long overall and has five cross members. It is hot-riveted and reinforced by gussets. Dash is of 11-gage steel. The rear axle is of the semi-floating type fitted with tapered roller bearings and bevel gears with 4.7 to 1 ratio. Brakes are 16 in. in diameter and the road clearance is 9½ in. Front axle is a conventional I-beam type and is fitted with taper roller bearings.

A multiple disk clutch with five driving and five driven plates, and a three-speed gearset are included in the unit powerplant. Drive to rear axle is through two metal universal joints. Steering gear is a worm and worm wheel type with 18-in. steering wheel. All springs are semi-elliptic type made from alloy steel, those in the rear being arranged to take both drive and torque. Front springs measure 2 x 38 in. and the rear pair, fitted with rebound plates, measure 2¼ x 50 in.

Electrical equipment includes a combined generator and ignition unit, a starter with Bendix drive, six-volt storage battery, head and tail lamps and horn.

Price of chassis is $995.

Crawford Producing Dagmar Sport Model

THE Crawford Automobile Co. is now in production on a sport model to be sold under the name Dagmar. This is mounted on a 135-in. wheelbase chassis and is characterized chiefly by a special sport type of body of the custom built type fitted with Victoria top and seating four passengers. The car has a high, narrow radiator; two spare wheels mounted one each side of the hood, and fenders with straight lines and sharp angles, giving a distinctive appearance.

The component parts of the chassis include a six-cylinder 3⅝ x 5¼ in. Continental engine with chain drive, Zenith carbureter, Westinghouse starter, American Bosch light-ing generator and magneto ignition. The gearset is a four-speed Brown-Lipe unit driving direct on third and over geared on fourth. Front and rear axles are of Timken manufacture. The rear springs are 53 in. long and the front springs 36 in. Spicer universal joints and Brown-Lipe multiple disk clutch are employed.

The wheels are artillery type wood, but are covered with dummy metal plates giving the appearance of disk wheels.

The engine is mounted on a three point support with the rear supporting arms fastened to the frame by bolts screwed up against a helical spring.

Equipment includes six 33 x 5 in. cord tires, 35 gal. gasoline tank mounted at the rear of the chassis, Stewart-Warner vacuum tank, Willard battery, one-piece windshield, Hartford shock absorbers, Gas-O-Meter, clock, drum type head lamps, Moto-Meter and cigar lighter. Body colors are optional, while metal trimming is all of brass. Price of the car is $3,500, f.o.b. Hagerstown.

The body is provided with a narrow flat deck for a trunk at the rear. Vertical body cleats of brass protect the rear body panel.

IN a lecture before the Optical Society (Great Britain) on the problem of glare from motor headlights, J. W. T. Walsh, of the National Physical Laboratory, said that the number of devices to give the lamp beam the required distribution to eliminate glare was very great.

The difficulty lay in the fact that, while a safe driving light required a beam of at least 3000 candlepower, it was necessary, in order to avoid glare to drivers of oncoming traffic, to reduce this to about 500 candlepower.

There appeared to be no really satisfactory method of escape from this position of mutually antagonistic requirements. In the United States the problem had been dealt with by confining the main part of the beam to the region below the horizontal.

Low-priced American Cars Can Be Sold to Denmark

Most inland village is 40 miles from sea, making Denmark essentially a motor transport country. Domestic industry unable to compete with imports from larger motor-producing countries. Taxes make extensive use of high priced cars impossible. Copenhagen distributing point for all Baltic and Scandinavian countries. American service depots needed.

By E. C. Petrie

DENMARK, owing to its small size and its flatness, combined with the fact that its most inland village is not 40 miles from the sea, must be preeminently a motor transport country. Moreover, the nature of its products is such that they are better suited to truck than to rail haulage.

Denmark's motor development is retarded by the fact that the majority of its railroad mileage is State owned. Nevertheless, the competition of the truck is seriously affecting railroad receipts. The State railroad deficit over the period April-December, 1921, amounted to Kr. 32,000,000, and this exceeds by Kr. 7,000,000 the deficit for the corresponding period of 1920. (The present exchange rate on the kroner is about $0.22.)

Despite the writing on the wall, Danish railroad advocates are dying hard. True, projected extensions have been shelved, but a railroad bridge is to be built over the Little Belt that will cost Kr. 54,000,000.

How motor transport in Denmark is growing is shown by the following registration figures:

Year	Passenger Cars	Trucks	Trailers	Motorcycles
1917	6,823	971	..	8,793
Sept., 1920	13,870	3,787	..	12,182
Jan., 1922	17,581	4,679	10	14,241

A feature of last year's trading was the large falling off of imports from most countries. Germany was a notable exception, and it is estimated that about 600 vehicles entered Denmark from that country in 1921.

American exports to Denmark since the war are compared in the table below with those of 1914:

Year	Passenger Cars	Trucks	Tractors	Parts	Tires
1914	263	..	..	$8,664	$11,414
1919	2,519	643	899	472,376	1,254,324
1920	1,099	296	192	3,061,296	959,241
1021	119	18	166	1,842,018	279,370

The considerable fall in the export from the United States of completed vehicles has been counterbalanced by the production of the Ford assembly plant at Copenhagen. Indeed, the Ford output retained in the country is regarded officially as imports, and this accounts for the otherwise unaccountable total of 7283 vehicles shown as entering the country last year. Imports in 1919 totaled 6194; in 1920 they were 3770.

The Ford activities explain the large quantity of parts that have been sent to Denmark during the last two years. From April, 1920, to the end of the year the Ford plant assembled 3800 vehicles, and its present production is 30 a day. Many of these vehicles are re-exported to other Scandinavian and Baltic countries.

British exports to Denmark during recent years have been:

Year	Complete Vehicles	Chassis	Motorcycles	Parts	Tires
1914	125	..	..	....	£15,520
1919	77	43	666	£25,235	109,941
1920	148	23	945	80,836	206,735
1921	49	2	Not available	21,964	54,002

Apart from price, British sales have suffered from the inability to give prompt delivery. France sent cars to the value of Frs. 95,500 in 1914; Frs. 1,401,000 in 1919; Frs. 6,586,200 in 1920; and Frs. 2,389,500 last year. Italy sent one car in 1914; 143 in 1920; and 10 in the first half of 1921.

German dumping, together with the establishment of the Ford project, has resulted in the demoralization of the Danish motor industry. Some home manufacturers have been out of business for several months, while others have closed down entirely. It is anticipated, however, that the high class of the "Scania Vabis" car will bring it once more to the market when normal times return.

During the war three firms merged under the name of the United Automobile Factories. This combine produces 200 trucks — fitted with a French engine — annually. Known to the trade as "Triangles," these trucks are suited to local requirements, being substantial in build and economical in upkeep. In price, however, they compare unfavorably with most imported vehicles.

The Danish motor industry is unlikely to be able to compete in the future with the industries of the larger motor-producing countries. This is due, not only to the inherent weakness of many of the Danish industries (i.e., the necessity for the importation of raw materials and fuel, high wage bills, etc.), but to the fact that the market is too small to render economic the production of the large variety of types asked for.

The increase in Danish motor traffic has forced the Government to institute taxation and regulations for the maintenance and preservation of roads.

Cars are now taxed between 12 and 50 kroner per 100

kilog. of the weight of the car, with a minimum tax of Kr. 50.

Trucks are taxed at a flat rate of Kr. 20 per 100 kilog. weight of a pneumatic-tired vehicle, and Kr. 30 per 100 kilog. weight if the truck runs on solids. Thus a 3-ton truck with solid tires pays an annual tax of Kr. 1,050, while a similar vehicle fitted with pneumatics only pays Kr. 700 a year.

No truck with solids may exceed a speed of 18 km. per hour, but those with pneumatics are allowed a maximum speed of 24 km. per hour.

Trailer Taxes

TRAILERS are also taxed. Those with pneumatics must pay Kr. 10 per 100 kilog. of carrying capacity; those with solids Kr. 15 per 100 kilog. of carrying capacity.

The decreased wealth of the great majority of the Danish public renders it unlikely that in the near future there will be a market for the more expensive cars. Indeed, many owners of such cars have been obliged to put them up, partly to escape taxation, and partly from inability to find suitable buyers under present conditions. The high price of fuel also renders it improbable that there will be any material increase in the use of such vehicles in the future.

Definite information is not available as to comparative values, but there is reason to believe that in the imports during 1921 small, cheap cars predominated. The requirements of the country are mainly in the direction of a light, good class car, and, in view of the climate, the hood — in the case of an open car—should be well constructed and capable of resisting both heavy rain and wind.

Last October the number of private cars actually in operation were 15,635; of taxicabs and omnibuses, 1946; of trucks, 4679; and of motorcycles, 14,241. These figures show an increase of 4041 private cars, 892 trucks and 2059 motorcycles, while there was a decrease of 330 taxicabs and omnibuses compared with the figures in September, 1920.

Of the private cars, taxis, and omnibuses, 10,701 were in use in the towns (about 4500 in Copenhagen) and 6880 in the country districts. Of trucks, 3697 were in the towns (about 2350 in Copenhagen) and 982 in the country. The use of motorcycles is only slightly larger in the towns than in the rural districts.

The recent increase in the number of passenger cars is mainly due to their increased use in the country districts and provincial towns. Denmark has 8320 passenger cars of from 9 to 12 hp., as compared with 5047 in September, 1920; by far the larger number — 6798 — being of from 10-12 hp. Of the taxicabs, 1161 are between 8-12 hp., and of the omnibuses 638 are of from 6-12 hp.

The increase in the number of trucks is most noticeable over interurban routes, where, despite taxation, they offer successful competition with the railroads. The latter are considering the reduction of freight rates, but, despite this, it is considered that the Danish farmer appreciates too greatly the advantages of motor haulage to be reconverted to railroad transportation. Official opinion is divided as to whether the Danish truck market has reached saturation point. In some quarters it is claimed that there is still a good market in the country, while some authorities consider that the number of trucks at present in Denmark is sufficient for requirements.

Sixty-seven per cent. of the trucks in Copenhagen, 57 per cent in the provincial towns, and 64 per cent in the rural districts, weigh less than 2 metric tons. Of the 1498 trucks of this weight in the capital, 752 had a horsepower of from 10-12, while the same horsepower was found in the case of 454 out of 785 similar trucks in the provincial towns, and 390 out of the 626 less than 2-ton trucks in the country districts. In the whole country there are 819 trucks of between 2 and 3 tons, namely, 330 in the capital, 257 in the other towns, and 132 in the country. The majority of these trucks are of 12-20 hp. Of trucks over 4 tons in weight there are 164 in Copenhagen, 81 in the other towns, and 78 in the country. Most of these trucks are over 20 hp.

Quite apart from the importance of Denmark as a market lies the fact that Copenhagen is the great distributing center for all Scandinavian and Baltic countries. The establishment here of a service depot fitted out with complete lines of spare parts will overcome the chief obstacle to good sales—competition with adjacent motor exporting countries.

Firms so organized will be ready, not only to supply the needs of Denmark itself, but also to send to Norway, Sweden, Finland, Russia, Latvia, Lithuania, Esthonia, and Poland when affairs in Northern Europe become stabilized. The chief danger lies in German competition, and it is Teutonic activity in Denmark that is responsible for the constant fluctuation in automotive prices.

DENMARK is of interest to American car and truck exporters for two reasons:

1. **It offers an excellent market for low-priced cars, as is evidenced by the success of the Ford assembly plant in that country.**
2. **Its capital, Copenhagen, is the great distributing center for all Scandinavian and Baltic countries. American service depots in this city would materially help American manufacturers to overcome the chief sales obstacle in those countries—competition with European motor-producing countries which are nearer at hand and better able to render service.**

This article gives a brief, authoritative summary of automotive conditions in Denmark. It has been written especially for American manufacturers by a man who is in close touch with the situation in Denmark.

Commercial Type Oil Reclaimer

THE Bureau of Standards is carrying out an investigation of the possibilities of increasing the quantity of used lubricating oil which may be reclaimed. Experiments with a commercial type of oil reclaimer, which involved increasing the temperature at which the oil was allowed to stand from 180 to 200 deg. Fahr., increased the amount of oil recovered from 80 to 89 per cent.

The data obtained show that the reclaimed oil is similar to new oil except with regard to sediment. Satisfactory means for the removal of this sediment, which is probably carbon, requires further investigation. In this connection it should be borne in mind that this increase in oil recovered may represent an increase in quantity at the expense of quality.

More Specific Data Needed on Truck Market Possibilities

Truck uses divided into delivery and commercial freight classifications. Elements of each must be analyzed in greater detail. Results of study will affect truck design and sales.

By Harry Tipper

TRUCK marketing requires an entirely different approach to market analysis and distribution problems than does passenger car selling. The general fundamentals of all marketing problems are the same, but the factors vary in their importance. Methods of acquiring information and of classifying that information differ greatly, even in problems allied to one another in certan particulars.

The volume of business dependent upon the passenger car production is still the major portion of the business in the automotive production, and is likely to remain so for some time. Necessarily, the adoption of the automotive vehicles for business purposes has been worked out somewhat more slowly than the use of these vehicles for social requirements.

Despite the very large number of commercial vehicles being used in the United States today, this method of delivery and transportation of commercial freight has not been analyzed to the same degree as passenger car and bus business.

This is due in part to the fact that any new instrument for the use of business discovers its own uses in the development of the user's problem. Sold for one purpose, it is finally used for many other purposes. It is not uncommon, for instance, to find farm tractors of the proper type, used around factories which cover a considerable amount of space and where there is some outside haulage to be done. Reports from a number of factories indicate such use. The business man in search of means to improve his position in comparison with competition, seizes upon a new product, and conceives the possibility of applying it to problems not specifically visualized to the manufacturer of the products himself.

The lack of analysis is due in part also to the difficulty of acquiring sufficiently accurate statistics regarding the use of trucks so that curves of development and statistics of use will be sufficiently specialized to be of any purpose. This makes it necessary for the truck manufacturer to speculate to a very considerable degree as to the relative importance of the various markets for trucks and for commercial vehicles of all types. He has very definite information on the relative sale of the different sizes produced in his own plant and he has more or less information as to the larger industries by which these commercial vehicles are being used. The relation of these different sizes and types of commercial vehicles to one another and the general percentage of the market which may develop in connection with any one industrial problem, are matters which cannot be determined thoroughly as yet, although the manufacturers' records may be fairly complete in connection with his own progress in the course of his development.

THE use of trucks has not yet been so carefully studied as the use of passenger cars. Lack of analysis is due partly to the difficulty of acquiring sufficient statistical data that are accurate enough for the purpose.

* * *

Consequently, the truck manufacturer has to speculate to a very considerable degree when considering sales probabilities and production programs. This article discusses the problems connected with truck selling from the manufacturers' standpoint.

The uses to which commercial vehicles are put in connection with industry at this particular time, divide themselves into two very different groups of problems which must be viewed separately in the analysis of the market. These problems are

(a) Delivery Problems,
(b) Commercial Freight Problems.

The delivery problems under (a) must be re-classified in order to subdivide them into more specific groups and examine the conditions of operation in these various groups. These problems cover:

1. Delivery from stock or store to user.
2. Delivery from stock to railroad.
3. Delivery from stock to stock.
4. Delivery of raw materials to fixed lines of transportation.
5. Delivery of bulk goods from fixed lines of transportation.

The problem for which the commercial vehicle must be considered in connection with the store, is a problem of delivery from the store to the user of package goods where the dumps are small, close together, and frequent, and where the routes are laid out on a definite schedule of requirement.

The second problem is a problem of hauling, with one dump at the end of the journey for the purpose of transporting the freight from the warehouse to the railroad or other fixed transportation lines, where the lines themselves cannot be brought to the warehouse direct.

The third problem takes in delivery problems from wholesale to retail or from central storage to sub-storage. It may require a number of dumps and it may involve

only one dump at the end of the journey. It will always demand more or less regular schedule of operation, through certain transporting lanes and routes.

Fourth.—The problems under this head involve the delivery of products from the farm, the mine, or the logging area to the railroad or to the local storage or fabricating plant. They involve more severe conditions of haulage, and longer average hauls, usually for one dump. In some cases they involve a regular schedule of operation, and in other cases the operation must be intermittent to fit in the requirements of the case.

Fifth.—The problems under this group take in the delivery of bulk goods from fixed lines of transportation or local stock at the point of the fixed line to the user of the products. The local delivery of coal and of oil would come under this head. The delivery of sand, gravel, cement and other products to the contractor and builder would come under this same general grouping.

The market for the commercial vehicle in each of these cases is governed primarily by its economy and flexibility and, therefore, its operating efficiency in comparison with any other available methods of doing the same work. In the case of delivery from a central point to a number of individual points in the locality, the comparison is in connection with the older methods of using horse-drawn vehicles to accomplish the same purpose. In fact, in all the problems of delivery to and from central points of stock or fixed lines of transportation, the only comparative means, previously used, have been those involving the employment of horses and wagons for the purpose. The comparative usefulness of the commercial vehicle depends upon the cost per ton or per package of the goods delivered; the flexibility of the operation and the investment required, the overhead demands and the amount of idle time and the cost of such idleness.

THE second general grouping of problems under the head of Commercial Freight problems differ entirely from those which are solely delivery problems of one kind and another. These commercial freight problems take in inter-city or inter-section express haulage and local express haulage. These applications of the commercial vehicle do not merely replace the horse and wagon. They replace the fixed lines of transportation themselves for the movement of freight within restricted areas where there is a considerable volume of movement required.

Under these circumstances, therefore, the comparison is not only with methods of operation using the horse and wagon, but with the possibilities of railroad or trolley car haulage under conditions obtaining in connection with those methods of transportation. The economy, and particularly the flexibility, of the commercial vehicle in use under these conditions is of the utmost importance in examining the posibilities of this market. Except for a small number of manufacturers in a given city area, there is no other method of delivering the product to the doors of a factory or a warehouse several miles away without the intervention, either of the horse and wagon at some point in the journey, or the switching arrangements of one line of railroad to another, both of which add very materially to the cost and to the delay.

There are two elements entering into the short haul by railroad or other fixed line of transportation. The first element is the actual rate per unit charged for the movement of the product, and the second element is the time consumed in that movement. During the war, we had many experiences as to the cost and time consumed in the movement of products. It was not unusual in the movement of goods from New England to New York to discover that the interest on the value of a product in transit, during the time of transit, amounted to as much as the freight paid for the shipment of the goods. Both elements of rate and time enter into the total cost and are required in the comparison.

Even a cursory examination of the elements of these problems would indicate the impossibility of solving these business requirements without a very considerable variation in the design, capacity and development of the vehicles best suited to the work.

THIS has been shown to some extent in the growth of the commercial vehicle business. The very large use of light delivery wagons, speed wagons, and other vehicles of limited capacity capable of considerable speed, suggests the necessity for low horse-power requirement and high average speed where the delivery problem requires a number of dumps at frequent intervals over a regular route. The way in which some industries have developed the use of heavy trucks of 3 and 5-ton capacity, indicates the necessity for vehicles of great strength and capacity in dealing with heavy or bulk goods either for delivery in dumps or for transfer from one point to another.

Obviously, these various markets for the use of trucks are not equally important in their possibilities to the truck manufacturers. They vary in size, in the importance of the transportation problem, and in the number of conditions for which the commercial vehicle is suitable in connection with their work. Little information is available as to the relative importance of various lines of industry in the use of trucks. Some time ago, AUTOMOTIVE INDUSTRIES attempted a survey along these lines.

A great deal of investigation was conducted with a wide variety of companies and sources of information in the hope of developing something from which accurate estimates could be made. The results were not encouraging. Apparently, there was little or no reliable information as to the number of trucks in use in the different lines of industry, the sizes most frequently used, or the character of the work for which they were employed. This does not mean that the information was entirely absent, but it was so fragmentary that no general estimates could be made from it and, consequently, no general comparisons of these various lines of marketing could be developed in that way.

In the absence of such statistics as would enable competitive groups to be drawn, the market must be examined from the consideration of the necessities and the theoretical probabilities relating to the use of the commercial vehicle.

7-Passenger Westcott Has Permanent Top

A NEW seven passenger car has been brought out by the Westcott Motor Car Co. It is among the first phaetons with a permanent type of top as standard equipment. The top is of California type with a rigid frame. It is braced with angle iron and the rear quarters are steel sheathed. The car is known as the larger six and has 125-in. wheelbase. The equipment of the car includes storm curtains, and a cowl ventilator controlled by a rod on the instrument board. For $100 additional, a rigid frame plate glass window enclosure is provided which is designed to give practically a closed car appearance and weather protection. One of the features of the new model is seventeen-coat hand rubbed semi-baked finish.

The units employed in the Westcott Larger Six chassis include the Continental type 12-X 3½ x 5¼ in. six-cylinder engine. Timken axles, Fedders radiator, Delco ignition and other electrical equipment, Willard 120 amp. hr. battery, Rayfield carbureter, Gemmer steering gear and pressure gun chassis lubrication. The price of the new car is $1990.

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Where Does Bus Selling Begin?

SOMETIMES, when common sense indicates that there is a real economic need for a product, temporary obstacles prevent that economic need from becoming an immediately active market.

This is the case with motor buses to some extent at the present time. Buses are being sold, of course, but the big potential bus market, which undoubtedly lies ahead has not yet opened up. The full economic development of buses is being impeded, seriously in some cases, by the selfish interests of capital already invested in other forms of transportation.

This appears to be the situation in California. Similar instances of less aggravated character are to be found elsewhere in the country.

It begins to look as though more than ordinary sales work will be necessary if buses are to be sold as widely as their economic use justifies. Automotive manufacturers will play a constructive part in the support of any movement, national or local, designed to give the American public the best form of transportation at the lowest cost.

Lessons of the Roma Disaster

THE final official report on the Roma disaster leaves the cause of the catastrophe uncertain. American officers who examined the evidence reached the conclusion that flattening of the upper surface of the nose caused the ship to take a downward course. The resultant strains in the stern stabilizers are believed to have caused the keel to buckle, putting the rudders out of commission and rendering the crew helpless to guide the ship. Italian experts take the view that certain of the rudders were overstressed, causing breakage of the rudder control cable. This allowed the rudder to assume a position which guided the ship downward.

The report makes it clear that all the facts necessary to establish with certainty the cause of the disaster can never be known owing to the death of most of the members of the crew and the fire which destroyed such physical evidence as might otherwise have remained.

It is concluded that future ships of this type should be inflated only with noncombustible gas, preferably helium, and should be so arranged that the commander can drop all or any part of the ballast instantly. It should be possible also to drop the fuel tanks and to shut off all engines by means of a master switch. Two engines were running when the ship struck the earth and this had, of course, tended to speed the ship downward.

To what extent the crash of the Roma may have been due to lack of experience upon the part of those who were called upon to navigate it is a question. It is certain, however, that every effort should be made to develop an experienced personnel before the Army again undertakes experiments with so large a dirigible. While developments in so new a field are inevitably fraught with certain unusual hazards, these should be minimized through the most careful training possible, starting with ships of small size until sufficient training is secured through experience to successfully handle larger ones. This will not only help to avoid an unnecessary loss of life but will render less likely disasters such as those which have already done irreparable damage to the progress of aeronautics and greatly handicapped its commercial development.

Presidents and Car Sales

ARGENTINA has elected a new president. He takes office this fall. In a letter to AUTOMOTIVE INDUSTRIES, M. T. Meadows, Secretary of the American Chamber of Commerce in the Argentine, speaks very favorably of the new executive. Meadows believes that under his clear-headed leadership Argentina will make marked economic progress during the next few years.

This intimation carries considerable interest to American car manufacturers, since the Argentine is one of the largest motor using countries in the world

outside of those which produce cars and trucks within their own borders. General economic conditions have improved considerably during recent months. The new administration is likely to favor a constructive road building program and thus give additional encouragement to the use of motor vehicles. There is every indication that the new government will be successful in its attempt to raise a $165,000,000 loan with which to refund short-term loans made in New York last year.

Because of product and proximity, American car makers should gain an increasing place in the Argentine market. This can be done by effective merchandising applied steadily during the next few years.

Powerful Ideas

AUTOMOBILES have been widely sold because they fill a transportation need. Many other human desires have influenced automobile purchases, of course, but the real reason behind the huge automotive development of the past ten years is utility value. Automobile manufacturers have made money from automobile sales, but the need for the automobile as a transportation unit has been the big driving force rather than sales effort as such.

Future development lies along the same lines. Automotive growth will be in direct proportion to automotive service. The progress of an individual manufacturer is determined by the same factors.

Ned Jordan said the other day that "The most powerful thing in the world is an idea. . . . . If the idea is intended to serve only yourself and you count upon its paying dividends only to you as an individual, it will not travel very far.

"If, however, that idea is designed to serve self by serving others, it will never stop traveling so long as you adhere to that fundamental."

This practical philosophy is directly applicable to car and truck selling, advertising and production methods.

Visualizing Good Service

A NUMBER of car manufacturers have used motion pictures of their manufacturing processes in promotion work. These films have been interesting and successful.

The average dealer and user, however, is much closer to the problems of service than to those of manufacture. That is a good argument, in one way, for the manufacturing films. On the other hand, there is undoubtedly a place for a "Good Service" film to supplement the manufacturing films already out.

This "Service" film might show what a properly designed and equipped service station should be, how proper service is rendered and how the particular make of car is kept in good condition for years after the original sale. The picture might be so designed as to serve the purpose both of dealer education and of arousing prospective buyer interest.

It is true that a "Good Service" picture might make certain owners more than ever dissatisfied with the service that is commonly their lot, yet the dealer to whose customers such a film was shown would undoubtedly be spurred to greater service efforts, both from the standpoint of courtesy and efficiency.

Utility Passenger Cars

"THE sales of an individual salesman can be increased 40 per cent by the use of a motor car," says the sales manager of a large mercantile company. The percentage, of course, depends upon the salesman, the type of product he is selling, and the character of the territory in which he operates. The saving ability of the car is there, however, in almost every case.

How many dealer salesmen use material of this kind in digging up prospects or in selling passenger cars? It isn't hard to sell a car to anybody if you can prove to him that he will actually save money by buying. To do this requires more than merely telling him.

The ability to understand his particular selling problem, product, and territory and then to tell him specifically and definitely how a car fits into his particular picture must be added to the more general statements.

There is a wider field for the purely utility passenger car. Manufacturers can help develop this field by telling their dealers more about what it is and how cars can be sold to it.

"What's in a Name?"

THE body nomenclature standards set up by the S. A. E. have not met with an enthusiastic reception from many car manufacturers. While there has been some definite effort to replace the term "touring car" with the standard nomenclature "phaeton," even that change has been by no means universal.

In the case of less widely used body models, moreover, the adherence to the agreed standards is even less. New names are still coined with the coming of a new model or a new year. The tendency in this direction has not decreased to any marked extent.

The reason for these varied body designations, of course, is to increase sales appeal; to make the customer believe he is getting something different. Insofar as the varied names actually accomplish this sales purpose, it is hopeless—and perhaps unwise—to expect standard nomenclature to be adopted. There is some question, however, as to whether or not these various names do actually increase the sales appeal.

The names in many cases are not descriptive in any sense. They are so individualistic that probably no one except the owner and the manufacturer has the slightest idea of what type of car is referred to when the name is used. As a consequence the peculiar name does not come into current use, even among owners of the particular make of car. Thus the sales value of such names is probably more limited than casual observation may have indicated in the past.

Large Output Made Price Cuts Possible

Industry Passed Benefits of a Lowered Overhead on to Consuming Public

By JAMES DALTON

NEW YORK, Aug. 8—Price cuts naturally are the chief topic of conversation in the industry at this time, but it is difficult to find anything especially alarming in the changes made. None of them is sensational and most of them have been made by highly competitive companies.

Revisions have been based on the reasonable expectation of a continuance of heavy production. They have been made possible by large output and a consequent lowering of overhead and manufacturing costs. The industry is again passing on to the consuming public the benefit of reduced production expense. This policy has had much to do with bringing the phenomenal business which the industry has enjoyed this year.

This will be one of the factors which will encourage a strong farm market. Farmers have felt for two years that they were having to pay extortionate prices for the goods they needed while not getting fair prices for their own products. They have been convinced that automobile makers are playing fair with them, and for that reason are in a mood to buy when they get enough cash to go into the market for something they don't actually have to get.

May Retard Sales for August

The price cuts may slow up sales for August but they will not have a really demoralizing effect unless they are followed by a second series of cuts. Such a move is highly improbable, however. Manufacturers now have their prices down to such a level that they can't go on indefinitely making them lower if they expect to operate at a profit. There are no companies in the field which expect to operate at a loss.

The industry went into August with a large number of unfilled orders on hand in the plants making the more popular lines. How many of these orders will stand in the face of price reductions is problematical, but it is not likely there will be a heavy shrinkage. July business probably was about 25 per cent less than June, and it is not probable August will fall more than 25 per cent under the July level. Indications now are that business will be

(*Continued on page* 295)

Business in Brief

NEW YORK, Aug. 5—Uncertainty as to how long the railroad and coal strikes will last and what will be the aftermath have had their effect on trade in general. And yet, despite these drawbacks, business struggles along manfully, indicating that if it were not for labor troubles we would be in the midst of prosperous times right now. Failures have been fewer, the building materials' market has been brisk and improvements have been noted in the shoe and leather manufacturing trades. Fall buying is encouraging and crop reports are the best of the year.

Failing fuel supplies are responsible for the falling off in iron production, more than 10 per cent of the country's furnaces being idle at the present time, with prices going up.

Proof that industry and trade are standing up strong under the strike yoke is had in the report of car loadings, which exceed those of any previous July. Deducting coal, there were 785,064 cars loaded in the week ending July 22, exceeding two years ago by 58,236 cars. Railway earnings for June show slightly larger gross receipts than June, 1921, brought about by a reduction in the cost of operation and a gain in the net operating income.

Spring wheat is especially good in the Canadian Northwest, which promises the largest yield since the record crop of 1915. Almost a record breaking crop in corn is looked for, and there is a possibility of potatoes showing up equally strong. West of the Mississippi cotton is good. The oats crops are larger than was expected earlier in the season, while rye is promising.

Stocks are quiet after early advances; bonds are steady to firm and the money flurry is said to be only temporary.

Crude oil is down 25 cents per barrel, the third reduction since July 15.

Bank clearings for the week ending Aug. 3 aggregated $7,079,964,000, a gain of 7.4 per cent over the preceding week and of 12 per cent over this week, 1921.

PLAN 1923 GRAND PRIX

PARIS, July 27 (*By Mail*)—A piston displacement of 122 cu. in., with a minimum weight of 1433 lbs., will be the conditions of the 1923 French Grand Prix race, according to a decision just taken by the racing board of the national club. In addition to this race there will be a repetition of the fuel consumption race, with a lower minimum chassis weight and a smaller allowance of gasoline. It is not known where the races will be held.

M.A.M.A. Furthers Plan for Meeting

Program for Round Robin Discussion at Advertising Convention Completed

NEW YORK, Aug. 7—The program for the round robin discussion at the meeting of the Motor and Accessory Manufacturers Association at Buffalo Sept. 13-14, which will be participated in by automotive advertising managers, has been completed. E. W. Clark, advertising manager of the Clark Equipment Co. and chairman of the council, will preside.

Maurice Switzer, vice-president of the Kelly-Springfield Tire Co., will present a paper for discussion on the status, responsibility and executive authority of the advertising manager in relation to other officials in the company. The discussion will be led by Joseph S. Jacobs, advertising manager of the American Hammered Piston Ring Co.

J. C. McQuiston, manager of the department of publicity of the Westinghouse Electric & Manufacturing Co., will speak on the greater standardization of printed matter as a means of reducing advertising costs.

Publicity problems affecting both trade papers and general press will be discussed by James Dalton, editor of AUTOMOTIVE INDUSTRIES, and Walter Bermingham, automobile editor of the *Chicago Evening Post*.

Edward S. Jordan, president of the Jordan Motor Car Co. will speak on behalf of the advertising executives of the National Automobile Chamber of Commerce.

"Charting the Future Markets of the Automotive Industries" will be the theme of two papers to be presented by Harry Tipper, business manager of the Class Journal Co., and C. A. Musselman, treasurer and general manager of the Chilton Co.

Export Managers Meeting

The meeting of the export managers will be presided over by S. W. Dorman, vice-president and general manager of the Overseas Motor Service Corp. and export manager for General Motors accessories. The speakers include Dorman; George Quisenberry, managing editor of *El Automovil Americano;* George F. Bauer, secretary of the Foreign Trades Committee of the N. A. C. C.; Gordon Lee, chief of the automotive division, Department of Commerce; Glenn Davies, foreign manager, General Motors Acceptance Corp., and William F. Earle, advertising department, United States Rubber Export Co.

Speakers at the meeting of the traffic managers include A. L. Vilas, general manager, Rubber Association of America; J. S. Marvin, general traffic manager, N. A. C. C.; H. E. McGivern, traffic manager, Motor Wheel Corp., and W. M. Twohig, traffic manager, Willard Storage Battery Co.

Reorganization Plan Proposed for Harley

Would Discharge $750,000 Hendee Mortgage — Trustees Supplant Receivers

SPRINGFIELD, MASS., Aug. 7—Referee in Bankruptcy Walter L. Stevens has appointed Samuel M. Green, George A. Bacon and Albert W. Morris trustees of the Harley Co., to act in place of Green and Bacon as receivers.

At a meeting of creditors Aug. 4 receivers' inventories were submitted, showing a total valuation of $831,593 for the business considered as a going concern and $635,761 on a basis of quick sale. In papers previously filed the company was represented as having assets of $1,280,331 and liabilities of $894,048. The attorney for the company stated that there were more than 300 creditors. The trustees will meet soon to take further action in the company's affairs.

Morris, who headed the company that took over the plant from the Hendee Manufacturing Co. last December, said that shortly he would submit a plan for reorganization, with the necessary capital, and if this were accepted the plant would be in operation by September. During the past two months the company's operations have been virtually at a standstill.

If plans mature, the obligations of the Hendee Co., which holds a mortgage for $750,000, will be discharged soon and, incidental to this, an adjustment made of disputed points relative to the face of the mortgage and the ownership of certain metal at the plant.

McCord Separates Units in Plan for Financing

DETROIT, Aug. 7—The McCord Manufacturing Co. has presented to its stockholders a plan for refinancing whereby the company will segregate certain units of its business that show better than normal earnings and finance them independently of the company as a whole. This step is being taken to care for obligations due Aug. 11 which the company will be unable to meet. Owing to the inability of certain branches of the company to show satisfactory earnings, it was determined to base the refinancing upon these divisions now on sound footing.

Under the plan, the gasket, radiator and lubricator divisions will be formed into a new company, to be known as the McCord Corp.

In the first instance, all of the issued stock of the McCord corporation, consisting of 50,000 shares of Class A and 150,000 shares of Class B, will be owned by the company. The 50,000 shares of Class A will be sold and the proceeds paid to creditors, thus enabling the company to retire the advisory committee. All of the 150,000 shares of Class B will be held by the company.

The creditors advisory committee headed by John Fletcher of the Fort Dearborn National Bank, Chicago, has assented to the plan.

SIGNS WILLYS ORDER

NEWARK, N. J., Aug. 8—An order was signed by Federal Judge Bodine yesterday directing that judgment claims approximating $300,000 be paid creditors of the Willys Corp., whose plant in Elizabeth has been taken over by Durant Motors, Inc. Application for the order was made by the counsel for the equity receivers.

PHOENIX JOINS BENZ

LONDON, Aug. 2 (*By Mail*)—The Benz Automobile Works of Mannheim has secured a very powerful ally through a merger which has just been effected whereby the Phoenix Steel Works of Frankfort-on-the-Main has combined with the motor car company.

Future of Foreign Trade Hangs Largely on Shaping of Foreign Policy

By J. WALTER DRAKE,

Chairman of the Board of the Hupp Motor Car Co. and Chairman of the Foreign Trade Committee, National Automobile Chamber of Commerce

Detroit, Aug. 7.

PASSAGE of a tariff bill which does not provide for some satisfactory means of an interchange of commodities between the United States and foreign countries will work unfavorably to the best interests of the automotive industry and other large producing industries.

It cannot be expected that countries whose goods and products are excluded from the American market by severe tariff restrictions are going to feel kindly toward the reception of American products. Furthermore, it would be impossible within a short period of years for other countries to buy American products, because such a policy if carried to its final conclusion could only mean that all the money of the world would be lodged in the United States.

To maintain some sort of balance of trade, provision should be made in the tariff for the empowering of the president to make concessions to other countries which are desirous of doing business with the United States on a reciprocative basis. There should be some sort of elasticity to the tariff policy whereby trade agreements may be cultivated and encouraged.

The automotive industry to-day is in a position where it can manufacture 20 to 35 per cent in excess of its domestic market demand. By reason principally of this large domestic market it can produce cars at a far lower price than is possible in any other country. There would be no difficulty in selling these cars in every market in the world if prohibitive tariff walls are not raised, or national feeling not directed against them.

The National Automobile Chamber of Commerce has steadily advocated low tariffs on automobiles entering the United States in the belief that automobile tariffs in other countries would be held similarly low. Since the war tariffs in European countries have risen considerably but between countries there are little trade ententes which encourage interchange of products. There is no reason why similar ententes should not be entered into by the United States.

In the Asiatic countries the automobile will find an important market. China alone can absorb 1000 cars a day, with a potential market for 10,000,000 cars when a highway system is in operation. The Chinese like American products and are very much interested in American machinery and methods.

In consideration of the vast potential market for American automobiles and other products, the industry should be deeply interested in the provisions of the tariff. A tariff commission under which the entire foreign trade would be constantly under scientific study would tend to keep the trade with other countries on a secure basis. Pending the creation of such a commission it is important that the good will of our foreign markets be maintained through reciprocative trading.

Peerless Management in New York Changes

NEW YORK, Aug. 7—Distribution of Peerless motor cars in New York and the Metropolitan district, which includes Connecticut as far as Hartford and to New Brunswick, N. J., will hereafter be under the active direction of J. A. Clark, formerly sales manager of the Van Cortlandt Vehicle Corp. of New York, who took over the Peerless distribution from C. T. Silver in 1916 under the management of W. A. Woods as vice-president and general manager.

R. H. Collins, president of the Peerless Motor Car Co. announces the election of Clark as vice-president and general manager of the Van Cortlandt Vehicle Corp. and that the company will continue as a direct factory branch.

D. A. Burke, general sales manager at the factory, has been elected president of the Van Cortlandt Vehicle Corp., and Clark succeeds W. A. Woods, who has resigned.

Truck Weights Loom as California Issue

Road Supervisors Want 22,000 Pounds Maximum—Dealers and Owners, 26,000

LOS ANGELES, Aug. 7—The county supervisors of California undoubtedly sounded a battle-cry when, in convention at Eureka, their legislative committee reported in favor of 22,000 pounds as the gross maximum weight on State highways and the committee's report was adopted unanimously by the convention.

The county supervisors have absolutely no jurisdiction over the State highways, but in going on record for 22,000 pounds they threw down the gauntlet to truck owners and dealers, who are advocating a gross maximum limit of not less than 26,000 pounds. Undoubtedly this means a fight will be waged at next winter's session of the legislature.

The supervisors, by their action, publicly revealed the political line-up in the State. The California Highway Commission has jurisdiction over State roads and the supervisors control weight limits on county roads. The present law permits 30,000 pounds on State roads and, by going on record as favoring a decrease in this to 22,000 lbs., it becomes apparent the commission has lined up the supervisors to help to bring about a reduction in the State through the legislature.

Road Conditions Involved

There are fifty-eight counties in the State and five supervisors in each. There are but 120 members of the legislature, so the preponderence of political influence that can be exerted upon members of the legislature through the supervisors is what the commission believes will prove a trump card.

Trucking interests maintain law enforcement would have saved the roads and that a weight reduction is being sought only to cover up the shortcomings of the commission in building poor roads at heavy expense. The roads have been constructed mostly through bond issues and many miles of highway are in deplorable condition, as the result, it is maintained by some, more from faulty construction than traffic.

Supervisors of some counties have gone on record as favoring the prevention of the use of motor vehicles equipped with other than pneumatic tires.

2500 RICKENBACKERS PRODUCED

DETROIT, Aug. 5—Rickenbacker Motor Co. has completed 2500 cars since getting into production in February. The occasion was celebrated at the factory by executives and distributors, together with a number of Captain Rickenbacker's associates in the American flying unit, who were in Detroit as his guests. President B. F. Everitt declared the company was preparing to make a large increase in its production schedule to meet the steadily increasing flow of business.

GEORGIA BUS LINES WIN IN LEGISLATURE

ATLANTA, Aug. 7—The Georgia Motor Bus and Transportation Association has won a substantial victory in its effort to defeat a bill before the present session of the Georgia State Legislature, and formulated by the short line railroads, by the terms of which the motor bus was to be made a common carrier under the jurisdiction of the State Railroad Commission.

The Senate committee on railroads, after a hearing on the bill, reported unfavorably regarding it and named a sub-committee to further investigate and to draw a substitute bill. The latter will be considerably less stringent than the one offered by the railroads, if such a bill is passed at all, of which there is now considerable doubt. The bus industry feels that it has won a complete victory in the fight.

American Steam Truck Plans 300 Cars Monthly

CHICAGO, Aug. 5—Preparations for the manufacture of 300 cars a month are being made by the American Steam Truck Co., which is making its first public showing of its steam passenger car this week at the Chicago Pageant of Progress. R. R. Howard, president of the company, stated that the plant the company is now using at 5008 Bloomingdale avenue is tooled up for the 300 a month production, but that it probably will be 90 days before that schedule is approached.

The present effort is directed toward the early completion of a group of 100 cars, most of which will be sent to dealers. The company has been conservative in making dealer contracts and has not attempted to get representation at any great distance from Chicago.

R. & V. TO INCREASE OUTPUT

EAST MOLINE, ILL., Aug. 5—Operations have been resumed at the plant of the R. & V. Motor Co. and the force is being increased as rapidly as materials and supplies are being received. A fortnight's suspension was ordered by Supt. A. A. Gustafson during July in order to take an inventory. This report was so satisfactory that a production campaign was authorized upon a larger basis during the final six months of the year than during the first half.

Acceptance Corp. May Have Best Year

Business Done for First Six Months of 1922 Shown to Aggregate $68,251,586

NEW YORK, Aug. 7—The condensed balance sheet as of June 30 shows that for the first six months of the year 1922 the General Motors Acceptance Corp. has exceeded the volume in any corresponding period since the organization of this institution, which finances the wholesale and retail sales of such General Motors properties as Buick, Cadillac, Oakland, G. M. C. truck, Chevrolet and Oakland. A total business of $68,251,586 for the half is reported, a showing which, if continued, will make this the corporation's greatest year.

Total assets for the six months are $49,405,658, of which $6,075,150 is cash and $41,667,151 secured receivables. Capital, surplus and undivided profits are $5,132,635 and discounted obligations, $42,259,311. Reserves are $598,725.

The report also shows that since the inception of the corporation early in 1919 to June 30, 1922,, there have been financed under the G.M.A.C. retail plan a total of 186,161 cars, trucks and tractors and under the wholesale plan, 126,-920. This does not include other General Motors products financed, nor the operation of the foreign department. The total amount of financial accommodation extended by General Motors Acceptance Corp. from inception to June 30, 1922, is $270,692,236, distributed as follows:

	Foreign Department	GMAC Plan Retail	GMAC Plan Wholesale
1919	$3,256,192	$9,989,019	$7,635,777
1920	19,830,994	46,693,170	37,578,470
1921	3,361,881	39,725,007	34,370,140
1922*	3,303,479	36,339,750	28,608,357

*First Six Months.

Business by Years

The total business done for 1919 was $20,880,988; 1920, $104,102,634, and 1921, $77,457,028.

Through a comprehensive sales organization the obligations arising from the sale of General Motors products under these financing plans are sold directly to banking institutions. From inception to June 30, 1922, total sales of obligations have been $267,257,000, representing over 5600 individual sales to over 1100 banks and trust companies. This record by years follows:

	Number of Sales	Amount of Sales
1919	258	$13,018,000
1920	2,078	92,389,000
1921	1,646	96 741,000
1922*	1,690	65,109,000
Totals	5,672	$267,257,000

*First six months.

Germany Will Keep Trucks Sold There

Department of Agriculture Decides Not to Seek Their Reimportation

WASHINGTON, Aug. 8—The sale of approximately 1800 trucks by General Henry C. Allen, in charge of the Army of Occupation in Germany, will not be contested by the Department of Agriculture, which, through its representative abroad, has agreed to waive the department's claim to the trucks.

All of the automotive equipment sold by the Army of Occupation, when it withdrew from Germany, had previously been offered to the department, which in turn was to proportion it out among the states to be used in highway building.

Without authority, it was alleged by the department, the War Department sold the 1800 trucks to highest bidders in the occupied area. A representative of the bureau of roads went immediately to Germany and reported that the sale of the trucks has been so nearly consummated that for the agricultural department to insist on its right to the trucks would embarrass this government with a foreign country. Consequently the department has announced that it will not re-import the trucks to this country.

It is not thought likely, however, even if the trucks had not already been sold, that the full number would have been re-imported as the bureau's representative reports that a large percentage of the trucks, together with some passenger cars, would not be worth bringing back.

Slough Has 300 Trucks Unsold

NEW YORK, Aug. 8—Disposal of American trucks reimported from the former war zones by the Slough Trading Corp. of America is proceeding rapidly and, according to officials of the company, only about 300 vehicles are yet to be sold at wholesale. It is also stated that reports indicate that dealers in various parts of the country who have bought the trucks for resale have been successful in disposing of the greater number of them.

Up to date the Slough company has brought into the country only about 1,200 trucks and about 200 others were brought here in small lots by other importers.

Information given the American commission by the Slough Trading Corp. of England is that nearly all of the trucks available for reshipment to the United States have been sent here and that the process of putting these vehicles on the American market is practically complete. It was at first expected that a much larger number of trucks would be brought here but a good many have been sold in Europe and recent attempts of the Slough Trading Corp. of America to get additional shipments started on the way here have been met with the information that there are no vehicles to be had.

Virtually all the trucks brought here are heavy duty vehicles, including Macks, Packards, Pierce-Arrows, Whites and a few other makes.

CLAIMS HE PRODUCED FIRST CAR IN 1883

ATLANTA, Aug. 9—With the continued advancement of the automobile industry the past several years, the question of who built the first car has often been asked, and there have been several claims to that honor.

Comes now Adelbert Brown Coe, of Macon, Ga., claiming that he constructed at Lima, Ohio, in 1883 the first automobile that was ever built, and furnishes what appears to be tangible proof of the fact—proof that the car was constructed at least in 1883 and propelled under its own power. This proof is in the nature of a signed statement by several business men of Lima, Ohio, who declare therein that they distinctly remember seeing this automobile in the fall of 1883.

The car was a three cylinder one, capable of 12 miles per hour and was operated by steam.

Coe, who is now 63 years of age, is employed in the automotive department of the Williams Manufacturing Co. of Macon, Ga.

Call Issued for Road Meeting at Washington

WASHINGTON, Aug. 7—The second national conference for the study of highway engineering and highway transport education will be held in Washington Oct. 26-28, the call having been issued by Chairman John J. Tigert of the Highway Education Board.

Members of the program committee consist of T. R. Agg, professor of highway engineering, Iowa State College; Arthur H. Blanchard, professor of civil engineering, University of Michigan; C. J. Tilden, professor of engineering mechanics, Yale; Lewis W. McIntyre, professor of civil engineering, University of Pittsburgh; H. G. Shirley, chairman Virginia State Highway Commission and Dr. Walton C. John, U. S. Bureau of Education, Washington, who is chairman.

To the seven principal committees have been assigned the study of the following problems: Undergraduate and elective courses in highway engineering; Undergraduate and elective courses in highway transport; Graduate work in highway engineering and highway transport; Short courses in highway engineering and highway transport; Introductory general course in highway engineering and highway transport.

Horace E. Rice Dies When Train Hits Car

Assistant to American Bosch President Well Known in Electrical World

SPRINGFIELD, MASS., Aug. 4—Horace E. Rice, assistant to the president of the American Bosch Magneto Corp., was killed to-day when his automobile was wrecked by a Pennsylvania railroad train at a grade crossing in Oxford, Penn. He was on a trip that was to have comprised the principal cities of the Middle West. Rice was an ignition expert and came to Bosch from the Atwater Kent Manufacturing Co. of Philadelphia last March. His home was in Thompsonville, Conn. He was 39 years old.

Born in Philadelphia June 4, 1883, Rice was identified with the electrical world throughout his business career. After completing a high school course, he started in with the Consolidated Fire Alarm Co., Philadelphia. He was in the laboratory of the Philadelphia Electric Co. as a special designer from 1903 to 1906 and from there went to the Rowland Telegraphic Co., Baltimore, as chief electric draughtsman for two years, moving on from there to become sales engineer for W. P. Dallett of Philadelphia.

Joined Atwater Kent in 1910

After two years as general manager of the Electrical Exhibition Co., Philadelphia, Rice joined Atwater Kent in 1910, where he stayed until 1913, when he became identified with the Schoen-Jackson Co., Media, Pa., as sales manager for a year. Then he returned to Atwater Kent as sales manager. In 1915 he added advertising manager to his sales manager title and remained with this company until last March, when he went to Springfield, Mass., to become assistant to the president of the American Bosch Magneto Corp.

Few men in automotive ignition circles were better known than Rice. His long connection with Atwater Kent brought him into close contact with factory executives everywhere. He was a prominent member of the Society of Automotive Engineers and a member of the Electrical Equipment Division of the S.A.E. Standards Committee.

RULING AGAINST BUSES

BUFFALO, Aug. 7—Justice Pooley of the Supreme Court has ruled as illegal the operations of buses in opposition to the trolley car service of the International Railway Co. and a writ of mandamus may issue. The street car company had no objection to the buses operating while the strike was on but after the trolleys resumed operations, manned by imported workmen, the people continued to use the buses, which caused the protest and the appeal to the law.

Expansion Program Mapped Out by Gray

By 1923 Expects to Have Four Assembly Plants in Operation

DETROIT, Aug. 5—Gray Motor Co. will reach a production of 100 cars daily in its Detroit factory by Sept. 1 and is making preparations for the opening of a plant at Oakland, Cal., possibly by Oct. 1, in which it will produce an additional 50 daily. By January it is expected to have four assembly plants in operation, including Detroit and Oakland, the two later ones to provide for the eastern market.

President F. L. Klingensmith said this week that the company is now manufacturing 40 cars daily in Detroit and will reach 50 by Aug. 15. When 100 daily is reached that will be the maximum of the Detroit district. Production of 200 daily in all plants is planned for 1923.

A roadster will be added to the line during August which will have a detachable rear deck, permitting its instant change to a delivery vehicle. It will have a khaki top and will sell for about $470, the price not being fixed definitely at this time. A four-door sedan will be added to the line later in the year.

The company is now opening up dealer territory west of the Mississippi, its sales to this time having been confined to eastern territory owing to limited production. Chicago sales of the Gray will be handled by Simmons-Handin Motor Co., the company being formed of C. J. Simmons, former Grant dealer, and J. A. Handin, former Ford branch manager in Cincinnati and Salt Lake City.

Not with Taxi-Cab Company

DETROIT, Aug. 5—President F. L. Klingensmith of Gray Motor Co. said today he was not connected with any company planning to manufacture taxi-cabs. A proposal to enter such a company, he said, had been made to him, but he declined it.

Hudson-Essex Earned $1,264,071 in June

DETROIT, Aug. 7—The June earnings of the consolidated Hudson and Essex companies were $1,264,071, or more than $1 per share, according to a report issued by President Roy D. Chapin of the Hudson Motor Car Co.

This report is for the seven months' period ending June 30, 1922, and shows the net income of the Hudson Motor Car Co. to have been $3,041,774 after provision for Federal taxes. This includes only one month's earnings of Essex Motors, as the shares of stock of that company were not acquired by the Hudson Motor Car Co. until the end of May.

The consolidated balance sheet of the two companies as of June 30, 1922, shows: Cash in banks and on hand, $4,050,195; sight drafts for car shipments, $1,963,882, and accounts receivable, net of reserves, $576,493. Accounts payable, for invoices not due covering materials and current expenses, are $4,060,314, and accrued accounts and distributors' deposits, $1,050,763.

Rolls-Royce Sales Plan Boosts Quarter's Total

SPRINGFIELD, MASS., Aug. 8—Sales for the second quarter increased 233 per cent over the first quarter, Rolls-Royce, Inc., reports, this pace also being maintained in July. The sales were widely distributed as a result of the company's new sales plan establishing representatives in the principal cities.

In the factory the output also showed a satisfactory increase, as additions were made to the works force at intervals during May and June. In July, when the force was complemented throughout the different departments, an increase was reached in finished cars of more than double the average monthly shipments of any previous quarter in the history of the company. A night force in some of the departments is being considered.

The organization of the company's own coach works, under the management of George W. Korr, is about completed.

Wilson Foundry Working to Meet Willys Schedule

PONTIAC, MICH., Aug. 5—The Wilson Foundry and Machine Company, manufacturers of Willys-Knight and Overland engines, is working on the problem of getting up to 300 daily production on Knight engines, while at the same time maintaining a steady output. Changes in the plant, increase of assembly space and rearrangement in order to multiply efficiency have all to be made while the lines are in production under present schedules, officials of the plant say.

This is being accomplished in order to supply the 300 daily schedule announced a month ago by John N. Willys during a visit to the plant.

Production of Willys-Knight engines had risen to about 175 daily during the past week, and of Overland Fours to about 465.

ALLEN BID REJECTED

COLUMBUS, Aug. 5—Only one bid was received by W. C. Willard and George A. Archer, receivers for the Allen Motor Co., for the plant located on Dublin Avenue. This property is on the tax duplicate for something over $303,000, and the bid was so low that it was not considered. Bids will again be received by the receivers Aug. 14. All of the other property of the company has been sold, and this last piece of real estate remains to be disposed of before the company's affairs can be wound up.

5,000 More Workers Engaged During July

Federal Report Shows Shortage of Skilled Labor in Detroit Plants

WASHINGTON, Aug. 7—Figures compiled by the U. S. Employment Service for July show marked gains in employment in the automotive industry, especially in the Middle West.

In Wisconsin, the automobile industry indicates a steady gain in operatives. Firms making automobile accessories are fully employed and some are sold up far ahead. In Michigan, however, factory schedules were reduced for July, due to the holiday and the inventory taken. There is a shortage of skilled mechanics in automobile and metal plants in Detroit. The Federal Employment Service has been advised that a motor company will open an assembly plant at Detroit which will employ from 750 to 1000 employees.

Automobile factories in Ohio are running to capacity. In Akron there is a shortage of skilled tire builders in the rubber factories.

Statistics compiled by the employment service show that approximately 5000 people were added to the payrolls of the automobile manufacturers. This federal agency believes that "a thorough canvass of the industrial situation reveals an optimistic opinion that the country, with the settlement of the two major controversies, will experience a rapid advance in industrial prosperity. Throughout the country a strong undercurrent in the direction of an industrial recovery is evident, notwithstanding difficulties incident to lack of fuel and transportation. Evidence of this is found in decided increases in ten of fourteen basic industries."

Employment on Gain in Toledo Factories

TOLEDO, Aug. 5—Despite the brake put upon industry by rail and coal strikes, employment in automotive plants here held its own in most of the large plants and made slight gains in smaller shops.

The gain for the industry was nearly 200 employees as compared with June 30.

Electric Auto-Lite Co. put on 97 more employees. Milburn Wagon Co. added 71 men. Bock Bearing Co. made a slight gain, while Willys-Overland, Chevrolet and Champion Spark Plug Co. held steady.

Toledo Machine & Tool Co. and Doehler Die Castings Co. made gains in employment.

Textiles showed an increase in numbers at work.

The total number of workers in automotive plants here is more than 17,000 at the end of July.

August Tire Output May Make High Mark

Indications That It Will Surpass Record That Was Established in July

AKRON, Aug. 7—With July the biggest month from a standpoint of production in the entire history of the tire industry in the Akron district, everything so far this month indicates that the August production will exceed that of July and will establish a new record.

Tire production in the Akron district for July exceeded 2,750,000 tires. This is a bigger production than registered for any month during the hectic and short-lived era of unprecedented boom during the forepart of 1920.

The July record is unusual in view of the fact that, according to all records of the tire industry and all the laws of fluctuating tire demand as based upon the weather, July ordinarily is one of the slowest tire months of the year and a month when manufacturers have been accustomed to rest on their oars until the seasonal slump in buying is over. Many manufacturers anticipated this seasonal slump last month, but it failed to materialize, and they found themselves with inadequate forces to supply enough tires to meet the ever-increasing demand.

3,000,000 Mark Expected

And as August is usually a heavier month than July, this month's record probably will reach the 3,000,000 mark at the present rate of tire production of nearly 110 000 tires a day in the Akron district alone. Figures show that a dozen companies last month produced tires at the rate of 33,000,000 tires a year, or enough to supply the entire needs of the United States.

The downward trend of tire prices may be held accountable for a large portion of the heavy sales demand for tires. The increase in the number of machines in use naturally has increased the demand for tires also, latest registration figures for the United States showing 10,863,744 cars in use, as compared to 9,434,971 a year ago. This is an increase of 1,428,773 in a year.

G. M. Reports July Truck Output Approached June

PONTIAC, MICH., Aug. 5—July production of motor trucks in the General Motors Truck plant here was very close to that in June, which was a record month since the days of war production, says W. L. Day, general manager of the plant. August is expected to equal July.

Business on the three new truck tractor models put out by the company some weeks ago for heavy haulage purposes is remarkably good, Day asserts. The G. M. C. models in this line have met with a ready response from contractors and others having need for a particularly sturdy machine capable of hauling unusually heavy loads without damage to highways.

The new testhouse of the plant will be ready for use in about two weeks. The building has been completed and the electrical equipment is being installed. The equipment will make possible testing 100 trucks daily and putting to use the power generated by the engines under test.

Beaudette Transferred to Fisher Body Corp.

PONTIAC, MICH., Aug. 5—Formal transfer of the plant of O. J. Beaudette & Co., body manufacturers, to the Fisher Body Corp. has been effected, and the factory is now running under the general management of Frank E. Mills, former secretary of the Beaudette company.

While no definite plans have been announced by the Fisher company as to the work it proposes to turn out, it is understood the company will build a large number of Chevrolet bodies. The plant is still running on Ford work, completing contracts entered into by the Beaudette company.

3.09 Per Cent Production in June Shipped Abroad

WASHINGTON, Aug. 3—Of the total production of passenger cars and trucks in June, the export figures compiled by the U. S. Department of Commerce show that of the passenger production 3.09 per cent were sold abroad, and of the trucks 4.31 per ent found foreign buyers.

The ratio of exports to production in May was 3.09 for passenger cars and 4.43 for trucks, June figures showing a slight decline in the ratio to increased production.

TIRE INJUNCTION DENIED

NEW YORK, Aug. 7—Supreme Court Judge Tierney has denied an injunction to Frederick S. Dickinson and the Dickinson Cord Tire Corp., manufacturer of tire making machinery, restraining John Springer, its former vice-president, and several others from selling stock of the plaintiff corporation at a low figure. Dickinson claimed the shares issued to Springer were not transferred to his actual ownership, but given to Springer to hold for Dickinson, a claim that is denied by Springer.

ELGIN TO KEEP AT CAPACITY

CHICAGO, Aug. 5—Full production by the Elgin Motor Car Corp. is planned for the remainder of this season, according to an announcement made by officials of the company. Shipments of Elgin cars for the months of May, June and July were greater than those of any three months since the peak buying season of 1920, according to factory statements.

14,746,370 Casings Made in Six Months

For Same Period Last Year Total Production Aggregated 8,752,236

NEW YORK, Aug. 8—Figures furnished the Bureau of Foreign and Domestic Commerce by the Rubber Association of America show a total output of pneumatic casings of 14,746,370 for the first six months of 1922 as against 8,752,236 for the same period last year. June of this year showed an increase of approximately 100,000 over the May total and shipments increased approximately 500,000. A substantial decrease in inventories is reported for June. A gain in production of more than 100,000 is shown for June.

Production and shipments of inner tubes increased materially, and a large reduction is reported in inventories.

The figures for the first six months of the year as compared with the first six months of last year are as follows:

PNEUMATIC CASINGS

1921—	Inventory	Production	Shipments
Jan	5,319,605	703,430	965,117
Feb	5,193,018	819,892	1,073,756
March	4,597,103	1,163,314	1,611,651
April	4,527,445	1,651,418	1,785,951
May	4,451,668	2,100,917	2,085,882
June	4,154,456	2,313,265	2,643,850
1922—			
Jan.	4,171,060	2,055,000	1,597,000
Feb	4,691,000	2,084,000	1,562,000
March	5,183,286	2,645,790	2,073,963
April	5,464,336	2,401,187	2,086,651
May	5,523,095	2,721,503	2,639,273
June	5,042,147	2,838,890	3,133,260

INNER TUBES

1921—	Inventory	Production	Shipments
Jan	5,586,163	740,824	1,042,617
Feb	5,415,464	916,627	1,129,881
March	5,044,861	1,346,483	1,643,690
April	4,916,772	1,762,122	1,983,571
May	4,751,880	2,210,040	2,342,567
June	3,835,098	2,359,928	3,232,673
1922—			
Jan	5,247,000	2,343,000	1,850,000
Feb	6,142,000	2,597,000	1,703,000
March	6,991,118	3,017,511	2,090,737
April	7,250,096	2,650,573	2,329,343
May	7,189,552	2,970,696	2,938,947
June	6,186,534	3,130,629	3,973,679

SOLID TIRES

1921—	Inventory	Production	Shipments
Jan	303,753	21,220	29,116
Feb	304,374	25,365	29,593
March	293,800	27,710	43,926
April	269,985	28,858	42,080
May	261,663	35,156	40,122
June	240,336	28,395	49,867
1922—			
Jan	182,000	40,000	33,000
Feb	183,000	39,000	37,000
March	182,197	49,453	48,350
April	173,748	46,664	52,309
May	170,904	57,610	60,711
June	169,808	66,089	63,108

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic work in factory and in transit to, or at warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

Chicago May Exceed July Sales Volume

August Business Aided by Price Reductions—Active Fall Is Expected

CHICAGO, Aug. 7—With price reductions in a number of leading lines being announced, Chicago automobile distributors and dealers are making August sales at a rate which indicates this month's business will be slightly better than that of July. The volume of sales last month fell somewhat below the high point reached in June, but there was nothing like a slump. August is expected to reach a level between the June and July figures, and there is confidence that September and October will bring another period of unusually active selling.

A strike of street car and elevated railway trainmen which began Aug. 1 and completely stopped the cars gave the automobile industry a lot of favorable advertising on account of the excellent manner in which motor vehicle transportation is serving the city but thus far has not aided the sale of automobiles. The 200,000 motor vehicles in the city appear to have been adequate for the emergency and there seems to be no unusual inclination of prospective purchasers to close deals in view of the unsettled conditions.

Strike Helped Sales

A number of sales of used cars and trucks are undoubtedly traceable directly to the street car strike but, on the other hand, there are actually fewer prospective purchasers visiting the sales rooms than in normal times. Maintenance business has improved somewhat and the sale of gasoline has increased from 600,000 to 1,000,000 gallons a day, indicating a two-thirds increase in the use of motor vehicles.

Most of the car sales that would be made normally are being made, the dealers handling the popular well-established lines continuing to hold their lead. Deliveries are still slow in some of the leading lines in all price classifications. New car dealers are finding ready sale for the used cars they take in trade, but the exclusive used car dealers are finding business somewhat slow.

Time sales of new and used cars in Cook County, including Chicago, for the four weeks ending July 29 were 3990 as compared with 4280 for the four weeks ending July 1.

Farmers Buying in South

ATLANTA, Aug. 8—One of the most encouraging features the automotive industry has noted in the southeastern territory in the past two years is the steady increase dealers report from all sections in the sale of passenger cars, trucks and tractors to farmers during the past few weeks, this business now having attained a volume even better than the average of pre-war times.

The buying power of the southeastern farmer has been steadily increasing for months and with excellent cotton prices now prevailing for this year's crop, and other farm prices at levels that insure the agricultural industry of the section a satisfactory profit for the first time in three years, farmers have entered the market again apparently with a desire to make up for lost time.

Farm implement and tractor sales are among the automotive lines that have been steadily picking up of late and distributors in this section are anticipating a business during next spring that will be the best since the era of prosperity immediately following the war.

PARIS BUSES USING GIANT PNEUMATICS

PARIS, July 28 (By Mail)—Giant pneumatic tires are being used for the first time on one of the omnibuses operating in the City of Paris. The bus is a normal type single decker carrying 35 passengers which has been converted from steel wheels with solid rubber tires to Michelin steel disc wheels with pneumatics. Single tires are used in front and dual wheels and tires on the rear. The size is the same front and rear, being 1085 by 185 mm., this being equivalent to 7.3 ins. section. This is the biggest size pneumatic tire in commercial use in France.

The experiments on the Paris omnibus have been undertaken in order to get comparative data on costs. With solids the average life of a tire is 41,000 miles, and the tire cost per vehicle is 10 centimes per kilometre. In order to have any chance of being adopted by the Paris Omnibus Co. it will be necessary for the pneumatics to show the same economy as solids.

25 Motor Trucks Daily Shipped by Harvester

SPRINGFIELD, OHIO, Aug. 5—Shipments of motor trucks from the Springfield works of the International Harvester Co. are going forward at the rate of twenty-five a day, according to Superintendent Charles H. Smart. There has been no interference by the strike on inbound shipments of material, Smart said.

Good sized orders are coming in at the plant of The Kelly-Springfield Motor Truck Co. Shipments are going forward as rapidly as possible.

The Springfield Engineering Co., which is identified with the Kelly company, shipped a sewer cleaning machine mounted on a Kelly chassis to Detroit during the week. This makes the sixth machine purchased from the company by the city of Detroit.

Ford Delays Action on Site in Mexico

Reported Not to Be Entirely Optimistic Over Present Political Outlook

MONTEREY, MEXICO, Aug. 7—No definite decision has as yet been reached by Henry Ford as to whether he will establish a plant in Mexico for the manufacture of Ford automobiles and Fordson tractors, according to information received here direct from headquarters in Detroit.

Ford has had two sets of representatives in Mexico during the last few months. One set made an investigation of possible sites for the proposed automobile and tractor plant and the other set of experts made a study of the iron ore and coal supplies. It is stated that Torreon, Saltillo and Tampico are under consideration as a possible site for the manufacturing end of the proposed industry.

It is explained by men who are in close touch with Ford's tentative plans for industrial development in Mexico that it may be several months before he is ready to make a move for their consummation.

The reports of his field representatives who have been making investigations in this country are said to have been not altogether optimistic as to the political future of the country. At a meeting of Ford executives held in Detroit the latter part of July the whole Mexican proposition was discussed in all of its many phases without any final recommendations being made, it is stated here.

It is known to be the expressed desire of Ford that the proposed industrial development, if it should be undertaken, be on a scale that would give employment to many thousands of Mexicans. In this manner he hopes not only to do much toward improving the economic conditions of large numbers of people but by educational methods which he plans to put into effect bring them to a higher standard of citizenship.

PLAN TO OPERATE LORRAINE

BEVERLY, MICH., Aug. 5—Officials of the Lorraine Motors Co. are perfecting plans for the organization of a new company to take over and operate the plant for the manufacture of automobile parts and equipment. Plans for the manufacture of automobiles have been abandoned.

FREMONT GETS ALL-AMERICAN

FREMONT, OHIO, Aug. 4—Formal announcement has been made by the Fremont Consolidated Motors Corp. of Fremont of its acquisition of the All-American Truck Co., formerly located at Chicago. The Fremont company already is in production on the All-American truck.

Men of the Industry and What They Are Doing

Weschler Succeeds Hubbell

Colonel Lindley D. Hubbell has retired from the post of vice-president and general manager of the Hendee Manufacturing Co., and Frank J. Weschler, former treasurer, succeeds to the management and will have complete control of the factory operations. John D. Stephens, who has been assistant to Weschler, is advanced to the office of treasurer. Parmly Hanford continues as secretary. Weschler has been connected with the company 15 years, going there from the Pope Manufacturing Co. in Westfield. He entered the Hendee service as director of sales. Colonel Hubbell, who has been with the company since April, 1920, was formerly commander of the United States armory in Springfield. He resigned from the Hendee company on account of ill health.

Lubeck Heads Apperson Sales

E. M. Lubeck of Chicago has been appointed general sales manager of the Apperson Bros. Co. of Kokomo, Ind. Lubeck has a wide acquaintance throughout the industry. During the past 15 years he has served in a sales capacity with the Studebaker, Maxwell, Hudson and Buick companies. During the war he was in active charge of all motor transportation in the American sector at the front. T. E. Jarrard, vice-president of the Apperson company, has been promoted to the position of sales director.

Gallup Opens Own Office

David L. Gallup, for several years consulting and experimental engineer of the Nordyke & Marmon Co., has severed his connection with the company and opened his own office in Indianapolis. He will specialize on investigation advice and reports pertaining to design, material, manufacture, tests and performance for which his connection with the industry has fitted him. Gallup joined Nordyke & Marmon after holding a professorship at the Wooster Polytechnic Institute. He was a member of the Standards Committee of the Society of Automotive Engineers and has been active in the Indiana section of the Society.

Russell Back from Europe

E. E. Russell, vice-president in charge of production of the J. I. Case Threshing Machine Co., has returned from a three months' trip through Europe, where he has been studying conditions.

Davies Forms Ad Agency

Maxton R. Davies, formerly president and general manager of the Fidelity Advertising Agency of Cleveland, has established the Maxton R. Davies Co. with offices in the B. F. Keith Building, that city. Davies is president of the agency, E. G. Davies, vice-president, and J. A. Lombard, secretary. Maxton Davies was formerly vice-president of the Dunlap-Ward Advertising Co., Cleveland, and has been identified with the advertising of the Columbia Motors Co., the Grant Motor Car Co. and the Chandler and Cleveland companies.

Odle with Fremont Motors

Paul L. Odle, formerly with the Republic Motor Truck Co. and Denby Motor Truck Co., has been appointed sales manager of the truck division of the Fremont Consolidated Motors Corp., which is now manufacturing the All-American trucks in its factory at Fremont, Ohio.

White Succeeds Anzalone

J. J. Anzalone, comptroller for the Victor Rubber Co., has left the service of the company to become comptroller and general auditor for the Vaness Co. of Cleveland which looks after the business of twenty-four railroads and other concerns. R. F. White, who has been with the Victor company for the last five years, becomes chief accountant at the local plant. Anzalone will continue to act in an advisory capacity for the Victor company.

Hunt, Rayfield District Head

George Hunt, formerly sales manager of the Detroit Steel Products Co., has been appointed district manager for Rayfield carbureters in Detroit. Offices have been opened in the David Whitney Building.

Piper Manages Cotton Mills

B. S. Piper has been appointed resident manager of the mills at Millen, Ga., of the Western Reserve Cotton Mills Co. of Georgia. He succeeds T. W. Harvey, who has resigned.

Spinning with Service Corp.

Rolfe C. Spinning has resigned as advertising manager of the Service Motor Truck Co., Wabash, Ind., to become manager of the Detroit office of the Service Corp., Troy, N. Y., which specializes on automotive development, maintaining offices in Troy, Detroit and New York City.

Lolley Goes to Europe

William H. Lolley, special representative for the Standard Parts Co., sailed for Europe. He will make negotiations with German and French interests for the manufacture and sales promotion of Bock taper roller bearings on the Continent. Lolley will also visit British Bock Bearings, Ltd., which was organized last year for the manufacture and sale of Bock bearings for the British Isles and possessions.

Glenn A. Tisdale Retiring

Glenn A. Tisdale, who for ten years has been Franklin dealer in New York and Brooklyn, operating under the name of the Franklin Motor Car Co. of New York, is giving up his contract and expects to retire from business Oct. 1. A new dealer has not yet been selected. Tisdale came into the Franklin agency from outside the automobile business and has never distributed any other car. His present intention is to retire permanently from business. Tisdale's son, Glenn W. Tisdale, has just taken the Hupmobile dealership of Newark, under the name of G. W. Tisdale, Inc.

Coghlan Joins Trexler

Walter P. Coghlan, recently general sales manager of the American Hammered Piston Ring Co., Baltimore, has been appointed vice-president and director of sales of the Trexler Co., Philadelphia. Coghlan will direct the sales of the Trex air valve lock, which was placed on the market last spring.

Smith Goes With Mitchell

T. Harris Smith, formerly general manager of the Packard factory branch at Kansas City, Mo., has joined the factory organization of Mitchell Motors Co., Racine, Wis., as manager of advertising and sales promotion.

A. A. A. Promotes Croselmire

F. A. Croselmire, vice-chairman of the American Automobile Association, has been appointed acting chairman of the A. A. A. Contest Board. Croselmire is succeeding William Schimpf, the chairman of the board, forced to relinquish his duties because of ill health.

No Successor to Cobb

In the issue of AUTOMOTIVE INDUSTRIES of July 20, T. B. W. Zumstein was stated to have succeeded W. E. Cobb as New York branch manager of Master Trucks, Inc. A successor to Cobb has not been appointed, Zumstein being in charge of all sales activities of Master Trucks, Inc., and temporarily looking after the company's New York interests.

OAKLAND GAINED 20 PER CENT

PONTIAC, MICH., Aug. 5—The Oakland Motor Car Co. reports that, compared with June, the output of the plant for July showed an increase of 20 per cent.

Prospects for continuation of an increase in the production record are good, according to C. J. Nephler, sales manager, who states that factory arrangements and commitments on material are made with a steady increase of production in view.

Stockholders Attack Goodyear Financing

Ask. in Suits. That Common Stock Held by Underwriters Be Returned

AKRON, Aug. 9—Four suits attacking the legality of the $85,000,000 refinancing and reorganization program of the Goodyear Tire & Rubber Co. under which Frank Seiberling, founder of the company, was deposed as president and succeeded by E. C. Wilmer in May, 1921, demanding an immediate surrender of 275,000 shares of common stock alleged to be held illegally by underwriters of the Goodyear $27,500,000 issue of debenture bonds and claiming the contract under which Wilmer is serving as president is illegal were filed in the Summit County Common Pleas Court here to-day by Laura L. T. Weiss of Cleveland on behalf of herself and all other Goodyear stockholders.

The first action reveals for the first time publicly the alleged existence of a contract entered into by Goodyear with Leonard Kennedy & Co. of New York, the terms of which, according to Mrs. Weiss' petition, stipulate that the Kennedy company shall receive $250,000 a year for five years for providing a president and treasurer for the Goodyear company and in addition shall receive 5 per cent of the company's net annual profits on earnings of not less than $10,000,000 nor more than $20,000,000.

Want Annual Contract

The suit claims the contract is illegal and prays for its annulment. The suit claims the company's profits, if $20,000,000 a year, will mean a bonus of $5,000,000 in addition to the $250,000 to the Kennedy company, and states that profits were $240,000,000 in 1919.

The second action charges the illegal issuance of 10,000 shares of management stock to John Sherwin, chairman of the board of directors of the Union Trust Co. of Cleveland; Clarence Dillon of Dillon, Read & Co. of New York, and Owen D. Young, vice-president of the General Electric Co. of Cleveland. The action claims each of these three, as the holder of the management stock, receives a salary of $10,000 a year, with $10,000 available for their traveling expenses, and that they control and dominate the company to the exclusion of all stockholders and directors, having the power to elect a majority of the stockholders.

The third suit claims that the Goodyear company illegally is paying a bonus of $6,000,000 to persons buying the $30,000,000 worth of first mortgage bonds issued. These bonds are redeemable at $120 plus 8 per cent accrued interest. Mrs. Weiss claims this payment of a $20 premium or bonus on each $100 bond is a dissipation and misappropriation of the company's assets.

Suit number four charges that underwriters of the $27,500,000 issue of debenture bonds were assigned 275,000 shares of common stock as a gratuity and agreed to give them to the public, 10 shares for every $1,000 bond purchased. She alleges they failed to keep this agreement and still hold the stock to the exclusion of stockholders.

Mrs. Weiss asks annulment of the Leonard Kennedy & Co. contract, cancellation and surrender of the 10,000 shares of management stock and an injunction against further payments on the Kennedy contract or to the trustees of the management stock. She asks an injunction against further payment of a bonus on the first mortgage gold bonds redeemed and demands surrender of the 275,000 shares of common stock.

Defendants in the four suits are bankers and banking houses assisting in negotiating the Goodyear company's $85,000,000 refinancing program.

Wilmer was in New York to-day. His office stated the action was a request for a court review of the reorganization proceedings and would be adequately defended.

Lexington Has New Line; Cuts Price of Old Models

CONNERSVILLE, IND., Aug. 8—The Lexington line for 1923, just announced by the Lexington Motor Co., shows ten body types included in the list of Series 23 models. The company has decided to confine its line to one chassis, the Ultimate, with 123 in. wheelbase, abandoning for 1923 the 122 in. and the 128. The Ansted motor will be the only engine used in the new line.

Of the 1922 family only two models are retained, the 5 passenger phaeton, which has been reduced from $1,745 to $1,695, and the 5 passenger sport model, which has been dropped from $2,100 to $2,045.

The rest of the new line consists of a 2 passenger roadster which lists at $1,695; a 7 passenger phaeton at $1,795; 5 passenger California top, $1,995; 7 passenger California top, $2,095; 5 passenger Royal Coach, $2,145; 4 passenger coupe, $2,345; 5 passenger sedan, $2,545; 4 passenger brougham, $2,645. The roadster, Royal Coach and brougham are brand new additions to the line.

REO PRICES DROP

LANSING, MICH., Aug. 9—New prices announced by the Reo Motor Car Co. show a reduction of $100 on the 5 passenger phaeton and $110 on the 7 passenger phaeton. The prices on the two closed jobs remain unchanged. The revised list is as follows:

	Old Price	New Price
5-pass. phaeton	$1,745	$1,645
7-pass. phaeton	1,595	1,485
7-pass. sedan	2,435	2,435
4-pass. coupe	2,355	2,355

(*Other Reductions on Next Page*)

FOUR FELLOWSHIPS OFFERED

ANN ARBOR, MICH., Aug. 5—The Board of Regents of the University of Michigan will award, not later than November 1, four fellowships in highway engineering and highway transport.

No Gasoline Combine, Says Welch at Probe

Also Tells Senators Falling Prices Not Due to Investigation of Conditions

WASHINGTON, Aug. 9—Seasonal consumption of gasoline and the advent of the internal combustion automobile engine are assigned as the reasons for the high price of gasoline by the American Petroleum Institute, whose books were placed before the Senate Manufacturing Committee in the gasoline probe which began Monday.

There is no restraint of trade and no combination among the oil refiners of America to keep up the price, was the declaration of R. L. Welch, secretary and spokesman for the institute. Efforts on the part of the committee members to establish the fact that there was a gasoline combine were evidently expected by the Institute which cited several hundred pages of figures to prove that the independent companies are competitors and that the so-called Standard group constituted but 36.4 per cent of the total.

479 Refinery Plants

According to the figures submitted by the Institute there are 479 gasoline refinery plants in the United States. Of this number 38 belong to the so-called Standard group and the remaining 441 are independent.

Practically the whole of the first two days were consumed by members of the committee discussing the production and pro-rata sales of the two groups.

Touching on the profits made by the refiners, the declaration was made by Welch that from the fall of 1920 to the date of the Senate resolution authorizing the probe, the refiners of the United States, taken as a whole, produced gasoline and other petroleum products at a loss.

In response to questions of the committee as to the explanation of falling gasoline prices throughout the United States since the beginning of the probe, Welch declared that the contemplated investigation had nothing to do with the falling prices, but that the answer lay in the fact that the price of crude had fallen and that the refiners had lowered the price of their product.

Demand Forced Increase

The rise in prices in May and June of this year, he declared, was the result of the increase in the demand in relation to the supply. Efforts of the committee to show that this simultaneous rise in prices throughout the United States was the result of a combine was met with prompt denial.

Members of the committee, while refusing to discuss the trend of the probe, declared that they felt safe in predicting a "substantial" decline in the price of gasoline to motorists.

(*Continued on page* 297)

Durant Lists Stand Until Next August

Lack of High Priced Inventories Given as Base of Year's Guarantee

NEW YORK, Aug. 8—Present prices on Durant four and six cylinder cars are guaranteed until Aug. 1, 1923, by W. C. Durant, who has just advised his distributors and dealers of his decision

In notifying them, Durant says:

Our present prices were established when business was at a standstill, with material cost as low or lower than now prevailing. Durant Motors, Inc. made an absolutely lean start Aug. 1, 1921, with no high priced inventories and no burden incident to war time operations.

Other manufacturers, less fortunate, were obliged to liquidate by gradual price reduction and where this liquidation of high priced inventories has been successfully accomplished it has taken several months to reach our prices. We claim no advantage in the matter of material or labor from or after this date, but we do claim simplified design and engineering features and special merit not found in other competitors' lines.

This price guarantee does not apply to others in the Durant line like Locomobile, Flint, Star and the Mason truck.

Price of Closed Jewett Advanced; Open Lowered

DETROIT, Aug. 7—Price changes on the Jewett announced by the Paige Detroit Motor Car Co., effective Aug. 6, lowers the price on the open models $70, while on the sedan it is advanced $70 and the coupe $50. The revised list is as follows:

	Old Price	New Price
5-pass phaeton	$1,065	$995
3-pass. roadster	1,065	995
5-pass. sedan	1,395	1,465
4-pass. coupe	1,395	1,445

DORT CUTS CLOSED MODELS

FLINT, MICH., Aug. 7—A revised list is offered by Dort, which has lowered the prices on all of its closed models. No change has been made in the list on the two open cars, which remain at $885. The new prices go into effect at once.

The new list is as follows:

	Old Price	New Price
2-pass. roadster	$885	$885
5-pass. phaeton	885	885
Large coupe	1,315	1,265
Small coupe	1,065	1,045
Small sedan	1,115	1,095
Large sedan	1,445	1,385

FIRESTONE PRICES LOWERED

AKRON, Aug. 9—The Firestone Tire & Rubber Co. announces price reductions approximating about 15 per cent on its standard lines of cord casings. In addition to the price cuts the Firestone company has absorbed the 5 per cent excise tax heretofore borne by the consumer and added to the purchase price of the tire. The Firestone straight side 30 x 3½ is cut from $18.50 to $12.45, the 32 x 4½ cord from $41.90 to $37.70, and the 33 x 5 cord from $52.15 to $49.95. Similar reductions are made on other sizes. There is no change in the Firestone fabric prices, the 30 x 3½ remaining at $10.65.

MILLER TIRE LOWER

AKRON, Aug. 7—Price reductions averaging 10 per cent on cords and 12½ per cent on fabrics is announced by the Miller Rubber Co. The 30 x 3½ cord which formerly was quoted at $24.75, and more recently at $18, is priced at $15.95 on the new list. There is another 30 x 3½ Miller cord at $13.95 and still another — the new Wedge tread — at $12.50. The 32 x 4 cord has been dropped from $32.40 to $29.15, and the 35 x 5 cord to $49.30. Fabric prices begin at $9.

Estimates July Output in Excess of 246,000

NEW YORK, Aug. 9—With 90 per cent of the returns in from shipments and driveaways and estimating the remaining 10 per cent, the National Automobile Chamber of Commerce to-day announced that the July output of passenger cars and trucks would exceed 246,000, thus marking another record breaker for the industry in that this is the biggest July production ever recorded. In fact it stands as the third best of all months, being exceeded only by June, 1922, with 288,000, and May, 1922, with 256,000.

This July mark is only 14 per cent below June, 1922, which is a surprising attainment because of the usual seasonal slump in manufacture. It is proof conclusive of the continued demand for automobiles. The previous best July was in 1920, when a total production of 206,000 was reported. A year ago it was 177,643.

Large Output Made Price Cuts Possible

(*Continued from page 286*)

shaken down to a solid foundation by Sept. 1, and that the industry will go into the fall season with excellent prospects for large sales, especially in the closed-car field.

The seasonal decline thus far has been less than normal, and conditions are entirely satisfactory for this period of the year. Factories are not forcing production as they did in the second quarter, but they are doing exceedingly well. This applies also to parts manufacturers.

The market for light trucks promises to be very satisfactory the last half of the year, and sales of heavy vehicles are running about as they have for several months past.

Hupmobile Reduces Prices $100 to $200

In Addition Company Quotes $1,025 as List on Its Chassis Phaeton Now $1,150

DETROIT, Aug. 7—Reductions in the Hupmobile line range from $100 to $200. In addition a price of $1,025 is quoted on the chassis. The new list is as follows:

	Old Price	New Price
2-pass. roadster	$1,250	$1,150
5-pass. phaeton	1,250	1,150
Coupe	1,835	1,635
Sedan	1,935	1,785
Roadster coupe	1,485	1,335
Chassis		1,025

Chalmers Announces Cut on Four Models

DETROIT, Aug. 7—Price reductions ranging from $160 to $400 are announced by the Chalmers Motor Corp. as follows:

	Old Price	New Price
2-pass. roadster	$1,345	$1,185
5-pass. phaeton	1,395	1,185
7-pass. phaeton	1,495	1,345
Coupe	1,995	1,595

Haynes Open Car Price Cut $100; Closed, $200

KOKOMO, IND., Aug. 7—A new price list, showing reductions of $100 on the open 55 models and $200 on the closed 55 models, is announced by the Haynes Automobile Co. The revised prices became effective Aug. 2. The list follows:

	Old Price	New Price
Phaeton	$1,595	$1,495
Roadster	1,645	1,545
Coupelet	2,295	2,095
Sedan	2,595	2,395

SIGNAL TRUCK DOWN

DETROIT, Aug. 4—The Signal Motor Truck Co. has cut $500 from the prices throughout its entire line. The changes are as follows:

	Old Price	New Price
Model N-F, 1 ton	$1,950	1,450
Model H, 1½ ton	2,450	1,950
Model I, 2½ ton	2,875	2,375
Model M, 3½ ton	3,675	3,175
Model R, 5 ton	4,400	3,900

These prices are in effect as of Aug. 1.

PRICES OF BUICK TRUCK

FLINT, MICH., Aug. 7—The prices on the four-cylinder, special delivery Buick truck are based on a chassis price of $725. The body prices vary with the type and are as follows:

Open Express body with cab, $840; panel body with cab, $860; canopy top with roll curtains and cab, $855; canopy top with screen sides, roll curtains and cab, $875; De Luxe panel body with cab, $960; combination passenger and express body with cab, $935.

Mason Truck Added to Durant Products

Two Models Will Be Built—Factories at Flint and Bridgeport

NEW YORK, Aug. 7—The Mason Motor Truck Co. of Flint, Mich., has been added to the automobile family of W. C. Durant, according to an announcement by Durant Motors, Inc. This rounds out the group which now includes the Locomobile, Durant, Flint and Star cars and Mason truck.

The Mason company will bring out the Mason Road King, a 1-ton truck, and also the Mason Twoton. At present, production is centered on the Road King, which is being manufactured at both Flint and Bridgeport. At each place, it is expected that this production will reach 30 trucks a day. The Twoton will be taken up later.

A. C. Mason President

As yet the personnel of the company has not been announced, outside of the fact that A. C. Mason is president. Mason has been identified with the Durant interests for 20 years, principally as a builder of engines. Recently he branched out for himself, starting the Mason Motor Truck Co. of Flint, taking over a plant there that Durant built about three years ago for a spring factory, but which never was used. Before he got into production at this plant, his company became a part of Durant Motors.

The Mason Road King chassis will be furnished with all of the standard types of bodies, including stake, delivery and bus, and the price will be $1,200. It carries a four cylinder engine of 35.40 h.p., and the gear reduction is 4.9 to 1, which makes 40 miles an hour with full capacity load a possibility. The wheelbase is 131 inches and the weight of the chassis, with hood and fenders, is 2,950 lbs. Rear springs are 2½ in. wide and 38¼ long, and the front springs are 28½ in. in length. Cord tires 34 x 5 are standard equipment, as also are electric starter, lights and horn.

Celebrates First Year

NEW YORK, Aug. 7—The anniversary of the first Durant year was celebrated last Friday. A year ago that day the first Durant car was placed on public exhibition in New York City. Since that time 30,000 Durants have been produced, of which number 14,755 came through the second quarter of 1922.

To-day the Durant products include the Durant Four, Durant Six, Star, Flint Six, and Locomobile passenger cars and the Mason Road King, a truck. Durant plants have either been built or acquired in Oakland, Cal.; Muncie, Ind., Lansing, Mich.; Flint, Mich.; Long Island City, N. Y.; Elizabeth, N. J.; Leaside (Toronto), Canada, and Bridgeport, Conn.

There are nine plants in all. Muncie makes the Durant Six; Oakland, Durant Fours; Elizabeth and Lansing, the Star and Durant Four; Long Island City, the Durant Four and Flint Six; Bridgeport, the Locomobile and Mason Road King, and Flint, the Road King and Flint, which will be in production Jan. 1, 1923. The Canadian plant at Leaside handles the Durant Four and Star.

Star Distributors Meet

NEW YORK, Aug. 7—At the meeting of 75 of the eastern distributors of the Star now in progress at the Biltmore, here, it was announced by President Carroll Downes that the Star now is in production at the Lansing and Long Island plants and that production will start in the California plant in two weeks.

The distributors also were told of the awarding of a $1,000,000 contract for the construction of new buildings at Leaside, Canada, which will be used for Star construction.

While it has not been officially announced, it is believed that the Star policy to distributors and dealers will take the form of a fixed allowance instead of a discount on cars, which would protect the agents in case of a price reduction. The Star will be marketed through Durant distributors and dealers in that the Durant representatives will be given first choice when an appointment is made.

Says Birmingham Motors Used Mails Fraudulently

WASHINGTON, Aug. 7—Alleged to have sold more than $300,000 worth of worthless stock to Virginia, Maryland and District of Columbia investors, through misrepresentation, eighteen officials of the Birmingham No-Axle Motors Corp., Jamestown, N. Y., were to-day indicted by the Federal Grand Jury, on a specific charge of violation of Federal statute number 215, involving misuse of the United States mail. The indictment was returned as a result of more than ten months' investigation by post office officials.

According to the literature which was sent through the mails and on which the Government built up its case, the factory is alleged to have been turning out several hundred cars a day and sent out reports of large orders each month.

President Denies Charges

BUFFALO, Aug. 8—In a dispatch received here to-day from Jamestown, N. Y., Samuel A. Carlson, mayor of that city, denied all knowledge of alleged fraudulent use of the mails by persons said to be interested in the Birmingham Motors Co., of which he is president.

"This company was organized to produce automobiles," he said in speaking of the concern. "It has a plant at Falconer, which Mr. Mansfield of Detroit, our consulting engineer and a recognized authority on automotive construction, says is capable of producing 3000 cars a year at a cost of approximately $1,000 each."

Stutz Control Goes to Schwab Interests

Buys Stock from Bank—Steel Head Will Be Actively Interested in Company

NEW YORK, Aug. 9—Charles M. Schwab became an automobile manufacturer to-day when he and Eugene V. R. Thayer, formerly president of the Chase National Bank of New York City, secured the controlling interest in the Stutz Motor Car Co. of America from the Guaranty Trust Co. of New York, which has been in power since it bought at auction last week 132,914 1/3 shares of the Indianapolis concern at $20 a share.

Rumors that Schwab really was acting for his friend, Allan A. Ryan, in consummating this latest deal, are scouted by those who have been in close touch with the chairman of the directors of the Bethlehem Steel Corp. They say that Ryan is completely out of Stutz affairs and that Schwab personally will take an active part in the operation of the Stutz company. In fact, following the closing of the deal with the Guaranty Trust Co. he started for Indianapolis to map out a vigorous campaign for the Stutz company.

It is understood that the deal whereby Schwab comes into control is one that the Stutz directors have been working on ever since the auction and that the change in control is one that is most satisfactory to all parties concerned. That harmony exists and the old manufacturing administration has been indorsed is borne out by the action of the directors to-day by which W. N. Thompson is continued as president and given complete authority. Thayer and Willard Mitchell have been elected directors to fill the two vacancies and Mitchell succeeds, as secretary and treasurer, George F. Lewis, who has resigned.

It is said that Schwab and Thayer secured the stock from the Guaranty Trust for about the same price, $20 a share, that the bank paid for it at the auction.

Joint Highway Committee Will Meet in September

WASHINGTON, Aug. 9—The second meeting between the committee composed of representatives of the state highway associations and the committee of the National Automobile Chamber of Commerce will be held in Seaview, N. J., Sept. 14, 15 and 16.

The joint committee will continue the work of the first meeting in Washington this spring, when the subject of highway finances, legislation, regulations of loads and kindred topics affecting good roads were first taken up and discussed from a national aspect.

One of the most difficult problems in the construction of good roads is their finances, the committees reported at the conclusion of the Washington conference.

Ford's Coal Supply Will Last 14 Days

If It Is Not Augmented Company Will Have to Limit Production—May Close

DETROIT, Aug. 5—Ford Motor Co. has but fourteen days' supply of coal, according to an application for priority shipments filed with the Michigan State fuel administration offices in Lansing this week. If supplies are not available within that time, its plants at River Rouge and Highland Park and the Lincoln plant will be compelled either to close or go on such limited production as may be possible through the use of Detroit Edison power or auxiliary power generated with other fuel than coal.

Up to the issuance of the priority regulations by the Interstate Commerce Commission, the company had been hauling daily supplies over its Detroit, Toledo & Ironton Railroad, but this supply is now cut off. Without coal it will be compelled to cut off its supply of coke which it has been selling to other large car manufacturing companies in the district and will likewise be unable to furnish gas by-product of its coke plant to the city.

Offers D. T. & I. Facilities

The Ford company, through Henry Ford, has offered to the Michigan fuel administrator, the facilities of the D. T. & I. Railroad to bring in coal now standing in cars on the Louisville & Nashville Railroad, the coal to be used for Michigan utilities and industries, if the administrator can make the necessary arrangements with the L. & N. officials and national fuel administration officials.

Indications are that even if coal and rail strikes are settled at once, there will be a rationing of coal and power throughout the winter. The Detroit Edison Co. sees no hope of adequate supply in any case for months with domestic and public needs to be met. It will be impossible to meet the needs of householders and of industry for the winter no matter what progress is made in the dual strikes.

Rather fortunately, the real pinch will come at a time when sales will be declining, and the effect will be to interfere with manufacturing against the spring demand, rather than manufacturing to meet immediate sales requirements.

Strikes Felt by Chicago Makers

CHICAGO, Aug. 5—The coal and railroad shopmen's strikes have hurt the business of automobile parts and accessories manufacturers in Chicago and threaten to do it much more serious injury unless a settlement is reached soon.

According to W. E. Greene, secretary of the Association of Automotive Equipment Manufacturers, there has been in the last three weeks a substantial decline in the volume of orders coming to the Chicago firms. He believes this is due principally to hesitancy of customers to buy under the prevailing unsettled industrial conditions.

Some manufacturers also have been hampered by the slow delivery of materials, especially steel. Instances were cited of steel orders being four weeks on the way, which is very unusual. The local street car strike which has completely tied up the cars also has added to the troubles of the manufacturers.

Representations Made to Washington

WASHINGTON, Aug. 8—Representations have been made to Federal officials that the railroad and coal strikes threaten automobile production. It is said that the pinch has already been felt in the shortage of steels. Deliveries of finished products have also slowed up because of lack of equipment and the increasing number of bad order freight cars due to the shopmen's strike.

With little change in transportation in the coal situation, manufacturers throughout the country are manifestly disturbed as to the period of their operations. The coal shortage is becoming acute in many industrial centers and the stocks are at a low ebb. It is estimated that the average supply of coal in industrial plants is for a 20-day period.

It has been estimated that the daily consumption of bituminous coal in the United States at present is 1,600,000 tons, so that it may be seen that railroads, public utilities and industrial plants generally are eating into their stocks at an enormous rate, as the soft coal production is roughly only 4,000,000 tons a week or considerably less than half of the amount being consumed.

Would Give President Authority on Tariff

WASHINGTON, Aug. 9—Recommendations that the President be given authority to equalize competitive conditions by an increase or decrease in rates on the basis of the actual findings of the tariff commission and that the tariff commission be required to report to Congress and the President detailed studies of conversion costs, have been made to Congress by the National Automobile Chamber of Commerce.

In the letter addressed to Senator McCumber, chairman of the Senate finance committee, the N. A. C. C. points out that the tariff, if it passed to-day, would not meet the needs of to-morrow.

The chamber suggested that the tariff measure now under consideration could be rendered most valuable to American industry if an amendment could be written into it which would accomplish these two purposes. It is the belief of the automobile industry, as expressed by its national organization, that the inclusion of these principals would make the tariff bill "an operative measure and would do much to relieve the uncertainty which now exists in the business world."

It is expected the tariff will be disposed of before September.

Bill May Be Chosen President of Saxon

Company Works on Car Changes —Stockholders Approve Stock Issue

DETROIT, Aug. 9—The Saxon Motor Car Co., following the authorization by its stockholders of a new issue of preferred stock which will give the company $750,000 in additional working capital, is working out plans for revisions in its product, which if followed through will result in the changing of the line into a six cylinder line which will market at about the same selling price as the present four cylinder.

It is expected, too, that the introduction of the new capital will see the reorganization of the company, and the election of a new directing group, so that the company may proceed to market its product on an extensive scale. Harry L. Bill, vice-president in charge of manufacturing, who has been directing the affairs of the company since the resignation of Clarence A. Pfeffer as president, will probably become president of the reorganized company.

As authorized by stockholders, the company will issue 200,000 shares of stock which a New York banking group will underwrite for $750,000 in cash. This stock will have a par value of $1,000,000. Under the plan the present $1,000,000 preferred issue will be called in and cancelled. Liabilities will remain unchanged, and the company will have $750,000 in additional working capital.

No Gasoline Combine Says Welch at Probe

(*Continued from page* 294)

"Despite the testimony which has been taken thus far tending to show that the refiners are losing money, while at the same time the automobile owner is being made to pay more and more for his gasoline, the committee is of the belief that the price of gasoline can be brought down substantially, and we intend to do so," declared Gilbert C. Roe, attorney who is actively conducting the probe for the Government.

The actual hearings will continue for more than a month, it is indicated.

Gasoline Prices Lowered

NEW YORK, Aug. 8—The Standard Oil Co. of New Jersey announces a reduction of 2 cents in the price of gasoline for all of its territory. A similar cut in price together with a 1 cent reduction in kerosene throughout Pennsylvania and Delaware was made by the Atlantic Refining Co., the retail price of gasoline now being 27 cents and to garages 24 cents. The Texas Company has followed these reductions in the same territory and has reduced crude oil 25 cents a barrel in Oklahoma, Kansas and northern Texas districts.

Sales in New York Stimulated by Cuts

Effect Would Have Been Greater If Reductions Had Been Made Earlier

NEW YORK, Aug. 8.—Price reductions on several popular lines of passenger cars have had the expected effect in New York, stimulating slightly mid-summer sales of the cars reduced and materially slowing up deliveries in competitive lines.

Coming at one of the slow periods of the year in the Metropolitan District, when a large majority of car buyers are away on vacation, planning to go away or just getting back, the effect of price reductions has not been so keenly felt as it would have been a month or two ago. The lines reduced have made a more than seasonal number of retail sales within the past week, an unusually large number of which were without trades, indicating that the new prices had reached out and brought into the market some buyers who were holding off until the cars they wanted got within reach of their pocketbooks.

Wholesale Business Better

There has also been quite a bit of improvement in wholesale business in these lines, and particularly there has been an increased demand for dealerships in some of the smaller communities of the territory. This applies especially to two or three cars in the class recently reduced whose dealer organizations had never been wholly rebuilt after the stagnation period of a year ago.

In connection with low and medium priced cars whose prices have not been reduced the public has adopted a natural waiting attitude. Some dealers, as well, are looking for reductions on their lines between now and the first of September.

The demand for closed cars continues strong and this with general conditions outside the railroad and coal strikes has prompted Metropolitan distributors and branch managers to anticipate a brisk fall business, provided the national industrial troubles are settled.

Goodyear's Net Sales to July $51,410,240

NEW YORK, Aug. 9.—Net sales of $51,410,240 for the first half of 1922 are reported by the Goodyear Tire & Rubber Co. The surplus account shows a total of $1,915,889. The general balance sheet as of June 30, 1922 shows that the company has no bank loans and that the ratio of quick assets to current liabilities is in excess of ten to one.

The net quick assets totaled $65,511,157, of which $32,756,663 was in the form of inventories, $14,603,402, accounts receivable; $8,500,856, United States Treasury certificates and other marketable securities and $9,560,136 cash on hand and in banks.

Net current liabilities totaled $6,223,554, of which $4,797,720 consisted of trade acceptance accounts payable; $80,500, notes payable and $1,345,334, accrued interest and premiums on bonds redeemed. The profit and loss surplus is $5,535,933.

Production and sales for the first half exceeded those of the same period last year, with June a record month for Goodyear. June sales and deliveries totaled 779,590 beating the previous best —734,948 in March, 1920.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Last week call money ranged between 3 per cent and 5 per cent as compared with 3 per cent to 4 per cent in the previous week. Funds were in plentiful supply for all kinds of business. Dullness was the general characteristic of the market for fixed date maturities, and no large transactions were reported. Quotations remained the same as for the previous week, 3¾ per cent to 4 per cent for 60 and 90 days' maturities, 4 per cent for four and five months', and 4¼ per cent for six months. The rate for prime commercial paper was slightly higher, being quoted at 4 per cent as compared with a range of 3¾ per cent to 4 per cent for the previous week.

Nothwithstanding negotiations for an adjustment of the controversies, the coal mining and railroad strikes are still important factors in impeding general business recovery. The effects of these labor troubles appear chiefly in restricted production, delayed movement of merchandise, restricted buying power and rising prices in certain iron and steel products.

So far the reflection of fuel scarcity is shown primarily in the iron and steel industries. During the month of July more than 10 per cent of pig iron furnaces were shut down. After about six months of steadily increasing output, there was a net loss of 21 furnaces, the majority of them having been blown out in the last week of the month. During the 31 days of July production amounted to 2,400,045 tons, or 77,421 tons per day, as against 2,361,028 tons for the 30 days in June, or 78,701 tons per day. The 171 furnaces in blast August 1 had a capacity of about 68,000 tons per day, as against 81,845 tons per day for 192 furnaces in blast on July 1.

For the week ended July 22 car loadings totaled 861,124, an increase of 217 cars over the total for the preceding week, and an increase of 73,090 over the corresponding week of last year. As compared with the corresponding week of 1920, however, the total loadings for the week showed a decrease of 67,294 cars. Omitting coal loadings, the total for the week ended July 22, 785,064 cars, was an increase of 58,236 cars over similar loadings for the same week two years ago, and is the heaviest total for this season of the year in the history of American railroads.

FINANCIAL NOTES

B. F. Goodrich Co. net earnings for the first half of this year after deducting depreciation and interest on borrowed money amounted to $1,312,000. The net sales for the period approximated $39,000,000. The directors have authorized the calling for retirement on Oct. 1 of $30,000,000 7 per cent gold notes due April 1, 1925 as part provision for the retirement of these notes. The directors have approved the immediate sale of $20,000,000 of the issue of $25,000,000, first mortgage 6½ per cent 25 year gold bonds which was authorized by the stockholders at a special meeting on July 24.

Gray & Davis, Inc. stockholders at a special meeting have approved the refinancing proposal authorizing 10 year mortgage 7 per cent bond issue of $1,500,000 of which $1,000,000 is to be issued soon, and also an increase in the common stock of 115,000 shares of which 22,000 shares is to be issued immediately.

Stewart-Warner Speedometer Corp. for the quarter ended June 30 reports a profit before taxes of $1,605,267 which is the largest in the history of the company and compares with $601,945 in the similar quarter of 1921. For the first half of this year the profits totalled $2,121,686 as against $652,872 the same period of last year.

Keystone Tire & Rubber Co. in its tentative operating statement for the first six months of this year, shows operating income of $872,351, operating expense of $75,400 and a loss after various other charges of $145,026. Isadore Brenner has been elected a director to succeed Sydney Bernheim. Other directors have been re-elected.

Franklin Automobile Co. reports that the sale to dealers of stock, preferred and common, issued in the expansion program of the H. H. Franklin Manufacturing Co., will amount to approximately $1,000,000, or one-fifth of the total new capital when all the subscriptions are in.

American LaFrance Fire Engine Co. for the six months ended June 30 reports operating profit of $456,970 as against $452,653 for the same period last year. The net income after interest but before allowing for taxes was $450,899 as against $356,178.

Ajax Rubber Co., Inc. for the six months ended June 30 reports earnings available for surplus of $191,535 or the equivalent of 45 cents a share on the outstanding capital stock. For the same period in 1921 there was a deficit of $5,205,577.

Timken-Detroit Axle Co. has declared the regular quarterly dividend of 1¾ per cent on the preferred stock, payable Sept. 1 to stock of record Aug. 20.

B. F. Goodrich Co. has declared the regular quarterly dividend of $1.75 a share on preferred stock.

Wright Aeronautical Corp. reports net sales of $667,037 for the quarter ended June 30 and net profits after taxes of $136,340.

OVERLAND SALES BIG

TOLEDO, Aug. 7—Total shipments of Overland and Willys-Knight cars for the first six months of 1922 lacked only 113 cars of being equal to the entire shipments for the entire year 1921. Indications for the third quarter, the company reports, point to a continuance of this demand.

INDUSTRIAL NOTES

Miami Rubber Co. of Cincinnati has been placed in the hands of Edward F. Peters and William J. McCauley as receivers upon application of Joseph A. Niehaus, treasurer of the company. The assets of the concern are estimated at $91,000 and the liabilities $21,408. In his application Niehaus says the company's condition is due to its inability to collect outstanding accounts. The court ordered the receivers to continue the business.

Brightman Manufacturing Co.'s control has passed from the children of L. H. Brightman, who is recuperating at Long Beach, Calif., to Mrs. L. H. Brightman, his wife. It is announced that the four sons will organize a new company and erect a plant in Columbus where the Brightman factory is located for the manufacture of finished steel, shafting machinery, cold finished products and an additional line of screw machine products.

Clinton Tire & Rubber Co. has bought at a receiver's sale the Ohio State Rubber Tire Co., Sandusky, Ohio. The property was appraised at $262,000 and the indebtedness was about $300,000. The sale price was $18[illegible]. The purchasing company has been incorporated for $100,000 and will have the local plant in operation next month. With the installation of new machinery, it is expected the capacity of the plant will be from 500 to 1,000 tires a day.

Biflex Products Co., manufacturer of automobile bumpers, has increased the capacity of its plant at North Chicago, Ill., 150 per cent by the purchase from the Chicago Hardware Foundry of buildings and land adjoining its property. The new property is well served by railroads and the ground now held by the company is large enough to provide for future expansion.

Topp-Stewart Tractor Co. of Clintonville, Wis., is making arrangements with the Four Wheel Drive Auto Co., Limited, of Kitchener, Ont., for the Canadian manufacture of its products. At the present time the company does not contemplate building a plant in Canada but will take immediate steps to form a new Canadian company.

Grand Rapids Tire & Rubber Corp. has authorized the construction of an addition to the Corduroy Cord factory [illegible] of a complete new unit. Work on the new addition will start at once and when completed will cost approximately $250,000.

Farco Manufacturing Co. has been organized with offices at 30 Church Street, New York City, by Paul M. Farmer, formerly connected with the Klaxon Co., wholesale [illegible]. The company is producing and will market through trade channels a line of automotive accessories.

Brown-Lipe-Chapin Gear Co., Syracuse, has 1,750 employees on its payroll including 250 on night shifts. The gear industry in that city while not at its highest is estimated as approximately 80 per cent of what it was when production was at its peak two years ago.

Smith Wheel Co., Inc., Syracuse, maker of steel wheels for motor trucks, is now doing nearly five times as much business as it did the same time last year, according to Burns Lyman Smith, president of the corporation.

Scheid Engineering Corp., 90 West Street, New York City, has been appointed metropolitan and export representative for the Franklin Moore Co., Winsted, Conn., manufacturer of material handling machinery for industrial plants.

Durant Common Holders Totaled 63,237 July 20

NEW YORK, Aug. 7—When the stock of Durant Motors, Inc., was withdrawn from the market last Saturday, at which time the corporation had disposed of all it wished to sell, the company made the claim that, although only a year old, it ranks the fourth largest in the United States in point of numbers of stockholders of common in the United States.

At the time the national statistics were compiled for the second quarter of the year the American Telephone & Telegraph Co. led the field with 216,103 common stockholders, with the Pennsylvania Railroad and its various subsidiaries second with 139,628. Third was the United States Steel Corp. with 99,512. Durant Motors and its divisional companies had 59,500, but since that time this number had increased to 63,237 as of July 20.

General Motors had 71,331 stockholders of all kinds at the end of the second quarter this year, of which 49,725 held common stock.

Barley Will Manufacture Medium Priced Automobile

DETROIT, Aug. 9—The Barley Motor Car Co. is preparing to bring out a medium-priced car following the general lines of the Roamer, according to a statement by George Hopkins, secretary of the company, in an address before the Kalamazoo Exchange Club. The car will not be called the Roamer, this name being reserved for the higher priced vehicle. Hopkins declined to give any details concerning the new car.

NEW EARL ROADSTER

JACKSON, MICH., Aug. 5—A new roadster model has been added to the Earl line. Three color options are offered, while either wire or disc wheels are standard equipment. Ready for the road, the car weighs 2460 lbs. Its over all length is 13 ft. 11 in. The price is $1,485, which is $390 greater than the Earl phaeton.

WILLS STE. CLAIRE BROUGHAM

DETROIT, Aug. 8—A Wills Ste. Claire brougham is now in production at the Marysville factory, and deliveries are ready to go forward at once. The brougham is the first of this model that the company has made and is priced at [illegible].

MITCHELL HAS NEW PHAETON

KENOSHA, WIS., Aug. 7—Mitchell Motors Co. announces a new five-passenger phaeton, which will sell for $1,790. This model has a newly designed radiator shell. Two color options, maroon and blue, are provided as standard.

METAL MARKETS

ALTHOUGH activity in the steel industry is confined to the immediate needs of the hour and sales managers wear an air as though market conditions a month or two hence were the least of their worries, there is unmistakable evidence, especially so among the smaller producers of an undercurrent of uneasiness as to the market's lay once the abnormal conditions of the present have given way to a more orderly state of affairs. Long before the coal and railway transportation strikes had become serious handicaps there was much misgiving as to the extent of steel consumers' demand during the last quarter of the year. A seasonal slacking of buying during that period is always taken for granted, but while things were running fairly normal it was thought that the momentum of August demand would suffice to carry the mills into September and at least into the beginning of the year's final quarter with a fair backlog of orders.

The precarious situation in which many steel consumers find themselves now with reference to their own fuel supply has caused them to lose all interest in other than immediate shipments of steel. Making allowance for enforced curtailment of production as the result of inadequate fuel supply, quite a few producers, especially sheet rollers, have nominally a sufficient quota of orders on their books to carry them through September. None of this business, however, is fresh. It denotes backwardness in production rather than continuity of demand. Obviously the post-strike market for steel remains to be established. The nominal quotations now prevailing will form the basis on which the contest between buyers and sellers will be ushered in, but it remains to be seen whether these price levels will be able to endure the apathetic attitude of consumers when it comes to any but immediate shipments.

Demand for heavier shipments on account of previously made contracts for sheets by some of the automotive interests continues to be stressed in the market. Apparently integrated steel producers are diverting considerable of their fuel supply from units upon which the pressure is not so insistent to sheet rolling and finishing mills. As a result sheet production has been relatively less impaired than that of other steel products. The chief interest's sheet mills are working at close to 70 per cent of their capacity and automotive sheets are being rushed into consumers' hands at a greater speed than is tin plate. Scarcity of good order box cars and a not overabundant supply of labor in hot mill and shipping departments are some of the difficulties, aside from fuel shortage, with which the sheet mills have to contend.

Pig Iron.—Representative transactions in the pig iron market are in abeyance. Blast furnace interests are asking higher prices, but automotive foundries are apparently fairly well supplied. Those who are not buy small tonnages in a hand-to-mouth way. Foreign irons are active.

Aluminum.—The situation has undergone no change. Aluminum sheet consumers appear to have on hand all the material they can work up.

Copper.—Several large copper mining interests have abandoned their former practice of making public monthly reports of their output. Their decision, it is stated, was reached with a view to preventing foreign copper consumers from gaining knowledge that would give them an undue advantage. A tic. market is in evidence.

Calendar

SHOWS

Aug. 26-Sept. 1—Toronto, Ont., National Automobile Show held in conjunction with the Canadian National Exhibition.

Sept. 4-9—Indianapolis, Automobile and Accessory Show in conjunction with the Indiana State Fair, Auto Show Building, under the auspices of the Indianapolis Automobile Trade Association, J. B. Orman, manager.

Sept. 23-30—New York, Closed Car Show, Grand Central Palace.

Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 27-Feb. 3—Chicago, Annual Automobile Sales.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Sept. 1922 — Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Associação Automobilista Brazileria.

Sept. 15-20—The Hague, Automobile Show.

September — Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.

Oct. 4-15 — Paris, Automobile Show, Grand Palais.

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 10 - Dec. 19 — Brussels, Automobile Show, Palais de la Cinquantenaire.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show, British Cycle Motors, The Tower, Warwick Road, Coventry.

November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

CONVENTIONS

August 28-Sept. 2 — Detroit National Safety Congress.

Sept. 18-23, 1922 — Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

Sept. 13, 14, 15—Buffalo, Lafayette Hotel, Annual credit meeting, Motor and Accessory Manufacturers Ass'n.

Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

Elliott Sets Mark in Cotati Contest

COTATI, CAL., Aug. 7—Frank Elliott set a new world's record in winning the 50 mile race and also won the 100 mile feature of the triple event program of automobile races on this speedway yesterday.

Driving a Leach special, equipped with a Miller engine, Elliott did the 50 miles at an average speed of 107.5 m.p.h., beating Bordino's record of 116.2 m.p.h. made in this same bowl last spring. Elliott's time was 25.49:7. Tommy Milton, driving a Leach special, was second, and Eddie Hearne, in a disteel Duesenberg, came third. Elliott did his fastest lap at the rate of 122 m.p.h.

Elliott won the 100 mile race in 53 minutes flat, at the rate of 113.7 m.p.h. Jimmie Murphy came in second. Murphy was forced into the pits in the 17th round of the 50 mile race and discovered that a tire had become wound into the inner disc of the wheel necessitating much time for repairs and so withdrew.

Tommy Milton was third in the long race and Bennett Hill, a newcomer in Northern California racing, was fourth. Jerry Wonderlich, Harry Hartz, Joe Thomas, Al Melcher, Art Klein and Roscoe Sarles were the other entries.

The 50 mile Ford dealers race, preliminary of the afternoon, was won by A. G. Matthews, driving the Hugheson Ford special, in 43.11:4.

VELIE DEALERS ORGANIZE

CHICAGO, Aug. 8—Distributors and dealers handling the Velie cars have effected a permanent national organization. The following officers were elected at a meeting attended by representatives of Velie sales organizations from all over the country at the factory in Moline: President J. K. Gregory, Gregory Motor Co., Kansas City; vice-president, A. J. Shorey, New England Velie Co., Boston; secretary, R. C. Cook, R. C. Cook Co., Chicago. The organization is entirely independent of the factory and its field staff. The main purposes are close and active co-operation in expanding the market, the interchange of management and sales methods and ideas, and the promotion of common interests.

Better Window Displays Approved by Chevrolet

DETROIT, Aug. 9—The Chevrolet Motor Co. has endorsed a program for better window displays throughout its dealer organization, under which the windows of the Chevrolet branch in the General Motors Building will be a key for all sales windows throughout the country. This window will be given an elaborate dressing each month, in which the utility of the car as a means to promoting outdoor pleasure will be featured.

The treatment of the window will be carried to all Chevrolet dealers by photographs and minute descriptions in the Chevrolet sales organ. In endorsing the plan the company takes the attitude that it can be used effectively in all cities of 50,000 population or over to promote ownership desire among persons hitherto without cars, and of concentrating general automobile attention upon the Chevrolet line.

Honolulu Reports Trade Returning to Good Basis

NEW YORK, Aug. 7—Mail advices from Honolulu relative to conditions there say:

The total number of cars in the islands at this time is approximately 15,000 and slowly increasing. The car business has had a number of very severe setbacks, attended by the liquidation of some concerns, but now is getting on a solid basis again. Tourists are here in small numbers because of inadequate transportation facilities between here and the mainland.

The pineapple business is in excellent condition. The summer's pack this year is all sold. Sugar is recovering somewhat from low prices and a few plantations expect to resume payments of dividends within the next few months.

Dealers to Protest Carload Minimums

PORTLAND, ORE., July 31—Automobile dealers of the Pacific Northwest are to seek relief from what they claim to be discriminatory carload minimums, in action before the Interstate Commerce Commission. This decision was reached following meetings at Portland and at Olympia, Wash., where it was shown that California shippers of automobiles are paying as much as $50 less per carload than shippers into Portland, Seattle and Spokane.

The trouble, according to the dealers' committee, lies with the minimum weight restrictions on the average carload used coming into Oregon and Washington is for automobiles. This minimum for cars 11,200 pounds, while into California the minimum is 10,000 pounds. The carload charges are based on this minimum, though the freight may weigh less. The rates per hundred in both districts are practically the same, and the dealers claim that the railroads cannot justify the discrimination, since the rate structure on all but a very few commodities is the same to all points on the Pacific coast.

With the demand for closed car constantly increasing, this matter is becoming increasingly important, the amount of "dead" space in the car being greater. In some cases this has reached such a proportion that the freight charged on each automobile has reached nearly 20 per cent of its total sales price in Portland.

Committee Appointed

The Automobile Dealers Association of Portland has appointed a committee, headed by F. W. Vogler, president of the Northwest Auto Co., to co-operate with committees from other Northwest dealer bodies to fight the case. The committee is authorized to engage counsel and to carry the matter to the Interstate Commerce Commission for final action by that body.

AUTOMOTIVE INDUSTRIES
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Truck Makers Perplexed by Baffling Fundamental Problems

Trading evil generally considered most serious question. Answer hard to find. Exceedingly difficult to locate right kind of dealers. How dealers can finance themselves another riddle of industry.

By James Dalton

NO one at all familiar with the subject will deny that highway transport is in its infancy. The recent development of the motor truck has brought many perplexing problems to which manufacturing executives are giving their earnest attention.

But inquiry will disclose that truck makers are giving deepest study and closest consideration to fundamentals which have been perplexing ever since the industry discarded its swaddling clothes.

These subjects have been discussed and debated until they have lost their freshness and have become thorns in the sides of those concerned with them. Something new always is more interesting than something old, but it does not always follow that it is more important.

Truck manufacturers are practically agreed that the three most important questions to-day, as they have been for years, are:

(1) How to build up a distributive organization composed of real merchants and business men.
(2) How to finance distributors and dealers.
(3) How to make money on sales when trading has reached such proportions that almost every sale needs the peculiar talents of a David Harum to turn it into a profit.

Notwithstanding all the argument and debate on these problems they seem little nearer solution than they were when they first became important. Very few of the many companies in the field have worked out plans which are in any sense satisfactory to them.

While getting the right kind of dealers who are able to finance themselves is in itself hard enough to bring creases in the brow of the greatest living optimist, most factory executives are tearing their hair trying to find the answer to the trading evil. If their dealers don't trade they don't make sales and if they do trade they don't make enough profit to increase their bank account appreciably.

The used car problem in the passenger car field is bad enough but in the truck branch of the industry it is worse. Remedies for the evil are easier to find in the sale of passenger cars but no panacea has been discovered. If anyone has found even a real sedative for the trading pains in the truck branch of the industry, he is keeping it a profound secret.

Some truck executives who are close students of their own problems and those of their neighbors, are coming to the conclusion that the real answer lies in educating truck operators to the profit to be derived from using their vehicles until they are worn out or ready for the junk pile.

If such an educational campaign is to meet with substantial success, service must become a fetish. Generally speaking, commercial vehicles require more service than passenger cars, and it is equally true that in most places service facilities are not as good.

A truck is a liability every day it is not in operation and for that reason the manufacturer who provides his users with the best service is the one likely to reap the largest harvest of sales.

The only way truck users can be induced to keep their old vehicles on the road is to give them prompt and efficient service at a reasonable price, thereby making it profitable to keep them in service rather than trade them in and get new ones. As it stands now it seems to be the fashion to run a truck for all it is worth one year and then trade it in the next for a comparatively small cash consideration.

AS long as this custom continues to prevail in its present proportions, few truck dealers will be able to show a satisfactory profit for themselves. When their earnings do not reach a reasonable figure they are discontented and when a man is discontented he never does his best work. When a factory branch does the trading it is worse for the factory.

Another complicating factor is the army truck reimported from England and France by the speculators who purchased them for a song after the war and who can afford to sell them over here for a fraction of their present list price. If a prospect can't get a liberal trading allowance he is quite prone to go out and buy one of these vehicles. The supply will be exhausted in the course of events, but it is putting a crimp in business at this time when the market is reviving. If Congress would impose a prohibitive reimport duty, as proposed in the Graham resolution, it would help a lot.

It would be easy enough to solve the trading evil if all manufacturers could make a gentlemen's agreement to adopt a definite policy in this respect, but such an agreement would be hailed as a combination in restraint of trade and even if it did not run counter to the anti-trust laws it would be impossible of realization with competition as keen as it is to-day and will be for years to come.

Inasmuch as a concerted policy is impossible at present it is up to each manufacturer and his own dealer organization to evolve the plan which comes nearest to meeting their particular needs. Many executives are getting gray-headed trying to hit upon this plan. Most of them would be well content to sell half as many trucks if they could eliminate trades.

Altogether it's a mighty hard nut to crack.

The most common practice seems to be to instruct dealers not to make trades on which they can't make money and not to look for volume of business. Its a philosophical dealer, however, who won't grumble when he refuses a trade because it will bring him only a small profit and then sees his neighbor across the street make the sale with the possibility of repeat orders in the future if he gives satisfactory service.

In the race for business, it must be confessed, some of the manufacturers themselves are not without reproach. For example, a prospect goes to a branch of a certain company and asks how much of an allowance will be given on his old truck. He gets an offer and then goes to a couple of other branches. He listens to their proposals and if they are not as good as that of the first company he tells them of the original offer. They say they will take it up with the company and see if they can't do something special for him. Usually, they meet the offer of the first company. Then the shopper goes back to No. 1 and says:

"You said you were making me a mighty liberal offer when you gave me that price for the old wagon, but you weren't. I know of a couple of other places where I can do better. Do you want to come through with something worth while?"

Then, rather than lose the sale, the first company interviewed will raise its bid and make the sale.

This kind of competition isn't good business, it doesn't tend to stabilize the market and it tends to give dealers hydrophobia.

Even if the contention that trucks should be operated until they are worn out is accepted without question, it brings in complications. Trucks frequently don't give as good service as they should because they are operated by careless or incompetent drivers who abuse them. Drivers of this type, and unfortunately there are many of them, have no regard for the factor of safety, either for the vehicle or the pedestrian. They seem to look upon traffic regulations as so many people do the Volstead law—made only to be broken. The vehicles they drive are subjected to overloading and other abuses which wear them out before their time and send them to the repair shop when, with decent treatment, no repairs would be necessary.

The subject of trades is closely related to that of dealers. The better merchant and business man a dealer is, the more likely is he to turn down a prospect unless he can show a profit on the transaction. The chances are that if every truck manufacturer had exactly the right kind of sales organization the retail end of the truck business soon would settle down on a solid foundation just as the sewing machine, piano and talking machine businesses did after long periods of travail.

As a matter of fact the president of at least one important truck company is wondering if a good many of the evils of the replacement business cannot be solved by adaptation of the methods employed successfully in the sale of sewing machines and pianos. That angle of the situation might be worthy of serious study.

IT'S a hard job to get the right type of business man to handle trucks. He is not attracted by the comparatively small profits. While in the aggregate there are many men of this type in the truck business, there are many more who have little knowledge of business or business methods. They don't know how to read a balance sheet to say nothing of preparing one. Most of them have too heavy an overhead.

There has been a sadly large mortality among truck dealers since the depression began in 1920. It has been especially heavy in the agricultural districts and the smaller urban centers. As a consequence, just when the farmers are coming back into the market, most truck makers find themselves woefully weak in their representation in these sections. They can get by in

TRUCK manufacturers are giving most earnest thought at this time to three questions almost as old as the industry. They are:

How to get the right kind of dealers.
How to finance dealers.
How to cure some of the ills of trading.

This article does not answer these perplexing questions but merely outlines some of the difficulties which confront manufacturers of commercial vehicles and their distributing organizations.

the larger cities, but they have few missionaries to carry the gospel of the commercial vehicle to the farmer.

Largely because of their inability to get satisfactory dealers, most truck companies are turning to a greater or less extent to factory branches. This move, generally speaking, is largely experimental. If it is successful it undoubtedly will expand. The biggest joker in this system is that branches must trade, too, if they are to get their share of the business. As a matter of fact one of the greatest grievances of the truck dealer in the town where rival companies have branches but his company has none, is that the branches offer such liberal allowances in trades that he cannot possibly compete with them.

Dealer financing is the third acute problem in the truck industry. With loose money piling up in bank vaults and interest rates constantly trending towards lower levels, it might seem a comparatively easy matter for a reputable dealer to go to his bank and finance himself for a reasonable amount. But it isn't.

Banks in the aggregate have lost a lot of money in the last two years on trucks. It must be confessed that trucks weren't sold on a scientific basis, at least before the slump came in 1920, and a lot of them were purchased on time by people who thought they could make them pay for themselves. They might have been successful in this commendable effort if the bottom hadn't dropped out of business. It did drop out, however, and when there was no freight to transport there was no money with which to meet the notes and the banks were left with the trucks on their hands.

They weren't in a position to hang onto these commercial vehicles and wait until the market improved, so they sold them for whatever cash they would bring and pocketed their losses. With these experiences back of them, it is not unnatural that banks should look askance upon the financing of truck sales. They are not likely to analyze the economic situation to determine that the prospects for successful commercial vehicle operation are better now than they have been in two years. They don't want truck paper and they won't take it, in most places. This makes it exceedingly difficult for the dealer to finance himself.

AUTOMOBILE finance companies are not keen on truck business either. Their experience has been much the same as that of the banks. Credit men for these concerns spend a good share of their time cussing truck companies because of the calibre of their dealers as business men. They are more rigid in their requirements than they ever were before.

If the truck dealer can't finance himself either at his bank or through a finance company he's in a bad way. His company isn't going to ship him stocks unless he can pay for them.

What's the answer?

That's what's puzzling the truck makers. There's a fortune in it for the man who can solve the riddle.

THE companies which are in a strong enough cash position to undertake the work are themselves helping their dealers. One of them has evolved a plan under which the trucks on dealers' floors are financed through the banks. The dealer borrows from the bank at the regular interest rate and the loan is guaranteed by the company. When a truck is sold the transaction is automatically closed. That would be a perfectly satisfactory system if all trucks were sold for cash, but they aren't, by any means. Unless the purchaser can get credit from a bank or a finance company it's up to the dealer to finance the sale. If he does he takes a chance unless he's mighty sure of the character and ability of his prospect.

Many manufacturers believe that the day of the heavy duty truck, except for use in large urban centers, is rapidly passing. It is logical to assume that it will be easier to finance individual sales of less expensive vehicles but it may bring up a new crop of problems not yet foreseen.

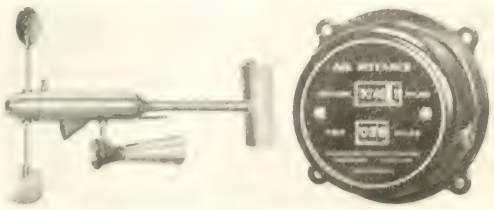
Makers who believe that the trend is away from heavy trucks base their contention on the fact that nearly 75 per cent of all the commercial vehicles now in use are of less than 2 tons capacity and nearly 70 per cent less than 1½ tons capacity. The demand for lighter vehicles is increasing steadily except in the larger cities. It is felt that the various states will not be willing to build roads which will carry heavy traffic when comparatively few trucks of more than 2 tons capacity are in operation. In this connection state regulations in regard to overloading are highly important. There are many truck makers who believe there will be important developments in the trailer field in the next few years.

Most manufacturers in the truck field, notwithstanding all the difficult problems with which they are confronted, are convinced that business will be better in the year which began July 1 than in the twelve months which ended at that time. They feel that sales for the next six months will depend largely upon the farm market but the outlook for large sales in the agricultural districts now is bright. They are certain that 1923 will be better than 1922 both for themselves and their dealers.

An Air Distance Recorder

AN instrument intended to perform in an airplane the function performed in passenger cars and trucks by an odometer showing the distance traveled, is being manufactured by the Pioneer Instrument Co. under the name air distance recorder. The instrument is similar to an odometer in appearance.

The instrument is actuated by a device called a transmitter which has a propeller rotated by passage of the plane through the air. Once a mile this propeller actuates a valve which admits air to a vacuum space exhausted by a small venturi tube. In so doing one mile is added to the record shown on the dial of the indicator, which is joined to the transmitter by a 3/16 in. metal tube.



Details of Pioneer Air Distance Recorder

Proper Highway Finance Essential to Automotive Progress

The building of highways should be put upon a sound economic basis. Adequate maintenance funds must be provided. Co-ordination of various highways needed. Deferred serial bond issue best form yet devised for fianancing where bonds are necessary.

By A. J. Brosseau*

THE past ten years have witnessed an evolution in highway transport far beyond the conception of even those men who pioneered its cause. From a total production of some 500,000 cars in all of the period up to and including 1911, the use of the motor vehicle has been extended to 10,500,000 machines in the opening months of 1922, while the production and sale continues to-day without abatement.

As President Harding said in his first address to Congress: "The motor car has become an indispensable instrument in our political, social and industrial life" and the evidence is to be found in the rapidly multiplying uses to which the vehicle is being put.

With this modern unit of transport has come an insistent demand for modern highways. Roads designed for slow moving traffic have been found inadequate. The increasing use of the motor truck has brought with it new requirements.

Highway engineers are faced with the dual task of providing heavier types of road bed and of finding the means to finance the huge construction program ahead.

To obtain a full perception of the relation existing between rolling stock and road bed, it is only necessary to say that while the former has increased some 2000 per cent in a decade, the effective increase in the latter has been only 250 per cent.

It is obvious, then, that just as the last decade has seen an intensive development of the machine, so the next decade must see an intensive development of the highway, if the two are to be linked together in an efficient and economical system of highway transport.

Sociological, economic and social surveys have demonstrated the imperative need of this system. No preachment is necessary. No alternative thinkable.

THE task then is to search out underlying facts and to proceed to a reasoned program of finance which will at once properly distribute the costs of this great undertaking, safeguard the investment of the public and permit the construction and maintenance of a system designed to give the broadest possible service.

Before a definite financial program can be laid down, it is necessary to examine the character of the project to be financed. This is not easy of determination in the present case because the very youth of highway transport and the lack of definite knowledge concerning its influence has obscured us in a mist of half-truths, fallacies and nebulous theories which must be subjected to the rays of understanding.

Thus we have heard it said the modern traffic has torn modern roads to pieces long before the expiration of the bonds issued to finance them. Let us then examine first the very nature of the highway.

First we find that 40 per cent of the cost of modern construction is devoted to location, gradients, drainage, bridges and other features which will last for literally hundreds of years. Second, we find that the remaining 60 per cent is devoted to wearing surface, and that even in the case of its deterioration that all except a fair interest charge can be and is being salvaged in the construction of new surfaces by the simple expedient of using the old material as a base for the new.

There are, however, definite limitations to these general statements.

NONE of the features mentioned as permanent would be so if the highway were constructed without regard for the economic or other needs of the community which it is to serve, so a first principle in construction must be reasoned traffic or economic surveys entirely apart from political or other wasteful considerations.

Again, if these permanent features are improperly constructed, they lose their value, hence adequate engineering control must be taken as a positive and definite requirement.

Pressing this one step further, highways do not attain their maximum of use unless they are constructed in coordination with other highways. The need for centralized engineering authority is at once evident.

Another series of limitations will be found in the provisions for safeguarding the interest of the investor —in this case the public.

No business man would ever invest his money in a building if he did not see his way clear to properly providing for the up-keep of that building. No highway should ever be constructed unless adequate funds are provided for its maintenance.

Many of the fallacies which have crept into our accepted theories have been due, not to the intensive use of the road, but to lack of proper maintenance.

It is sheer waste and even a misuse of the public funds to attempt to build a modern highway without assuring its upkeep.

*President, Mack Bros. Motor Car Co.; Highways Committee N. A. [illegible]

With these definitions and limitations in mind, it is necessary then to see who is to benefit.

It will be generally admitted to-day that the construction and maintenance of a system of highways is of service not only to those of the present generation but to those who are to come after us.

Theoretically we might press forward this limit indefinitely. Remembering that the native genius of the American has already set aside many of the traditions of the past, it is, perhaps, well to limit this discussion for practical purposes to the next fifty years.

If those who are to follow will benefit by this system of highways, should it be given to them free of charge or should they be asked to pay a fair proportion of the capital charge?

The answer is dependent upon the life of the system. If these highways are to be constructed by local authorities without due regard for economic or engineering facilities, then the community which is responsible should bear the full charge.

Similarly, if properly designed and constructed highways are not adequately maintained, then the community responsible should bear the full charge.

But, if these limitations are met, if there is responsible centralized, engineering control coupled with adequate maintenance funds, then as a matter of equity the cost should be amortized over a period of years, each generation assuming the responsibility of handing all its sector of the road to the next in as good or in better condition than it was when received.

Return to our analysis of the character of the highway for evidence.

Review the analogy of the business man who spreads his capital costs over a term of years, paying current operating costs out of current revenue.

With the nature of the project before us, some conception as to the life of the service it can render and an understanding of the limitations, the problem then is to select that form of finance which will most cheaply and most adequately care for the project and fortunately, here we enter upon carefully charted seas with the trained pilots of the banking world to steer.

At the outset the limitations made will restrict the discussion in a general sense to state highway bond issues as generally speaking it is only the states which have both centralized engineering control and tax rating powers ample to control maintenance requirements.

Some states may have progressed so far with their programs of highway construction that no present necessity will be felt for highway bond issues and there the determination is one which rests between the state highway officials and those men charged with the responsibility of raising revenues.

Where there is need for highway bond issues, however, and this condition is the more general one to-day in the present state of undevelopment, the first consideration is the particular types of highway bond issues which will best serve.

Thus far the most scientific form is the deferred serial bond issue on which payments of principal do not begin until after a period of say five years following construction. In this type of bond, payments begin at the peak and are scaled down in successive years as the principal is decreased.

The deferment of principal charges gives opportunity for completion of the project and allows the increased earning capacity of the highway to become evident.

The serial bond spreads the charge over as many years as may be desirable, absolutely protects the investor through required annual payments, offers an attractive issue to the man who desires long term investments and minimizes dangers involved in administration of a public debt.

With the capital outlay thus cared for, the state highway official can then definitely budget his requirements for construction and maintenance, year by year, and can point his organization definitely a fixed course.

The question of maintenance is no longer an indefinite subject, but is clearly defined since it must include all current operating expenses up to and including reconstruction unless an inferior is replaced by a superior type of pavement, or unless a highway is widened or extended, all of which are as definitely capital charges subject to amortization as floor replacement to care for heavier machinery, addition of new stories or extensions of a factory in business life.

Finally, the effect of such issues will be to definitely allocate highway costs as between this generation and those to come; to distribute the burden equitably; and in that distribution to expedite the completion of a system of highways.

The increased earning capacity at once visible through lowered costs of transport, added valuations for urban and agricultural property and the general uplifting of our standards of living, is all of the justification necessary for adoption of standardized methods of finance at the earliest possible moment.

THE importance of proper highway development is vital to the growth of the automotive industry. This is being rapidly recognized by automotive executives. The word "vital" is used with the full significance of its dictionary definitions, one of which is "being that on which life depends."

* * *

This article has been written by one of the men in the automotive industry who is keenly aware of the definite relation between highway financing and future car and truck sales. He has studied the entire problem very carefully. His views should be read by every executive in the industry.

British Truck Weight Legal Limits Raised

AN amending order to the Heavy Motor Car Regulations has been issued in England by the Ministry of Transport, covering tractor-trailer combinations, the general effect of which is: (1) to increase the permitted axle-weight of a trailer from four tons to six and one-half tons; (2) to prescribe a maximum limit of 22 tons for the sum of all the axle-weights of car and trailer; and (3) to permit a maximum speed of 12 m.p.h. for any heavy motor car fitted with resilient tires when not drawing a trailer. The special tractor and trailer combinations will be permitted a maximum speed of 12 m.p.h. provided all the wheels are fitted with soft tires, the total length does not exceed 33 ft., and the conditions as regards weight are complied with.

Neglect of Water Flow Cuts Cooling Efficiency

Heat dissipation in the cooling system of an engine depends upon many factors. Among those here considered are the rate of water flow at various points, and items such as pump design, arrangement of radiator, etc. Forced circulating systems are said to be more efficient, lighter and cheaper than the thermo-syphon type.

By A. Ludlow Clayden

PRIOR to 1915 comparatively little attention had been given to quantitative examination of engine cooling. Even to-day, while a good deal more is known, there still remains much to be learned. The very elements of the problem involving rates of transfer of heat from one substance to another have been studied only in a fragmentary way; in fact, as recently as last April the National Research Council set in motion machinery which it is hoped will collect existing information, arrange for the making of new tests, etc. In about ten years it is hoped that the fundamental facts concerning transfer of heat will be known.

Engine cooling as applied to automobile engines has always been haphazard. The needs of aviation forced attention to the grosser absurdities of current practice, and reaction from knowledge gained in the air is likely to have some effect on other automotive apparatus, but recent discussions on such subjects as air and water systems have shown that general appreciation of the fundamentals is lacking to a remarkable degree.

THIS is the first of a short series of articles dealing with the subject of cooling systems for automotive vehicles.

Mr. Clayden has had considerable experience in the design and layout of radiators, pumps, other related components and in solving practical problems which arise in connection with their use. In this article he deals primarily with water circulation and the factors which affect it.

In later articles he will cover various problems relating to air flow and will deal specifically with recent developments in steam or vapor cooling systems and to some extent with the subject of air cooling.

Written discussion of any or all these articles for publication in the Forum is invited.

There are several stages in cylinder cooling. First the transfer from the actual hot gas to the oil or carbonized film within the cylinder. Here the desire is to transfer as *little* heat as possible. Second is transfer from the oil film to the metal of which the cylinder is composed. Then comes conduction through the metal, and then transfer from the metal to the cooling air. This last stage can either be direct, or we may have transfer to water, from water to metal in the radiator, and finally from radiator metal to air. In all these stages the desire is to obtain the most rapid transfer possible, with exception of the first stage only. No exact laboratory data is in existence regarding any of the stages of transfer except conduction through metal, although there is a good deal of data available on overall rates of transference.

All heat rejected to cooling water is, of course, waste heat. If it be assumed that, for a given engine, a given amount of heat must be wasted, then the desire should be to dispose of that heat with a minimum additional expenditure of energy. In the case of a motor boat engine the amount of energy absorbed by operation of the cooling system is the power necessary to drive a circulating pump, which, owing to the unlimited supply of water available, need only consume very little energy in proportion to the size of the engine. In all aircraft and land vehicles energy is required to induce the passage of an adequate supply of air through the system, and energy is needed to carry around the weight of the parts used for cooling. The most efficient cooling system is that which calls for minimum power to operate it.

In aircraft a fairly exact comparison in respect to efficiency is possible, because the effect of the weight and of the parasite resistance can be calculated within fairly fine limits. On the road comparisons are not so easy, and first cost becomes an item of importance.

It would seem that, given the general characteristics of any engine, it ought then to be possible to state the amount of heat which would have to be dissipated through the water system. Actually the number of variables is so great that little more than a rough approximation can be arrived at without actual test. It is undoubted that the amount of heat rejected to the cooling water is proportional to the mean gas temperature in the cylinder and to the developed area of the combustion chamber. Experience shows that a Knight engine requires less radiation via the water than almost any other type, and it has, of course, the most compact combustion chamber. It is a

fact of common knowledge that a T-head engine requires a great deal of "cooling." For this reason it is not possible to take the more precise data obtained from close study of aviation engines and to apply it in a general way to other types of gasoline engine, because nearly all aviation engines have combustion chambers of the most compact sort. Also aviation engines normally are desired to operate with lower mean cylinder temperatures than motor car engines, probably owing to the fact that the cooling of the piston by transfer through the cylinder is important in engines of high duty and large bore, while it is of relatively little importance in engines of the road vehicle type.

F. W. Lanchester in 1916 gave some more exact information than had hitherto been published,* but later data has shown the necessity for modifying many of his conclusions. An important factor of which practically nothing was known at that time is the turbulence of flow of both the cooling liquid and of the air. Consequently radiators of considerably smaller dimensions than those which Lanchester considered necessary can now be used for both aircraft and automobiles.

HOWEVER, in so far as heat rejection from the cylinder is concerned, Lanchester's work has been well upheld, although the rule he gives is admittedly quite general and liable to considerable variation due to details of design. He states:

> "The mechanical equivalent of the heat lost to the cylinder and combustion space in an internal combustion engine of ordinary type, may be expressed as equal to one-tenth of the mechanical equivalent of the heat value of the fuel consumed, plus one horsepower for every inch of cylinder diameter."

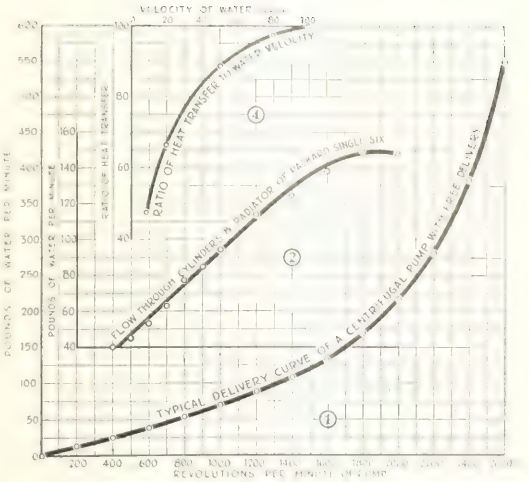
In most cases this will be found to be approximately equivalent to the brake horsepower of the engine. Lanchester also states his rule in another way which is a little less accurate, but also very near to the truth in a great many cases. His statement is in effect that the loss of heat to the cooling water in normal engines is 13 horsepower per developed square foot of area of all cylinder walls and combustion chamber walls added together.

Since in the design of cooling systems for road vehicles it is usually desired to be well on the safe side, the author considers that far the best rule to apply in the absence of more exact data is that the heat which the radiator must be capable of transferring to the air available will be equivalent to the brake horsepower at the required speed.

The last qualification "at the required speed" leads to mention of another highly variable compromise factor. It is practically impossible to provide an automobile with a cooling system which will enable the engine to be run at full power on low gear indefinitely, nor is it necessary. An engine should have equipment which will keep it cool at full power and full speed on *high* gear indefinitely. Such equipment will be adequate for nearly all conditions of actual operation.

One of the hardest conditions for the conventional cooling system is continued operation at or near the speed of maximum torque, as, for instance, pulling up a long stiff grade, wide open on high gear doing, say, 20 miles an hour. This condition is usually provided for by a reserve excess of water, a sort of water flywheel. Suppose, for instance, that it is desired to operate the engine at a mean water temperature of 160 deg. Fahr., which is about normal for an automobile. At such a mean temperature the maximum will usually be about 170 deg. Fahr., and

*The Cylinder Cooling of Internal Combustion Engines. Proceedings the Institution of Automobile Engineers 1915-1916.



The reduction of heat transfer to water flow in an automobile cooling system

the minimum, of course, 150 deg. Fahr. Boiling will not begin until the mean water temperature has been raised nearly 40 deg., or until the outlet temperature is 210 deg. Fahr. Now, suppose the cooling system at 20 miles an hour is capable of transferring to the air the equivalent of 20 horsepower and the engine is developing 30; the excess of 10 hp. will go to heating the water, and the time taken to raise it to boiling depends upon the total amount in circulation. With 50 lb. of water in the system and heat being added at the rate of 10 hp., it will require between four and five minutes' operation to heat all the water 40 deg., and this is a longer time than it takes to climb most grades of the character considered.

The point to be remembered is that any road vehicle which normally keeps the water at the desired temperature but boils on exceptional hills, is usually best cared for by increasing the amount of water rather than by increasing the size of the radiator. Nothing of the sort can be done in the case of aircraft, which must be provided with radiator capacity adequate for indefinite full power output at climbing speed.

While there is considerable variation in the amount of heat rejected to the cooling water in various forms of engine, there is a far larger variation in the efficiency of transfer of different types of radiator. The radiator is fed with air at atmospheric temperature, and the amount of heat which it can transfer to that air depends upon the velocity of the air flow and the transfer coefficient, which last will be characteristic of the particular type of radiator.

THERE is, however, a stage preliminary to this which is usually neglected, but which is actually quite important, and this is the rate of transfer of heat from the water in the radiator to the metal thereof. The author is unaware of any precise data regarding this subject, but it has been observed that for radiators of different types there are different velocities of water flow at which the heat transfer is maximum. It is probable that there is a critical velocity depending upon the shape and dimensions of the water passages at which smooth flow changes into turbulent flow; also that the most rapid transfer exists at a degree of turbulence just below the velocity at which cavitation begins.

A very rough and ready rule indeed which the author has found applicable to radiators of widely differing type is that the maximum transfer from water to radiator occurs at about the maximum velocity obtainable from a 3-in. head of water above a radiator core 1 ft. high. Obviously such a rule is only the roughest sort of approximation, but since, in automobile practice, a 3-in. head above the radiator core is about the maximum obtainable, the rule emphasizes the advantage of a wide low radiator over the high, narrow designs now most favored.

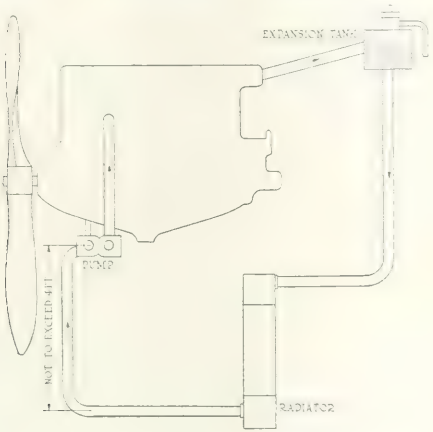


Diagram of airplane cooling system with radiator below engine and expansion tank above to insure rapid flow of water

The rule can be reversed to read that, with most designs of radiator, the head of water should be adequate to provide a rate of flow equivalent to that given by a 3-in. head over a 1-ft. height of core. It should be added that the falling off in rate of transfer as the velocity of flow falls is not very pronounced until about 60 per cent of the maximum, after which it decreases very rapidly indeed. In most of the writer's tests the curve has taken a parabolic form.

It is interesting to observe that this fact has been given considerable attention by airplane constructors, and it is now recognized that one of the advantages of placing the radiators low down on the side of the fuselage is so that the engine being perhaps several feet above them, the rate of flow will be rapid. On the other hand, there is hardly a road vehicle in existence in which the water flow is much more than half what it should be for maximum transfer.

THE idea of placing the radiator below the engine is so novel from the automobile standpoint that perhaps a little more explanation is desirable. Imagine the engine fed with water from a pump and neglect for the moment the source of supply of the pump. The cylinder outlet is at the top, as usual, and discharges into a small header or "expansion tank" open to the atmosphere. So far we have paralleled automobile practice, and we continue to do so when we say that the next stage is for the water to flow by gravity from the tank, down through the radiator core, except that in this case there is a drop of several feet before the core is reached, which means that the flow through the core will be much more rapid than otherwise.

Assume for a moment that the bottom tank of the radiator is also open to the air, then, to keep the system balanced, the pump must draw off water from this tank as fast as it reaches there and return it to the engine. This is exactly the ideal condition. Of course, in actual fact the bottom tank is closed, but efforts are made to proportion the system on the basis described.

For reasons which will appear later on it is desirable that the static pressure at no point within the system should be less than 26 in. of mercury. Four inches of mercury is practically the equivalent of 4 ft. of water in terms of atmospheric pressure, hence we reach the theoretical limit when the bottom tank of the radiator is 4 ft. below the pump, and this is considerably more than most designs of aircraft can accommodate.

Tests recently made by the U. S. Navy shed some interesting light on this question of water turbulence. These were made on a variety of radiators, principally a type composed of a honeycomb of round tubes with expanded ends giving a tortuous water passage, and with the Lamblin type, which has water passages of very narrow rectangular section. It was found that, at the speed of flow at which the honeycomb type showed its maximum efficiency, the rate of transfer from water to air was about the same for both types, per unit of developed area, but the efficiency of the Lamblin type increased well above this figure when the water velocities were made still much higher. Naturally it would require higher speed to produce turbulence of flow through a smooth rectangular pipe, then through the interstices of a honeycomb, but the speed of maximum efficiency for the latter was above that commonly employed.

AN effect of turbulence in the water which has only been studied very slightly is probably to be found at the other end; that is in the jack where the water picks up heat from the cylinders. Transfer at this point ought to be capable of increase in speed if means could be devised for ensuring turbulent water flow, but to secure the desired effect it would probably be necessary to use water spaces impractically thin and to feed and extract water at scores of points all over the jacket. It has been fairly well shown that no perceptible difference in rate of transfer out of the cylinders results from cutting down the water space from $\frac{1}{2}$ to $\frac{1}{4}$ in. while maintaining the same volume of water flow; which means doubling the flow velocity.

High velocity of water flow has another advantage although a lesser one than the gain in rate of transfer due to turbulence. This is because the rate of transfer from the radiator to the air is in direct proportion to the difference in temperature. Suppose the amount of heat being dissipated is 20 hp., roughly 850 B.t.u. per minute, and that water is circulating at the rate of 50 pounds a minute. Then the drop in temperature of the water must be 17 deg. Fahr. Suppose the atmospheric temperature is 75 deg. Fahr. and the outlet water 175 deg. Fahr., then the mean temperature of the radiator will be $166\frac{1}{2}$ deg. Fahr. and the mean difference $91\frac{1}{2}$ deg. Now suppose the speed of flow doubled. Then the drop will be only $8\frac{1}{2}$ deg., the mean radiator temperature $170\frac{3}{4}$ deg. and the mean difference $94\frac{3}{4}$ deg. Supposing the radiator correctly proportioned for the 50 pound flow, then an increase in flow would enable the amount of core to be reduced approximately 4 per cent. In actual practice this would mean from $1\frac{1}{2}$ to 2 lb., or perhaps fifty cents in cost.

Of course this does not sound a great deal, but the example chosen would represent a fairly good sample of automobile system. Often the drop is much larger, 20 deg. is not uncommon. Here let it be said that rapid water flow does not mean a "powerful" pump. Many automobile water pumps are altogether too powerful already. The only requisite is the provision of adequate water passages, in other words, minimum resistance to flow. Radiator cores

of almost all types will pass much more water than the pipe connections.

In laying out pumps the requisite to be kept in mind is to remove from the bottom tank say 75 per cent of the water which can flow down through the radiator on the assumption that the top tank is kept constantly filled with a hose. This should be the capacity of the pump at normal speed, say 1500 engine r.p.m. for a passenger car; and the maximum pumping capacity at maximum speed should not exceed 90 per cent of the possible radiator flow. A vitally important point is that the connection between the bottom tank and the pump should be large enough to take care of 100 per cent of the radiator flow and that the intake of the pump itself should be in proportion.

IF there is any restriction or bottle neck between the bottom tank and the pump intake then the pump may exercise true suction, which is an unscientific way of saying that the pump may produce a reduction of pressure below atmospheric in the line. Water boils at temperatures which vary with the pressure. For instance, at half atmosphere or 15 in. of mercury it boils at 177 deg. Fahr. It is quite usual in automobile systems to find a depression of 12 in. and the writer has seen as much as 19 in. depression occur at 2000 engine r.p.m. In such a case, when the engine is working hard, steam will be liberated in the pump intake, the pump will cavitate, water will be blown out of the overflow and the whole circulation will stop for an instant. In the case cited this happened when the bottom tank temperature was less than 170 deg. Fahr., at which time the top temperature was 190, so that all the ill effects of boiling occurred 22 deg. before they ought to have appeared.

A centrifugal pump of automobile type has a delivery characteristic which increases much more rapidly than its speed. It can be held down to a maximum in two ways, either by determining the proper clearance between the impeller and the casing, or by deliberately choking the outlet. The illustrations are of interest in connection with this point. Two of the cuts show the characteristic of a free pump and of a pump with throttled delivery.

That which has been said regarding the advantages of free and fast water flow is almost a sufficient indictment of the pumpless system which probably gained its limited support owing to the mysterious fascination of the term "thermo-syphon." Water to be circulated in a cooling system has to overcome the resistance of the jackets, the pipes and the radiator. In a convection system the circulating force available is that due to the difference in weight between hot water in the cylinder head and cooler water in the lower part of the radiator.

Suppose the engine jacket contains ten pounds of water and that waste heat is to be removed at the rate of ten horsepower, or for the sake of simplicity, 400 B.t.u. per minute. Now for operating reasons we want the jacket water to be at not less than 160 deg. nor more than 180 deg. Fahr., which means that ten pounds can absorb 200 B.t.u. as they flow through, or that for the temperature conditions stated, the flow must be 20 lb. per min. This is about one-fifth to one-tenth of the proper flow for best radiator efficiency, but that is not the worst of it. Actually it is not practical to carry enough water so that convention will take care of full power operation, so what really happens is that the theoretical system of circulation breaks down. When the outflow of heat from the engine is rapid enough steam begins to form in restricted parts



High speed Curtiss plane with Lamblin radiators mounted in slip stream of propeller

of the jacket, some water is ejected from the overflow and the water then "boils over" into the top tank. This is why top tanks have to be so large in convection systems and why trouble with them usually arises under the condition of continued high speed on level roads rather than on hills. The system contains enough reserve or "flywheel water" to care for hills, but this is soon used up on the straightaway. From that point on, the evolution of heat is faster than convectional flow can take care of and the only possible alternative is boiling. It is a very hard thing to argue, but the writer himself is convinced that the first cost of a reasonably satisfactory convection system with adequate radiator, jacket space and tankage is actually higher than that of a simple pump system, while in operation the power loss due to the pump is much more than compensated for by the saving in weight.

THE writer is well aware that he can have cited against him examples of several cars with convection systems that operate well and have been highly successful commercially. He will only retort that his belief is they would operate still better and be still better commercial propositions with pump circulation.

So far only water flow conditions have been discussed in any detail. In a subsequent article it is intended to take up the intimately associated but none the less separate subject of air flow.

IN a recent report of the National Advisory Committee for Aeronautics it is asserted that our natural gas wells give us a practical monopoly of the supply of helium, and it is recommended that steps should be taken to conserve these resources, which are being dissipated at a rate which threatens exhaustion within a period of twenty years. It is said that helium is escaping into the atmosphere in quantities sufficient to fill four large airships a week. The report, therefore, recommends that the Government acquire and seal for future use the best helium-producing gas fields, that research work be undertaken with the object of evolving an efficient process for the extraction and refinement of helium, and that the Government continue experimental work in connection with airships. It is stated that many successful flights have been made with an airship inflated with helium.

Some Automobile Engines Are Fitted With Longer Pistons

Better foundry practice and pressure lubrication have made possible the use of pistons with longer skirts and greater serviceability without undue reciprocating weight. Much useful information gained from experience with aluminum pistons is being applied.

By J. Edward Schipper

PISTON design has been the subject of more discussion perhaps during recent years than has the construction of any other part of the automotive engine. Considerable experimental work in both design and material has been carried forward both in this country and abroad.

In this article Mr. Schipper discusses the lessons that may be learned from recent experience and shows what the present trend in piston design means. His views on this important subject will be of interest to both engineers and production men throughout the industry.

ENGINEERS are, with few exceptions, willing to admit that there are a great many problems concerning the internal lubrication of a cylinder barrel which have so far been solved by compromise. Long before the importance of making the pistons light was realized the practice was to fully consider the guiding function of the piston and to make the skirt of considerable length. Speeds began to get higher, and when it became apparent that the inertia forces were beginning to go beyond a reasonable figure it was realized that in order to save weight it would be necessary to decrease piston length. This tendency was carried by some to such an extreme that piston slap and noticeable cocking of the piston in the bore began to result, with the consequent increase in cylinder wear. Furthermore, it was quite unfortunate that as pistons began to be shortened, connecting rods were shortened also, thereby increasing their angularity and the relative side thrust on the wall of the cylinder. This further augmented the rapid wear of the cylinder bore, particularly since, during all this time, engine speeds were increasing.

The attempt to cure this condition by the introduction of a piston ring at the bottom of the piston skirt has not been a success in all cases. If the ring is too good a fit in the bore, the upper part of the piston is starved and rapid ring wear is likely to occur. If the ring at the bottom is not efficient it might just as well be eliminated as far as a guiding unit is concerned. The natural result is a scraper ring of some sort which will permit sufficient oil to work its way up to the piston ring without permitting an over-supply to get by, thereby causing engine smoking.

ALL of these problems have been on the mind of the automobile engineer for some time, and it is very interesting to note the turn which matters are taking this year. One of the largest production companies in the business has eliminated the ring from the bottom of the piston and is making the piston skirt longer. Two or three others of importance in the industry, although perhaps not as large from a manufacturing standpoint, have also done the same. The reasoning behind this is quite obvious. In the first place, foundry methods have improved to such an extent that it is possible to make the longer pistons far lighter than would have been believed possible 6 or 7 years ago. Engine speeds have increased again to such an extent that it is necessary to have the additional guiding surface on the cylinder wall, but to offset any difficulty which may occur from this tendency, the increased use of pressure lubrication has cut down wear to a remarkable degree.

A great deal of the credit for the development of satisfactory, light weight, cast iron pistons must be given to the aluminum piston. The problems of expansion in the aluminum piston are so acute that, once these have been solved, it is quite simple to solve the expansion problems which occur with cast iron. The turning of the relief, for instance, on the sides of the pistons adjacent to the piston pin bosses has been very effective in securing pistons which fit better after the engine is warmed up.

ANOTHER point which has been learned from the aluminum piston, and which has been successfully applied to cast iron, is in the proper draining of the oil from the cylinder walls, so that an over-supply of lubricant is not passed up beyond the piston rings, even though the oil supplied by the splash or pressure system is in excess of what is necessary for lubrication. It has been found that little difference in the action of the oil reaching the cylinder walls can be noted whether a high pressure, a low pressure or a combination pressure and splash system is used.

In a high pressure system operating at from 20 to 30 lb. per sq. in., the oil stream which is forced out of the end of the connecting rod bearing resembles very closely the spray of oil which is thrown up by the connecting rod scoop in a splash system. In other words, there is no necessity for different piston forms or drain-

ing means because of a difference in the methods of providing oil for the cylinder walls; that is, by splash or by a pressure spray thrown from the end of the connecting rods.

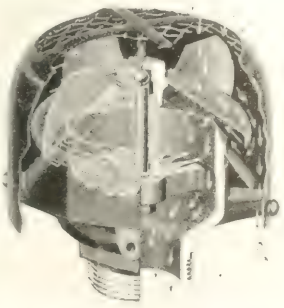
It is interesting, however, with all of these matters in mind to note the tendency toward making the piston a better guide, and at the same time to improve its sealing function. The long-skirted piston designed to prevent the oil from working above the piston rings, and at the same time to drain to the piston pin for lubrication seems to be considered good practice by the engineers who are clinging to the iron piston. From the standpoint of the aluminum piston, it may be pointed out that with the constant clearance types now in use, that very little or no complaint is being heard from service quarters in marked contrast to what occurred when aluminum pistons were first put out, designed according to iron piston ideas. It may also be noted with interest that, owing to the tendency for practically all cars to increase the height of the hood in order to give the straight line effect from the radiator back to the cowl, designers are able to use an engine with a higher block, and consequently can increase the connecting rod length, if so desired. This is one of the big changes on one of the prominent cars for 1923.

A New Air Cleaner

THE importance of the air cleaner in reducing piston and cylinder wear is now well recognized, according to the Standard Oil Laboratories. "An analysis of a great many so-called carbon deposits has shown they are from 20 to 75 per cent silicon or earthy matter which was taken in through the carbureter with the air." Results of these analysis show that in passenger cars used on city streets the percentage of silicon and other earthy matter in the deposit ranged from 25 to 30 per cent, in trucks used in hauling dusty material or on dusty roads the percentage ran as high as 50 per cent, while in tractors it reached the maximum of 75 per cent.

To meet this problem the United Manufacturing and Distributing Company has designed an air cleaner which consists of a shell open at the top and enclosing a centrifugal fan and a driving turbine. The air enters the top, as shown by the arrows in the illustration, coming in contact with the centrifugal fan, which forces the dirt and dust toward the shell, where it is exhausted to the outside. There is no receptacle to catch this exhaust. The air used by the engine takes the path shown by the inside arrows and in its passage to the carbureter it operates the lower or driving fan. The two fans are connected by a hollow shaft, which is closed at the top for a ball bearing support.

The main frame of this air cleaner is cast aluminum. The fans and shell are made from sheet steel .035 in. thick. The weight at the ball bearing is carried on a hardened chrome-nickel disk backed by a felt washer which serves as a cushion. The fan shaft is held in line by oilless wood bearings.



Centrifugal type of air cleaner marketed by the United Mfg. & Distributing Co.

The unit is compact and light. For a 1-in. carbureter the cleaner weighs 1 lb. and is 4 in. in diameter by 4 in. high. For an inch and three-quarters carbureter the weight is 1¾ lb. and the dimensions 5 x 5¼ in.

Once this air cleaner is installed and the carbureter properly adjusted it is said to require no further attention. There are no dirt receptacles to clean or liquids to add. The action is entirely automatic.

The cleaning efficiency is said to have reached 99.69 per cent in one case, while the average is approximately 98 per cent. In these tests it has been found that the heavier particles of dust, such as silicon, are taken out and the small amount remaining is almost entirely vegetable material, which is relatively light. It is claimed that it is heavier dust which does the damage in the engine cylinders. The cleaner is adapted to a wide range of engine speeds.

Power Losses in Automobile Tires

IN connection with the general investigation of automobile tires and inner tubes, a rather comprehensive program has been laid out by the Bureau of Standards for dynamometer tests to study, among other things, the power losses, or energy dissipated into heat, in tires operated under different conditions of axle load, inflation pressure, speed, temperature and tractive effort.

Preliminary tests have been made to determine the influence of these factors which, aside from matters of design, are the principal items affecting the power loss in a tire. A continuation of the work will involve problems of design and construction, of influence of "oversize" tires and of "cord tires" of power loss, mileage and general all around efficiency of operation.

An investigation will be made to determine the effects of tire fillers, shields, puncture proof tubes, etc., and the properties of cushion tires will be studied. The equipment used in this work consists of two Sprague electric absorption dynamometers, one of which acts as a motor and drives the wheel carrying the tire, while the other is driven by a pulley bearing against the tire. The power input and output may be readily measured and apparatus is provided for obtaining all other necessary data. Curves are given showing the power loss under different conditions, and formulæ by which the results were calculated are explained.

British War Office Specifies 3360 lb. Truck for Future Use

New truck specifications give British Government idea of truck adapted to both commercial and war needs. Speed wagon type capable of hauling trailer at 30 m.p.h. specified. No English firm is building such units now. Subsidy scheme dropped.

By M. W. Bourdon

THE British War Office has published a specification giving general information concerning the type of motor transport vehicle it has decided upon for future use. The new pattern will supersede the standard 7000 lb. load capacity type which was used principally during the war, and to which the pre-war subsidy scheme applied. The chassis now specified is to carry a useful load of 1½ tons (3360 lb.), run on pneumatic tires, be capable of hauling a light trailer on good roads and have a top speed of 30 m.p.h.

It is made quite clear that there is no present intention to place large orders for this new type, though a few sample chassis have been or will almost immediately be ordered. The object of issuing the specification now is to induce British truck makers to adopt the pattern required as a standard type, for it has to be admitted right away that no British truck maker has in his range of chassis anything which complies with the War Office requirements. There are only one or two existing home products which approach the official needs, for British makers in general have not given serious attention to the fast, light, pneumatic-tired chassis for loads of 3000 lb. or thereabouts; in fact, it can be said that no British chassis designed for goods transport pure and simple is primarily intended to run on other than solid band tires. There is nothing to correspond with the Ford truck at any price, nor with other American chassis that could be named which are essentially suitable for carrying 3000 lb. loads on pneumatic tires.

The War Office, then, is endeavoring to force the hands of British makers; or, put in another way, offering an inducement to them to depart from their maintained policy of designing for solid rubber tires, by specifying a lighter and faster type, but waiving their requirements or modifying the specification on some points so as to ask for a type of chassis which it is believed will be popular for civilian use, and for which actually there is already a demand by private users. The chassis weight stipulated (3250 lb.) is not unreasonable, nor are the performance characteristics; most of the latter are those of certain standard American chassis, though there are a few features —such as number of gear ratios, final drive and brake efficiency—which rule out most if not all of similar chassis now being imported.

It is evident, then, that British makers will have to turn to and design a new model—to modify an existing one will serve in but very few cases—if they are desirous of having a standard type for which they will secure orders from the War Office when contracts are eventually placed. In complying with the specification there will not be found many features tending to increase the cost of production on account of refinements unnecessary for civilian use, though there are certainly some which will have that effect.

Most of the points brought into prominence are eminently practical, and a considerable amount of latitude is permitted, so that individuality and originality in design are not stifled. There are, of course, some features which even apart from cost will not meet with universal approval, but it is hardly to be expected that the views of everybody could be complied with. There are also some omissions and points of doubt which need rectifying and clearing up. But on the whole it is clear what the War Office has in mind, and that it has not specified its requirements without endeavoring to arrive at a compromise rendering the chassis suitable for private use as well as for military purposes.

Reasons for New Type Chassis

As to the reasons which have led the War Office calling for a type of chassis so entirely different from its hitherto standard pattern, the experiences gained during the war in practically all parts of the world have shown that the heavier type does not lend itself so well to varying conditions of use as the one now sought. On hard roads and under certain conditions the 7000 lb. load vehicle did satisfactory work, but in some theaters of war it failed badly, proving to be extremely uneconomical in money, manpower, road costs and most else. The lighter vehicle, on the other hand, was found more adaptable, and for standardization in time of peace is considered far more suitable, in view of the impossiblity of prophesying where another war might take place—in Europe or out of it; where made roads are found or where only soft tracks are available; in the tropics or elsewhere. Future motor transport for the Army must, it is held, be suitable as far as may be for all possible theaters of war, and it is believed that the light pneumatic-tired chassis is the best compromise for military purposes, and also eminently suitable for certain classes of civilian work.

Following is an outline of the specifications:

Four-cylinder internal combustion engine using commercial petroleum spirit; a minimum cylinder bore of 100 mm. (no reference is made to piston stroke). Minimum of 24 b. hp., maintainable for not less than three

hours at a speed equivalent to 22 m.p.h. road speed. Cylinder shape is not specified, but valves must be removable without affecting the cylinder holding-down bolts. It is desirable that in the event of fracture the parts of the valve shall not be able to enter the cylinder.

The lower part of the crank chamber to be removable without disturbing the main bearings, though for engines with ball bearing crankshafts this feature is not essential. Timing chains if employed to be capable of adjustment for wear or stretch. No system of lubrication is specified, but the broad statement is made that lubrication must be insured satisfactorily to bearings and pistons under all conditions. Test plugs to indicate high and low level of the oil in the sump and a plunger type of circulation indicator are required, the latter to be fitted where the driver can feel the plunger. The oil filter must be accessible, large and efficient, and its removal should not involve the loss of the main body of oil.

The "over-type" arrangement is not favored, for it is specified that the engine must not be under the driver's seat. Magneto ignition is stipulated, and if an automatic advance is fitted complete control should be provided for connecting it up to the contact breaker of a standard magneto in case the latter should have to be fitted as a replacement.

A maximum fuel consumption of one imperial gallon per 40 gross ton miles is required, though a lower consumption is desirable.

The engine must be efficiently cooled under all conditions, and if necessary be capable of being easily modified to enable it to function effectively in tropical climates. A water pump is essential, but the circulation should be able to continue by thermo-syphonic action if the pump fails. The temperature of the cooling water must not exceed 100 deg. Fahr., above that of the atmosphere, while provision should be made for fitting a radiator apron for use in cold climates. Provision must be made for cleaning the cylinder water jackets and passages.

The radiator to be supported so that it will not be damaged by frame distortion; it must be of the vertical gilled tube type, with provision for easy repair and cleaning, the minimum bore of the tubes to be ⅜ in. The filler cap opening to be at least 2½ in. diameter, with a hinged cap secured by a screw fitting without loose parts. The radiator to be protected by a collision bar at least 1½ in. diameter, while the fan, of large diameter, should preferably be driven by a flat belt.

Fuel Supply

The fuel tank should have a minimum capacity of 15 imperial gallons, and the system of supply to carbureter to be such as to insure continuous feed on all gradients up to, and including, 22 per cent and on any road camber. Gravity feed is preferred, the tank having a two-way cock for retaining 2½ gallons in reserve. If a pressure system is used an auxiliary gravity tank holding at least 2½ gallons must be fitted. (No mention is made of the vacuum system of feed, so presumably this is barred.)

The fully loaded vehicle should travel 200 miles on its tank capacity and spare supply, the latter to be contained in two or more 2-gallon tins carried in special racks forming part of the body equipment. In regard to material for tanks a lead coated steel is not desired, but the following are permissible alternatives: Welded steel, galvanized after making; copper or brass, brazed and riveted and stayed at soldered joints; sheet steel tinned, if tanks are of approved design. A gasoline gage and a removable gauze filer in the filler hole are necessary. The tank filler to be outside the frame and means to be provided for cleaning out the tank.

The Clutch and Gearset

Either a cone clutch or one of the single disk type is permissible; in any case, satisfactory means of lubricating the clutch pilot and withdrawal collar or thrust bearing must be arranged. An efficient clutch stop must be provided, and the whole of the design must be of ample capacity, tending to facilitate gear changing and with accessible means of adjustment.

The vehicle must be able to climb a gradient of 22 per cent on a hard surface with full load, and be able to stop and re-start on a 20 per cent gradient in both forward and reverse gears. Four speeds forward and a reverse with the selector type of change to be employed. A sketch is given showing the type of "gate" preferred; this has a normal arrangement of gear positions except that the reverse speed position is at the end of a forward continuation of the first-speed slot. Why this design should be considered preferable it is difficult to say, for it involves the necessity for "passing through" the first speed to get into reverse from neutral, and for that reason is not altogether desirable from the driver's standpoint, while it also encourages a wider spacing of the bearings in the transmission casing owing to the additional length of travel of the first, second and reverse sliding sleeve. Although no direct reference is made to the position of the gear shift lever, indirect references indicate that it must be on the right of the driver, himself located on the right of the chassis.

THIS article gives in detail the truck specifications decided upon by the British War Office for future use. They are of considerable interest to American manufacturers, since they were developed as the result of a careful study of transportation needs and engineering possibilities.

The type of vehicle specified is not manufactured by any British maker at the present time. The desire of the War Office has been to encourage such manufacture, so that peace time transport needs, as well as war necesssities, may be adequately met.

Nor is any mention made as to whether a unit construction of engine and gearset is preferred or not. In regard to gear ratios, it is laid down that the bottom gear should be about 35 to 1, and the ratio between top and bottom gears about 5 to 1, the reverse gear preferably being lower than the lowest forward speed. The transmission casing must have a test plug to indicate the maximum oil level and provision for driving a speedometer or mileage indicator.

Nothing is laid down as to the propeller shaft, whether it should be open or enclosed, but it is stated that laminated fabric or leather universal joints are preferred, though all-metal universals are not ruled out, but if fitted must be adequately protected. Nor is it stated if an open propeller shaft is used whether the drive and torque may be taken to the springs, or whether radius rods and a torque member must be fitted. The back axle is to be of the "live" type, which rules out one or two British chassis of the specified load capacity which have side chains.

For the final drive, straight-toothed bevels or worm gearing are permissible, and helical bevels may be accepted

after consideration. It seems probable, in view of the specified top gear ratio of 7 to 1, that worm gearing as an alternative will be preferred by designers. A direct bevel reduction of 7 to 1 is, of course, feasible without an unduly large axle casing, as witness the 8 to 1 direct bevel reduction of the 7000 lb. Saurer. The rear wheels should be detachable from the axle shafts, or the shafts easily withdrawn, leaving the wheels in position in order to free the transmission for towing purposes. It is to be noted that no locking gear for the differential is specified, even although from the military point of view such a fitting would be desirable; it has doubtless been waived as a concession in view of civilian use, in conjunction with the additional expense and complication. For the road wheel bearings the taper roller type is preferred, but plain floating bushes and ball bearings may be accepted.

Axles, Wheels and Tires

The axles, front and back, must have suitable inverted platforms, preferably at the same height from the ground and near the ends, to receive the head of the jack. No tie-rod for the rear axle is to be employed. The wheels to be of the detachable steel disk type, or with approved detachable rims or flanges, and provision must be made for fitting non-skid devices, such as short lengths of curb chain attached by permanently fixed hooks. The pneumatic tires should be of not less than 36 in. diameter, and of the same size front and rear. Large singles are preferred, but twins on the rear wheels may be accepted. A tire pump with an efficient oil filter, pressure gage, cooling and of adequate dimensions, capable of inflating one tire to full pressure in five minutes and driven from the gear box must be provided.

Two independent sets of brakes are required, each capable of stopping and holding the vehicle when fully loaded in either direction on a 20 per cent gradient. The design must permit of continuous application of one brake for a distance of half a mile on an average gradient of 8.5 per cent and at a minimum speed of 8 m.p.h. with the gear shift lever in neutral. Preference will be given to the arrangement consisting of a transmission brake supplemented by a second set acting on the rear wheel drums, the operating gear of the latter being fitted with an equalizer.

In regard to the steering, it is specified that all parts should be of approved design and all joints adequately protected, but the specification apparently leaves to the manufacturer the option of whether he will adopt worm and segment gearing or worm and complete worm wheel. The vehicle must be capable of turning completely on either lock in a space not exceeding 45 ft. wide.

It is specified that fully loaded and on level roads the vehicle must be capable of speed of 30 m.p.h. for one mile and 22 m.p.h. maintained for two hours. It must climb an average gradient of 10 per cent at 8 m.p.h. It need not be fitted with a governor, but if one is fitted this can be removed for any official trials that may be made, if so desired.

Chassis Details

The weight of the chassis must not exceed 3250 lb. exclusive of water, oil and fuel; it must carry a useful load of 3360 lb. and a body weighing 1120 lb. in addition to driver and passenger, together with fuel, water, oil and equipment. The engine and gearset must be mounted on a three-point suspension system. Fitted and driven bolts are preferred to rivets throughout the chassis, and all holes should be drilled.

The following dimensions are specified: Minimum road clearance, 10½ in., preferably more; maximum overall width, 84 in.; maximum wheelbase, 144 in.; maximum track, 78 in.; minimum track, 54 in.; approximate track desired, 66 in.

The vehicle should be capable of traveling at slow speeds through water 18 in. deep. The springs should be allowed a normal range of 4 in. up and 3 in. down from the fully loaded standing position, the clearances to include provision for a non-skid device. All road springs must withstand a repeated deflection of 3 in. beyond the normal when loaded. A choice of twelve sections of spring leaves is permitted, rising by ½ in. width from 2½ in. to 4 in., and by 1/16 in. thickness from ¼ in. to 7/16 in.

Substantial towing hooks must be provided at the front and rear and provision made for the fitting of a central rear towing eye of the spring buffer type. The frame must be braced against horizontal distortion due to a direct or diagonal pull in any direction up to 20 deg. with the longitudinal axis of the vehicle.

The specified controls are approximately normal, the clutch pedal at the left, brake at the right and throttle pedal preferably in the center. The clutch and brake pedals being marked *C* and *B* respectively, with means for adjusting the slope of the pedal plates. A pull-on brake lever is to be located at the right, well clear of the gear shift lever, and it is mentioned that the levers for throttle and ignition over the steering wheel shall have movement independent of the latter, while the one should move forward to open the throttle and the other move forward to advance the timing. Wires or chains for control connections are barred.

For chassis details, oil lubrication is desired as far as possible, with wick feed lubricators without loose caps. The capacity of the engine lubrication system should be sufficient for 200 miles loaded running, and all lubrication details must work efficiently with the British War Office standard lubricant, of which a specification is given.

Sundries

It is specified that ball and roller bearings should conform with the standards of the British Engineering Standards Association. British standard fine screw threads are desired as far as possible, but the following will be accepted in addition: British Standard Whitworth screw threads for bolts and nuts and British Standard screw threads for brass and copper tubes.

The materials employed should be in accordance with these specifications of the British Engineering Standards Association which apply, and where high-tensile steels are employed the parts should be stamped with the letter "T," followed by the ultimate tensile strength. If materials are not obtained in Great Britain the truck manufacturers must satisfy the War Office that no appreciable delay in obtaining exactly similar materials from British firms will result in case of war.

Reference is made to the desirability of ease of adjustment, lubrication, replacement and repair and to accessibility for inspection. Dimensioned working drawings must be supplied and information given on such points as the number, width and thickness of spring leaves; the number, depth, pitch and shape of pinion teeth; size and threads of screwed parts, etc.

Before any type is accepted and approved by the War Office the following tests will be applied to the vehicles submitted, loaded except where otherwise stated:

Speed. To be tested from a flying start for at least one mile on a level road, and also for two hours on a selected route, which will include gradients up to 7 per cent. For hill-climbing, a test will be made of average speed up a gradient of 10 per cent.

Brakes. Foot and hand brakes will be tested separately with the gear shift lever in neutral on a 20 per cent gradient from a minimum initial speed of 5 m.p.h.

This will be supplemented by the continuous application test already mentioned.

Fuel Consumption. Tests will be made during the average road speed test and then on a level road.

Various. Tests will be conducted over rough ground mainly to try the non-skids and their attachments, the efficiency of the engine cooling system and the springing. These will include trials on soft sand up to 10 in. deep, on un-metalled tracks with a soft surface and on boggy ground. The effect of frame distortion will be tried by jacking up one front wheel until the other is off the ground; under this condition it must be possible to operate the steering wheel, clutch, brakes, gear shift lever, starting crank, etc.

Small Percentage of Farmers Use Trucks and Tractors

A LARGER percentage of American farms are equipped with tractors than with motor trucks. The 1920 Agricultural Census, recently published by the Bureau of Commerce, shows that 2 per cent of the farms have motor trucks, while 3.6 per cent are equipped with tractors.

South Dakota and North Dakota lead in the use of tractors. 16.3 per cent of the farmers in South Dakota have tractors, while 15.2 per cent is the North Dakota figure.

The highest percentage for trucks is 14.2, recorded by the farms in the District of Columbia, while Rhode Island is second with 11.5 per cent.

The following table gives the detailed figures by states:

DIVISION AND STATE	MOTOR TRUCKS			TRACTORS		
	Farms Reporting		Number of Motor Trucks	Farms Reporting		Number of Tractors
	Number	Per cent of All Farms		Number	Per cent of All Farms	
United States	**131,551**	**2.0**	**139,169**	**229,332**	**3.6**	**246,083**
Geographic Divisions:						
New England	7,284	4.7	8,119	2,245	1.4	2,397
Middle Atlantic	20,472	4.8	22,011	13,240	3.1	14,140
East North Central	24,942	2.3	26,074	55,413	5.1	58,092
West North Central	32,331	2.9	33,375	92,123	8.4	97,884
South Atlantic	14,716	1.3	15,787	10,460	0.9	11,229
East South Central	4,869	0.5	5,153	5,044	0.5	5,379
West South Central	8,960	0.9	9,455	17,435	1.8	16,892
Mountain	7,108	2.9	7,589	15,865	6.5	17,513
Pacific	10,809	4.6	11,606	17,507	7.5	19,557
New England:						
Maine	1,061	2.2	1,120	605	1.3	635
New Hampshire	663	3.2	717	196	1.0	207
Vermont	576	2.0	616	424	1.5	444
Massachusetts	2,126	2.8	3,535	540	1.7	592
Rhode Island	471	11.5	536	69	1.7	70
Connecticut	1,377	6.1	1,595	411	1.8	440
Middle Atlantic:						
New York	8,636	4.5	9,259	7,021	3.6	7,497
New Jersey	3,075	10.4	3,380	845	2.8	946
Pennsylvania	8,761	4.3	9,372	5,374	2.7	5,697
East North Central:						
Ohio	6,960	2.7	7,319	9,934	3.9	10,469
Indiana	3,501	1.7	3,671	8,871	4.3	9,230
Illinois	5,907	2.5	6,154	21,932	9.2	23,102
Michigan	4,681	2.4	4,886	5,584	2.8	5,884
Wisconsin	3,893	2.1	4,044	9,092	4.8	9,407
West North Central:						
Minnesota	2,677	2.1	3,803	14,794	8.3	15,503
Iowa	8,669	4.1	8,910	19,427	9.1	20,270
Missouri	4,078	1.9	5,059	7,438	2.8	7,889
North Dakota	743	1.0	774	11,834	15.2	13,006
South Dakota	4,240	5.7	4,353	12,160	16.3	12,939
Nebraska	6,333	5.1	6,548	10,342	8.3	11,100
Kansas	3,782	2.3	3,928	16,128	9.8	17,177
South Atlantic:						
Delaware	283	2.8	304	220	2.2	239
Maryland	2,556	5.3	2,805	1,410	2.9	1,525
District of Columbia	29	14.2	29	1	0.5	1
Virginia	2,389	1.3	2,544	2,206	1.2	2,379
West Virginia	886	1.0	936	541	0.6	572
North Carolina	2,551	0.9	2,671	2,184	0.8	2,277
South Carolina	1,609	0.8	1,736	1,213	0.6	1,304
Georgia	2,913	0.9	3,145	2,083	0.7	2,252
Florida	1,500	2.8	1,617	602	1.1	680
East South Central:						
Kentucky	1,455	0.5	1,538	1,913	0.7	2,029
Tennessee	1,362	0.5	1,430	1,796	0.7	1,872
Alabama	1,111	0.4	1,180	737	0.3	811
Mississippi	938	0.3	1,005	598	0.2	667
West South Central:						
Arkansas	973	0.4	1,027	1,423	0.6	1,832
Louisiana	793	0.6	874	2,142	1.6	2,812
Oklahoma	2,070	1.1	2,155	5,786	3.0	6,210
Texas	5,124	1.2	5,399	8,084	1.9	9,018
Mountain:						
Montana	1,167	2.0	1,225	6,890	11.9	7,647
Idaho	779	1.9	837	1,468	3.5	1,587
Wyoming	551	3.5	591	969	6.2	1,075
Colorado	2,884	4.8	3,016	4,526	7.6	4,990
New Mexico	552	1.8	593	457	1.5	491
Arizona	527	5.3	581	820	8.2	930
Utah	541	2.1	572	553	2.2	583
Nevada	161	5.1	174	182	5.8	210
Pacific:						
Washington	3,172	4.8	3,371	2,474	3.7	2,635
Oregon	1,728	3.4	1,819	2,902	5.8	3,070
California	[illegible]	[illegible]	6,416	12,131	10.3	13,852

FRENCH automobile exports for the first six months of the present year show a drop of 2459 tons compared with the corresponding period of 1921. The number of cars exported by France from Jan. 1 to June 30, 1922, is 6408. The countries to which these cars were sent are as follows: Great Britain, 2262; Belgium, 1829; Algeria, 778; Switzerland, 312; Morocco, 195; United States, 145; French Indo-China, 113; Germany, 94; Tunisia, 69; Japan, 62; other countries, 549.

While exports decreased, imports increased for the six months, the tonnage being 3585, compared with 1814 a year ago. This tonnage represents 2171 cars. The greatest number of cars, 1797, came from the United States, others being Italy, 253; Belgium, 81; England, 24, and other countries 16.

Motor cycle imports into France during the first half of the year represent a value of 1,492,000 francs, compared with 1,252,000 francs for the corresponding period of 1921. Bicycle imports were 7,743,000 francs for 1922, compared with 10,940,000 francs for 1921.

French motor cycle exports show a considerable drop, being only 1,921,000 francs for the first half of 1922, compared with 5,910,000 francs a year ago. Cycle exports, on the other hand, show an increase, the value being 13,653,000 francs for 1922, compared with 9,880,000 francs for the initial half of 1921.

Multiple Sparkplugs and the Suppression of Knocking

Some interesting experimental evidence intended to show how location of the sparkplug and timing of the spark affect the tendency of an engine to knock. A 4.5 to 1 compression ratio can be used even with kerosene as fuel if four plugs are employed.

By C. A. Norman*

THE beneficial effect of two-plugs on power has long been known.[1] The ability of multiple sparkplugs to reduce knock has been emphasized by Hallet and others. In this respect, however, the remarks of Messrs. Dickinson and James at the summer meeting of the S. A. E. in 1921 were somewhat startling. According to them knock could be suppressed not only by multiple spark plugs, but also by simple spark adjustment. And not only could this be accomplished by retarding the spark, as of course was generally known, but it could likewise be effected by the opposite action, that of advancing the spark.

The explanation of this possibility is however very simple, if we accept the opinion of Sparrow[2] that detonation is conditioned mainly on the occurrence of a certain pressure. Manifestly, if this is true, it makes little difference, as far as detonation is concerned, whether we keep the combustion out of the dangerous high pressure region by letting it occur comparatively early in the compression stroke, or comparatively late in the expansion stroke. That a reduction of power and perhaps laboring of the engine may be brought about in the former case is another matter.

In this connection, however, it is of importance to keep in mind that the detonation we are talking about is not a peak of pressure, but is a vibration of the engine wall, attended by pressure oscillations in the gas itself. These latter oscillations have been clearly demonstrated by Midgley[3] by means of his high speed indicator. The article here published is one based on the application of this indicator to the study of knock suppression by spark adjustment and by multiple sparkplugs. In this last respect it seems to lead to conclusions that may be of practical value especially in connection with the use of heavier fuels than gasoline in aeronautic engines. With respect to the influence of spark adjustment it simply renders the matter treated by Mr. Sparrow very clear to the eye.

The apparatus used included a single-cylinder, air-cooled engine of 2½-in. bore, forming part of a Delco farm lighting set. For these experiments there were, however, available a number of special heads, furnished by the General Motors Research Corporation through the courtesy of Mr. Midgley. By means of these heads it was possible to raise the compression ratio from the value of 3.3, which is standard for the commercial set, to 3.7 and 4.5, and simultaneously bring into action from one to four spark plugs arranged radially around the circumference of the combustion chamber. The two plugs were diametrically op-

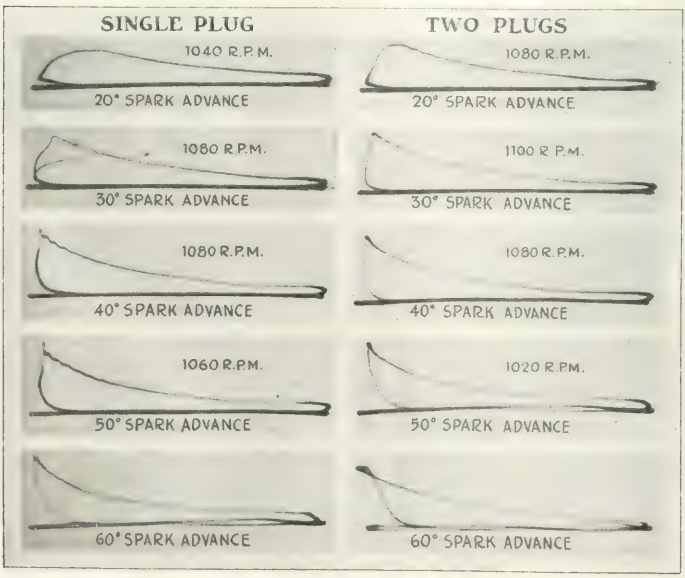


Fig. 1—Indicator cards showing comparative effect of one and two sparks at various spark advance positions in an engine using kerosene fuel at a compression ratio of 3.7

*Professor of Machine Design, Ohio State University. The tests upon which this discussion is based were made by W. G. Wheeler and E. H. Windle.

[1] See, for instance, F. Strickland, Petrol Motors and Motor Cars, 1914, p. 62, and earlier tests by W. Watson, Proc. Inst. A. E., 1909.

[2] Automotive Industries, May 4, 1922, p. 951.

[3] See for instance *Journal S. A. E.*, December, 1920, p. 493.

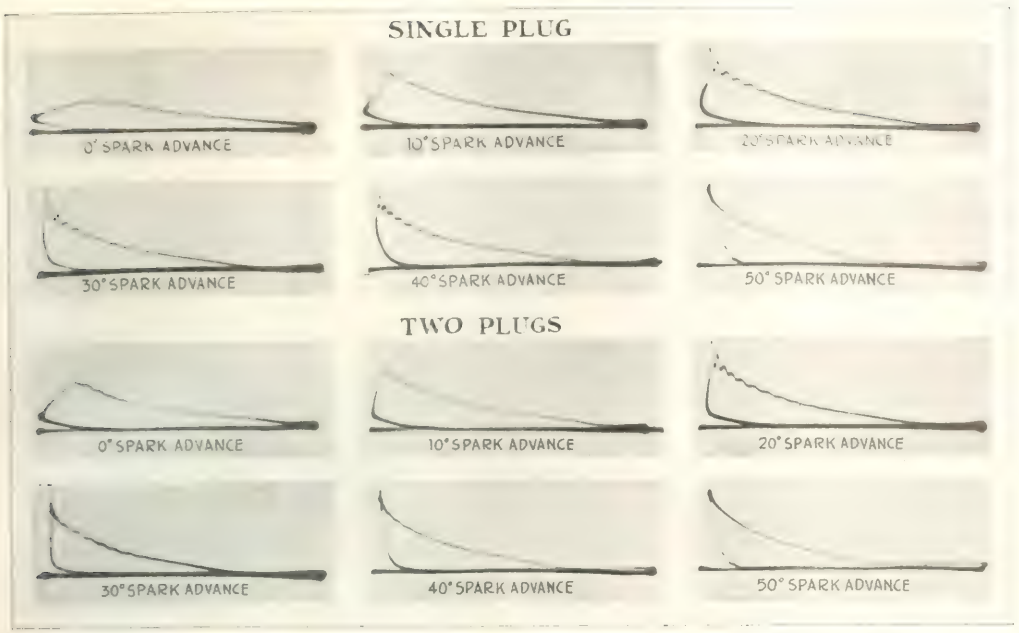


Fig. 2—Cards showing effect of one and two sparks at various advance positions. Fuel, kerosene. Compression ratio, 4.5. Speed, 1080 r p m.

posed to each other; the four plugs were spaced 90 deg. apart. The plugs were actuated by separate coils. The spark position was determined by means of a point attached to an arm adjustable around the axis of the crank shaft, and sparking to a point fixed on the flywheel circumference. The point on the arm was electrically connected to the main spark circuits in such a manner that the angular distance of the arm from dead center was exactly equal to the angular position of the timing lever in the spark circuits.

Results

The results of the tests made are given in the form of diagrams in Figs. 1, 2 and 3. All data are given on the charts. The speed at a compression ratio of 3.7, in Fig. 1, was the same as in the other series.

A study of the diagrams themselves will give more information than any discussion, consequently, the latter can be quite brief.

With a compression ratio of 3.7, as shown in Fig. 1, the gain in card area, that is in power, by the application of two plugs is very marked, for instance at 20 deg. spark advance. The earlier completion of combustion with two plugs is indicated by the sharper rise of the card at the left end. The ideal card is obtained with a spark advance of 40 deg. and two plugs. With this advance there is a distinct knock only when one plug is used. The vibration can be suppressed even with one plug by a spark advance of 60 deg., but only at an excessive sacrifice of power. At this advance, on account of the premature completion of combustion, two plugs give a looped card.

In Fig. 2, with a compression ratio of 4.5 a somewhat different story is told. With this compression and with kerosene as fuel, knock suppression is much more difficult to secure. Even at 40 deg. advance and with two plugs there is a trace of knock left. At 50 deg. the knock is suppressed, but at a considerable sacrifice of power. At 30 deg. the knock is quite noticeable.

A very important fact is brought out, however, in Fig. 3. With four plugs knock suppression is effected at a compression ratio of 4.5, with kerosene as fuel, in an air cooled engine, and at a spark advance of only 30 deg. On account of the small bore of the engine this result may, of course, not be as important as it would be for a somewhat larger engine. A somewhat more general discussion of the causes of detonation and of the wider applicability of the results may therefore be permitted.

Discussion of Detonation

Whatever the cause of detonation may be, the experiments here described seem to indicate that it can be suppressed by letting the combustion waves converge towards the middle of the combustion space, and meet there, rather than to let them impinge against a wall. The question is, why?

Midgley's quantitative explanations of the flame movement in engine cylinders, as observed by Messrs. Woodbury, Lewis and Canby,[1] is a distinct step forward in the application of strict analytic reasoning to combustion engine problems. Unfortunately, however, he does not explain detonation in detail and as far as he goes, he seems to give no direct key to the predominating influence of pressure on detonation as emphasized by Sparrow. While the diagrams herewith presented do not clear up this point, they appear to give a strong impression of the influence of pressure on the rapidity of combustion. A 10 deg. spark advance with a compression ratio of 4.5 gives as erect a combustion line as a 30 deg. advance with a ratio of 3.7.

Now chemical reaction in gases is nothing else than the breaking up and re-combination of molecules. It is therefore conditioned particularly of the number of molecular collisions per unit of time. Increased pressure at the same

[1] See *S. A. E. Journal*, May, 1922, and October, 1921.

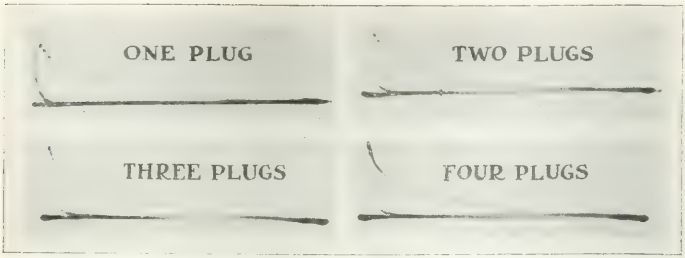


Fig. 3—Effect of one, two, three and four plugs on shape of indicator card when using kerosene as fuel in an engine of 4.5 compression ratio running at 1080 r.p.m.

temperature means more molecules per cu. in. per sec. and hence more chance for collisions. If the increased pressure is brought about by increased compression ratio, there is also an increase in temperature, that is, increased molecular velocity, another source of more numerous collisions. It should be observed, however, that, while the number of molecules per cu. in. varies directly as the pressure, the molecular velocity varies only with the square root of the absolute temperature. Hence pressure increase is more effective in producing collisions and rapid chemical reactions in gases than temperature increase. It should be noted especially that the increase in absolute temperature brought about by compression is, in any case, relatively very much smaller than the increase in pressure. Increasing the pressure tenfold does not even double the temperature. From all this it is perfectly plausible that detonation, which, whatever else it may be, certainly is also a rapid chemical reaction in the gaseous state, should be much more powerfully influenced by pressure conditions than by temperature conditions—within certain limits.

As for the mechanical side of detonation—the knock—Mr. Midgley's discussion, as far as it goes, and the experiments on which it is based, would, on the whole, seem to render the classical idea of this matter, as an engine phenomenon, more plausible than ever. We see the burned part of the charge expanding and driving before it and compressing the unburned part. Assume that this unburned part is driven against a wall and there suddenly attains the temperature of auto-ignition. It detonates in a body. On one side the explosion deflects the wall and sets it vibrating with the metallic ring that we hear. On the other side the explosion pressure in evening itself out through the burned gas gives rise to those rapid pressure oscillations which the indicator registers.

Under these circumstances there would appear to be two ways to avoid knock: First, to avoid compressing the unburned charge to the point of auto-ignition, and second, to avoid having the final explosion take place at a wall.

This second alternative is evidently the one attained by the use of multiple spark plugs so arranged as to have the combustion waves impinge upon each other. By this means auto-ignition of the remaining unburned charge is by no means avoided; but the force of the explosion is cushioned by the body of gas between the exploding core and the wall. The explosion wave when it hits the wall is both damped and distributed so as not to give rise to local deflections and vibrations.

From this point of view multiple spark plugs symmetrically arranged around the circumference of the combustion chamber and perhaps also in the head may very well suppress knock also in engines of considerable size. The piston and the head should, of course, be so designed as to make it impossible for the wave to hit any part of them at right angles.

Pitch of the Vibration

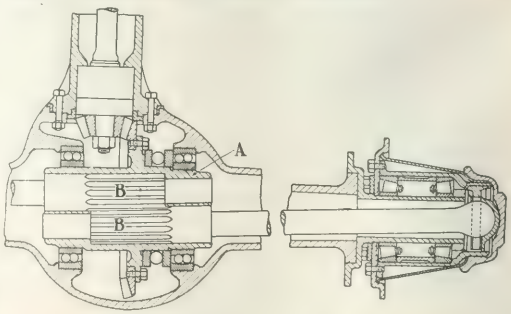
While the knock that we hear is a vibration of the wall, which may not at all synchronize with the vibrations of gas pressure in the cylinder, yet it may be of some interest to note that the number of vibrations per second, as registered by the indicator diagram, seems to lie between 800 and 900. This is approximately in the middle of the audible range, about five octaves from either end.

Novel Type of Universal Joint

A RATHER novel differential gear and rear axle construction has been patented in England by A. E. Jerram of Leicester. The object evidently is to reduce the manufacturing cost. Referring to the illustration, the cage *A* of the gear is bored out with two parallel slightly inclined holes to take the toothed ends of the driving shafts *BB*. The outer ends of the shafts are provided with universal joints. The cage *A* runs its ball bearings and is driven in the usual manner by bevel gearing. The toothed parts *BB* of the shafts, it will be seen, take the place of the planet wheels in the usual differential gear.

At a first glance the design looks very attractive, and it undoubtedly is unusually simple, but there are two points to which attention should be drawn. In the first place, the entire torque of the rear axle is evidently transmitted through a single tooth of a pinion. It seems that an attempt was made to provide for this by making the pinion of considerable width of face, but it is generally believed that an increase of width beyond about four times the circular pitch does not add materially to the strength owing to non-rigidity of the bearings. It is therefore likely that the pinions would have to be made of relatively larger diameter than shown in the accompanying illustration.

The other point is that if the universals at the end of the driving shaft are of the usual cross-pin or an equivalent type they will tend to cause slight fluctuations in the speed of transmission, which is undesirable.



Novel type of universal joint

Engineering Lessons of the Grand Prix

Magnesium pistons unsatisfactory thus far. Use of roller bearings in engine is receiving much attention. Renewed interest in Knight engine for racing. Panhard experimenting with sleeve with white metal coating. Weight reduction and filter streamlining needed.

By W. F. Bradley

GENERAL approval is expressed in France at the decision of the national club to maintain the 122 cu. in. racing rule for another year. The absence of delay in making known this decision has caused a favorable impression, for in the past the French club has frequently announced its racing rules too late and abandoned them too early.

It is felt that manufacturers have still a lot to learn under the 122 in. rule and most of them a good deal of ground to gain to get on a level with the winning Fiat. The rule naturally tends toward the development of an engine with increasingly high crankshaft speeds and the necessity for lighter reciprocating parts. Among the various problems involved is the use of metals other than steel or aluminum for pistons. The results obtained with magnesium pistons were not satisfactory. The Rolland-Pilain engines had pistons of this metal for the practice period, but after several breakages aluminum pistons had to be substituted. Fiat limited its experiments with magnesium pistons to bench tests, all the road work being done with aluminum pistons. The three Bignan cars which ran in the Fuel Consumption race used magnesium pistons, but owing to the fact that these cars were not in the race for long and were never pushed, little could be learned from their performance.

The use of roller bearings in these small engines is receiving a lot of attention. Fiat seems to have solved the problem with a type of roller bearing designed and built in its own shops, which stood up perfectly on all three cars, when used on all bearings in the engine except those on the wrist pins.

Rolland-Pilain also made use of roller bearings in the connecting rods, but instead of the single row type adopted by Fiat, made use of a double row staggered, each roller measuring 8 mm. diameter by 10 mm. long. Fiat had the same diameter of roller, but one of greater length. While the Fiat construction gave satisfaction, defects which led to the breakage of connecting rods were developed on the Rolland-Pilains.

Positive methods of valve closing, to overcome "floating" at high crankshaft speeds, have been given attention. Fiat worked on this problem for a long time and took out patents covering positive valve closing mechanisms, but decided not to use them at present for racing purposes. The valve springs used were made in the Fiat shops.

Rolland-Pilain had expected to run in the race with a positive valve closing mechanism, but so many difficulties were encountered during the preparatory period that it was decided to change the cylinder head and use spring controlled valves. Bignan ran with a positive valve closing mechanism, but the cars were not tested sufficiently to permit of drawing definite conclusions. In this connection interest is being revived in the possibility of the Knight engine for racing under limited piston displacement rules. In order to decrease internal friction Panhard-Levassor has been successful in white metalling the sleeves, but as yet the engines on which this has been done have been used only in short distance events.

Ignition is not giving the same trouble as formerly, and both magneto and battery systems are standing up well. Plugs generally are better, but it was seen in the French race that plugs which stood up perfectly in one engine gave trouble when used in an identical engine running at a speed 300 r.p.m. higher.

There is a lot of work to be done to get weight down to the 1434 pounds minimum under the new rules. Only Fiat has succeeded in doing this on cars produced up to the present, some of the others being very considerably above the minimum. Front axle design calls for attention in order to provide for the torsional stresses involved with front wheel brakes. Examples in this connection are the Sunbeam built up axles with H-section center piece and tubular end pieces, and the Fiat design of a tubular two-piece built-up axle.

SCIENTIFIC streamlining called for more attention this year than ever before, but still leaves room for progress. Fiat made experiments on models in a wind tunnel, the work being carried out by its airplane experts, and thus secured the best results. Among the mistakes made were too low a clearance, thus setting up considerable air friction under the car. In the endeavor to include all parts within the streamlining, some designers were led into adopting shapes of an exaggerated section. It is difficult to build a perfectly streamlined body without modifications in the chassis. Fiat had to use bowed frame members, having the same sweep toward the rear as the body. This involved bringing the two rear springs toward the center, in order to enclose them, and thus involved bringing the spring pads nearer the center of the axle instead of near the wheels.

Accurate information concerning the power available from existing 122 cu. in. engines is not obtainable, for the simple reason that every competitor has an interest in giving out erroneous figures. It has been stated that the Fiat developed 96 hp., but there is every reason to believe that the peak was very little above 90. The Sunbeams developed between 89 and 90, and the Rolland-Pilains 84 hp., while Bugatti, in a letter to the papers, declares that one of his 122 cu. in. engines has held 99.78 hp. at 4825 r.p.m. This is more than anybody else claims to have obtained and is a vast improvement on what was secured in the race.

The 122 in. cars will next be seen under test in the Italian Grand Prix on Sept. 10, when for the first time since 1914 Allied makers will have to meet German competition. All who raced at Strasbourg are entered.

Cutting Down Rejections in Pinion Shaft Production

Improved methods in new Hudson axle plant. Novel time-saving devices installed. Pinion roughs out pinion teeth in 6 minutes

By J. Edward Schipper

PROBABLY nowhere throughout the fabricated parts of an automobile is accuracy so essential as in the gears which transmit the drive. This not only applies to the transmission gears, but to the rear axle gears as well. Inspections are closer on these parts than ever before and the result is that unless manufacture has been carefully planned and carried through, the number of parts rejected, due to the careful inspection, are likely to run up to an abnormal amount.

One of the most interesting problems in automobile construction is the manufacture of the pinion shaft. It is customary practice now to forge the pinion integrally with the pinion shaft. This results in a piece which combines all of the problems of gear manufacture with those which would ordinarily be encountered in the machining of a forged blank. The Hudson Motor Car Co. has now in operation an axle plant which takes care of the combined production of Hudson and Essex cars. In this plant a great many novel and ingenious time and material saving methods are employed. It has been developed from a small beginning, until now it takes care of many parts for the main plant in addition to the axles. It is purposed here to follow through the manufacture of the Hudson pinion shaft in this shop. The methods here described have been largely responsible for cutting down rejections and other losses to one-tenth of what they formerly were.

HERE is a detailed description of how pinion shafts are made in an up-to-date axle plant. The story discusses each operation, while the photographs illustrate the details clearly.

Very close inspection is maintained on these parts. Consequently, the progress that has been made in reducing the number of rejected parts is worth special notice. This article tells how this desirable result was accomplished.

The forged blanks for the pinion shaft are received in this shop from outside. They have been heate treated before arrival, and are all held to a Brinnell hardness range of 4.3 to 4.6 before they are permitted to pass into the manufacturing department. By insisting on this uniformity in hardness, it has been possible greatly to reduce the tool upkeep, particularly in the gear cutting department. Furthermore, more uniform results are obtained all through manufacture and consequently fewer rejections. It has been found that when the metal is too soft, the gear cutters are apt to tear the metal, and when the blanks are too hard, tool chatter and wear increase.

The first machining operation on the blank is performed on a Cincinnati, doublehead, end mill, which cuts to length four of the blanks at a time. The double jig which is shown in Fig. 1 on this machine has been arranged so that either Hudson or Essex production can be taken care of. The jigs hold four Hudson blanks on one side and four Essex blanks on the other. The blanks are located from the back of the pinion or head of the blank, which fixes the overall length and provides enough stock for the subsequent machining operations. The Hudson shafts are slightly longer than the Essex, necessitating a different set-up when these are being cut.

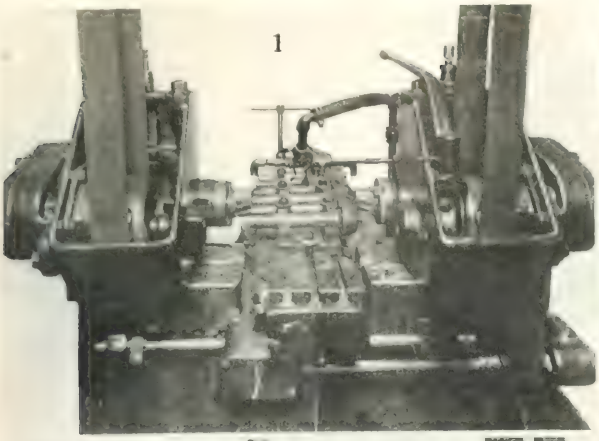
Following the end milling, the blanks are centered on both ends at once. This is performed on a double ended Cadillac centering machine and location of the part is from the small end so that the same size center will always be on the big end of the blank. This is the pinion end and is termed throughout the shop the head of the blank. A lug or driver is located on the head which permits of holding or driving the blank through several operations. This lug is left on the pinion shaft right through to completion.

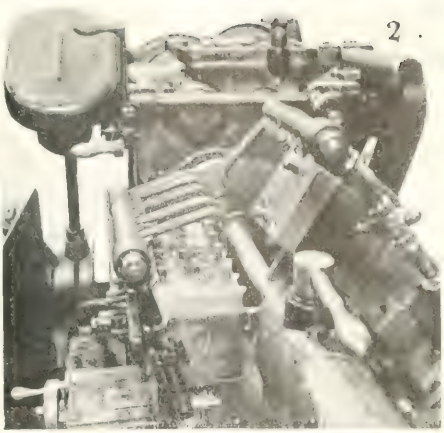
Fay automatics are used for roughing out the stem or shaft, Fig. 2. The blank in this operation is located between the centers which have been cut in the previous operations. On this roughing out machine, six diameters and a taper are turned, the Fay having seven tools. For finish turning the shaft, the same sort of a machine with ten tools is employed as in addition to the seven surfaces which might have been roughed out, this machine also takes care of the chamfering operations.

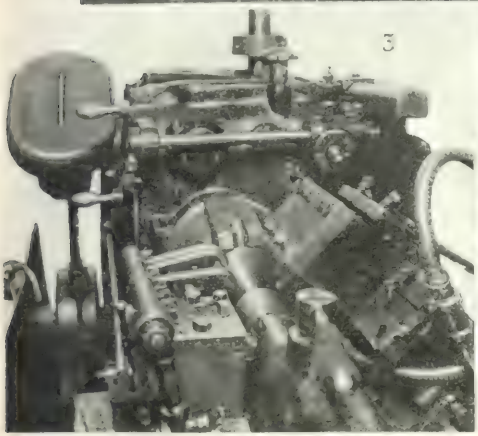
A Fay automatic is also employed for roughing and finish turning the heads or pinions. The turning operations are on the outside and each end of the pinion. The piece is located between centers and is held on a driving fixture against the back of the head. The fixture has a pin engaged by a slot in an arm as shown by Fig. 3, to drive the work.

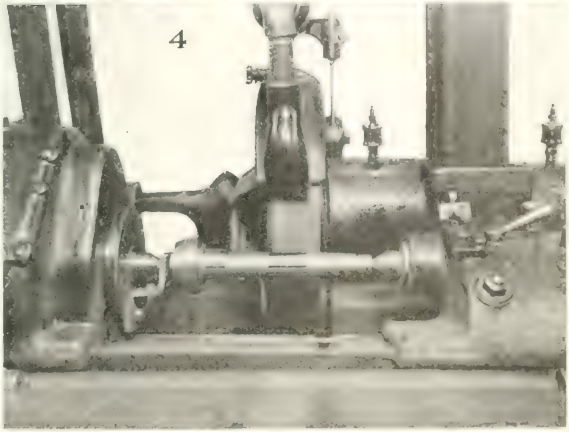
A preliminary grinding operation is then performed on the two pinion shaft bearings. This is not a finish grind, but is for the purpose of fitting the shaft to the Gleason adapter which holds the piece in the Gleason machine which cuts the pinion teeth. The grinder is of Pittsburgh manufacture and employes a grade 24, C-M wheel. The work is located between centers in this operation, Fig. 4.

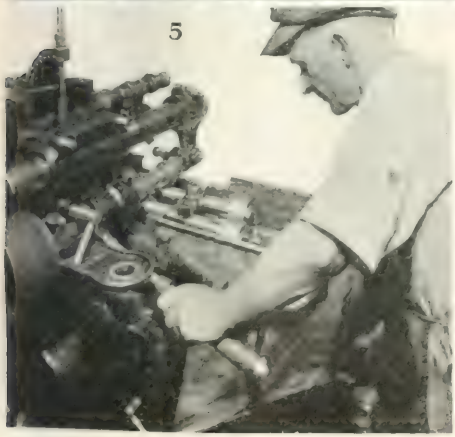
Two keyways are simultaneously milled in the stem. A large keyway is milled on one side and a small keyway





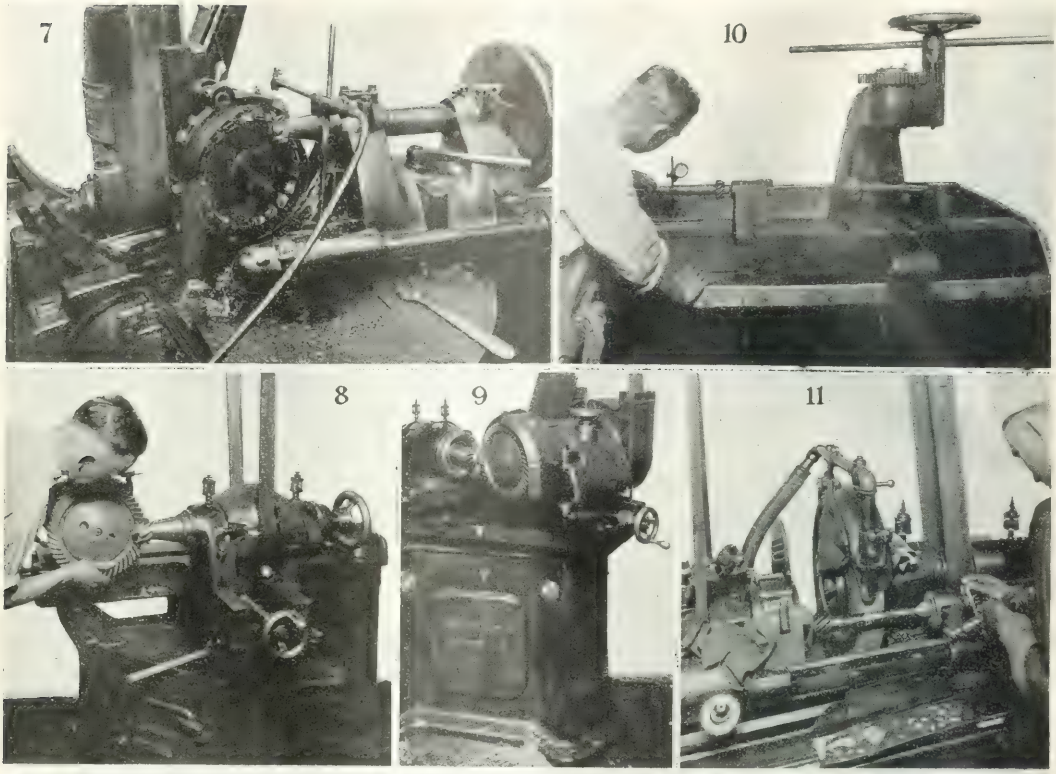








1—Cincinnati double head end mill which cuts to length the pinion shaft blanks. This machine handles either Hudson or Essex production with a slightly different tool set-up for the increased length of the Hudson blanks. 2—Roughing out the stem or pinion shaft on a Fay automatic. The shaft is located between centers and driven through the lugs on the heads. 3—Rough and finish turning the pinions on a Fay automatic. The outside and each end of the pinion are turned. 4—Grinding the two bearings on the pinion shaft to fit it to the Gleason adapter. 5—Milling two keyways for the key and lock washer in the end of the pinion shaft. This work is done on a Toledo hand mill. 6—Cutting thread on end of pinion shaft with Warner-Swasey hand screw machine equipped with Amco die head. Note slotted clamp in end of fixture to hold driving lugs on pinion



7—Cutting the teeth in the pinion on a Gleason machine. The pinion shaft is held in an adapter on the two ground bearings. 8—Inspecting pinion teeth by running them in with ring gears on running-in machines. 9—Burnishing the pinion teeth by running them against a specially hardened ring gear with red lead. 10—Checking the pinion shafts for any distortion which may have occurred in heat treatment. The checking is done by amplifying gage as shown and the screw press for bending is shown to the right. 11—Norton grinding operation on the two pinion shaft bearings. This is the final operation on the pinion shaft

on the other. The small keyway is for the purpose of holding the lock washer. A Toledo hand miller is employed for this operation, the work being located from the head and from the two ground bearings which fit in V-blocks on the fixture, Fig. 5. The shaft is then threaded with a 1-3/16 in. diameter 20 pitch thread on a thread mill and the end of the shaft also threaded to ¾ in. diameter 20 pitch on a Warney-Swasey hand screw machine with an Amco die head. The interesting point about this operation is the special fixture which is shown in Fig. 6 for holding the work. It will be noted that there is a slot in the clamp which slips over the driver on the end of the pinion, holding the work stationary while the die head performs the operation.

A cotter pin hole is drilled and counter-sunk in the end of the shaft. This is handled on a two-spindle speed drill. A burr is thrown up on the end center by this operation and in order to remove this, there is a special burring operation at this point, the center being cleaned out on a Foote-Burt drill. The blanks are then passed along to a bench where they are given a 100 per cent inspection before they go to the Gleason machine for cutting the pinion teeth.

It requires about 6 min. for pinion to rough out the pinion teeth on the Gleason machine, Fig. 7. The work is held in an adapter on the two ground bearings which have been provided for the purpose. As a support to the pinion shaft, a draw-bar is screwed on the end of the shaft. The roughing machine leaves from .005 to .008 in. for finishing the teeth and this operation immediately follows that of roughing. After the pinion shaft leaves the machine, the teeth are tested by running them in with ring gears, Fig. 8. The surface of the pinion and ring gear are coated lightly with red lead and allowed to run together on running-in machines with from .005 to .006 back lash. This inspection catches any "run-out" either by the irregularity of the sound or by showing irregularity in the removal of the light red lead coat. The test is not made against master gears but against ring gears from stock, although the testing room is provided with master gears to make special tests should they be necessary.

After the gears have satisfactorily passed the running-in test, they are hand burred by file and taken to a Gleason burnishing machine where the pinion teeth are burnished in against a hardened ring gear, Fig. 9. The burnishing is accomplished by running the teeth in with red lead against the ring gear which has been specially hardened for the purpose. The ring gear is used only for a short time and then passed along into production. This work does not impair the ring gear but really improves it.

A bath of kerosene is given the pinion shaft to remove grease and the red lead paint from the burnishing opera-

tion, etc., and they are then given to the heat treating department where they are carburized, wire brushed, hardened and drawn, wire brushed again, inspected for hardness by scleroscope and returned to the shop. Both centers are cleaned out with carborundum pencils on a speed lathe and the pinion shafts are then checked for any distortion which may have occurred in the heat treating process. This is removed by a hand screw press, Fig. 10. The checking for distortion is done with an amplifying gage, a very close limit being allowed at this point.

The pinion shafts are now ready for the final operation. The two bearings, which have only been ground in a preliminary manner to fit them to the Gleason adapter, are now finish ground to their correct size and the taper also finish ground on a Nortion grinder, Fig. 11. The work on this operation is held between centers and driven by the driver which remains on the end of the pinion. The grinding operations are inspected with snap gages and micrometers and a taper ring gage is employed to check the taper grind. They are then taken back to the silence room, paired up with ring gears with which they are mated by running them in together and making a careful inspection for noise, out-of-round or any inaccuracies which may have come through to this point. The experience of the shop is that by the time the pinions have reached this point, they are practically interchangeable and no difficulty is found in securing proper mating of the pinion and ring gear. The pinion shaft and ring gear selected are put in racks together and then passed along to the assembly department.

Germans Study Light Alloys in High Speed Engines

IN the *Zeitschrift für Metallkunde*, Dr. Ing. von Selve reports the results of some recent experiments in connection with the use of light alloys in high-speed engines and other parts of automobiles. He refers to a previous article by himself in *Der Motorwagen*, describing the six-passenger 8 30 hp. Selve car, and says that the aluminum rims used on the wheels of that car have run more than 3000 miles over rough roads without showing any signs of distress. He concludes that if aluminum can be used to advantage in the wheels, it can also be used in other parts of the automobile. For instance, the license plates could be made of the light metal, and Selve says he has been using such license plates now for many months, with a saving in weight of more than 1½ lb. About 45 lb. of car weight could be saved if the main frame and the subframe were made wholly or in part of aluminum, and experiments along that line have been started. It is suggested that several parts now made of brass should be made of aluminum.

A decrease in the weight of reciprocating parts is always a gain, as it results in increased power, decrease in bearing pressure, decrease in engine vibration, increase in speed of revolution and in pick-up. To attain these objects in the highest degree it is necessary to first study the most important qualities of the two light commercial metals and their most advantageous alloys. Following are the chief characteristics of the two metals:

	Tensile Strength, Lbs./sq. in.	Elongation Per cent	Specific Gravity
Aluminum			
Cast	28,000 to 35,000	1–1.5	3.0
Rolled	42,000 to 48,000	4–6	2.9
Pressed	45,000 to 51,000	2–4	2.9
Magnesium			
Cast	20,000 to 25,000	5–6	2.0
Pressed	40,000	8	2.0(appr.)

It would appear from these figures that aluminum is not a satisfactory substitute for high-grade steel with a tensile strength of 110,000 lb. per sq. in., an elongation of about 15 per cent and a specific gravity of about 8, considering that it is also more subject to fatigue than steel. In practice aluminum does make a good substitute, for two reasons, (1) because the heavier sections needed with aluminum give better assurance against defects in castings, and (2) because the thickness of steel sections often must be made greater than required by considerations of strength alone.

Selve claims that pistons cast in metal molds are superior to others because the thickness of the walls is always uniform and the cost of machining is greatly reduced. In addition, the metal molds last about twice as long as the best wooden patterns.

The serviceability of magnesium pistons has already been proven by tests. Whether they have a satisfactory life remains to be seen, as their temperature conditions are not as uniform as those of aluminum pistons. A remarkable saving in weight can be effected.

Sheet aluminum pistons are drawn in one piece and possess the advantage that they have absolutely uniform wall thickness, permitting of the use of thinner walls and eliminating all machining. The problem of securing the piston pin has been solved. The weight and thickness figures given in the following compilation were determined on a Selve engine of 81 mm. bore and 100 mm. stroke.

Cast Aluminum Piston; Sheet Aluminum Piston; Magnesium Piston

Properties			
Weight, lbs.	0.55	0.617	0.55
Tens. str., lbs.	25,400	35,000	22,800
Elongation, per cent	1.0	8–10	5–6
After approximately 50 hours' operation			
Tens. str., lbs.	25,500	31–34,000	17,700
Elongation, per cent	0.5–1	8–10	4.5

The test consisted of about twenty hours running on the block and about 600 miles run in an automobile.

Selve has also been attempting to reduce the weight of the connecting rods, and made tests with pressed magnesium rods, with results which up to the present have been very encouraging. Two sets were subjected to a twenty-hour test on the test stand and then used in various automobiles for nearly 1000 miles, and no deformation can be noticed as yet.

Before the endurance test the weight and strength figures were as follows:

Properties	Steel Rods	Magnesium Rods
Weight	1.6 lbs.	0.66
Tens. str., lbs.	120,000	39,600
Elongation, per cent	8	8

After the above-described tests the figures were:

Tens. strength	35,400
Elongation, per cent	5

The aggregate weights of the connecting rods and pistons for a four cylinder engine of 3.19-in. bore and 3.94-in. stroke are:

Cast gray iron piston and steel connecting rod ..... 13.6 lbs.
Cast aluminum piston and steel connecting rods ..... 9.5 lbs.
Sheet aluminum pistons and magnesium connecting rods 5.5 lbs.

In order to take full advantage of this weight reduction it is necessary to increase the speed of revolution. It should be borne in mind, however, that this weight reduction is the means of prolonging the life of the working parts and of reducing the load factor of the engine.

Designing Camping Cars and Trailers

Growing demand promises good market for properly designed camping outfit. Compactness, light weight, good appearance and low cost essential features for trailer. Standard axles suitable.

By Harry Wilkin Perry

RAPID growth of the motor camping movement indicates that a coming development of some importance is the camping vehicle. Tens of thousands of motorists make annual camping tours and the number is increasing each year. To accommodate these "sage-brushers" and "tin-can tourists" there are free camping grounds in each of the national and state parks, provided with pure water, sanitary arrangements, free supply of firewood and, in some cases, with pavilions for amusements, laundry work, etc.

Hundreds of similar grounds have been established by municipalities throughout the West and in parts of the South and East. Several campers' guides are published, giving the location of these camp grounds and the facilities afforded by each. One of these guides lists about 1000 and has a sale of more than 10,000 copies a year.

Camping lends a new interest to touring and the inexpensiveness of living out of doors enables the tourists to make much longer trips than they could otherwise. New possibilities are opened to the car owner in the way of pleasure, utility and return on his investment. The increase and permanence of motor camping are therefore not to be doubted.

THE last few years have witnessed a marked increase in the use of motor camping outfits. The perfect design for such vehicles has not yet been made.

Harry W. Perry, the writer of this article, has had a wide experience in the trailer field. Here he gives his ideas about the design of suitable trailer camping outfits. His discussion is interesting and pertinent.

This can be turned to advantage by the automobile industry through the exercise of ingenuity and business acumen. At present most of the tourist campers carry folding tents and other equipment on the running boards and in the rear part of their cars, and the money spent for such paraphernalia goes through the sporting goods houses to the makers of the equipment instead of through automobile dealers to car and body makers.

About a dozen makes of camping trailers are in the market and are selling in limited numbers, and there has been a noteworthy number of enthusiastic camper-motorists who, unable to find anything in the market to meet their wants, have spent much time and money in building or having built special camping bodies mounted on truck chassis. Some of these have been fitted up very elaborately. It is an indication that a well-designed camping body put out as a manufactured article and selling at a reasonable price would have a good reception.

In approaching this matter, the question at once arises: What is the best sort of camping outfit to build? The answer can best be found by considering what the largest number of persons will want and what construction will best meet the requirements. The chief essentials may be set down as follows:

1. Portability.
2. Ease of manipulation.
3. Comfort.
4. Convenience.
5. Moderate price.

Now, consider briefly the advantages and disadvantages of the different kinds of motor camps.

Tents.—These are outside the province of the automobile and body designer, as they require no change in the car. They must be erected and taken down at each camping place; the ground serves as the floor, and there is much packing and unpacking of the whole camp equipment to be done. Cooking and eating outfits, including folding table and chairs, all compactly stored in a case, may be carried on the running board.

Some tents have a ground cloth and also a protective cover for the car. The equipment and personal luggage of the passengers weigh down and encumber the car. When camp is made, the car can be used independently.

Trailers.—All equipment and luggage is carried in the trailer. Tent and beds are built on the vehicle and floor and beds are well above the ground. Tent or top may be raised easily and quickly. Equipment includes stove, icebox, food compartment, table, chairs, cooking utensils, and may include a wardrobe, folding toilet and water tank. The car can be disconnected and used independently.

Among the disadvantages are the towing of a weight of about 1000 pounds, possible difficulties of passing other vehicles in narrow, rutted roads, the impossibility of turning around in narrow places without uncoupling the trailer, storage of the trailer in small private garages when the camping season is over and the cost of a camping trailer that may be used only one or two months in the year.

Camp Cars.—The camping body mounted on the motor vehicle chassis avoids the popular objections to the trailer and the disadvantages of the tent, and may have the comfort and appointments of a snug little bungalow. Everything is self-contained, the running boards are not cluttered up and there is no tent to be put up and taken down. A minimum of work is required in making camp, so it is well



1—*The camp trailer will follow a car anywhere the car can go*



2—*The business end of a motor camp is the kitchenette and dining table*

suited for long trips with one-night stops. It must be substantial in construction and lends itself readily to heating when used for fall hunting and fishing trips.

The camp is inseparable from the car, however, and must be closed every time the car is used. Most such bodies have been mounted on truck chassis and are cumbersome and ungainly in appearance. They are unsuited for other purposes, and must either be removed from the chassis at the end of the season or both body and chassis allowed to stand idle through the winter.

It is hardly possible to combine all of the advantages of the several types in one, but the nearer the designer can come to realizing this the greater will be the demand for and success of his product. Both the trailer and camping body offer promising fields for development. The former is being rather widely exploited but the latter is almost virgin ground, so far as the manufactured article is concerned. If the designer decides to turn his attention to the trailer as the more desirable and the easier to work out, he may either undertake to improve on present constructions or to reduce the cost of production, or both. If he takes up the camping body, he will be confronted with many difficult problems. In either case, he will want to avoid infringing existing patents.

When contemplating the design of a trailer, due consideration should be given to compactness, light weight, appearance and low cost. The prospective buyer hesitates to invest $300 or more in an article to be used perhaps only one or two months in the year and for which storage will have to be found for the remaining ten or eleven months. This can be overcome to some extent by making the camping outfit readily removable so that the trailer can be used for haulage purposes after the touring and camping season is over.

Compactness and Light Weight

The greatest disadvantage of the trailer will be overcome if an automatic steering mechanism can be devised that will cause the trailer to back in the circle described by the wheels of the car. Any such mechanism, however, must not allow sideway or weaving of the trailer when drawn forward at high speed. Much study has been given to this problem by trailer manufacturers, who have solved it fairly well as far as the four-wheel trailer is concerned.

One probably cannot do better than to buy standard wheels, axles and springs, but roller bearings have been found preferable to ball bearings. A wooden floor is desirable but the body sides may be either of wood or sheet steel—each has advantages. The main consideration is the camp superstructure.

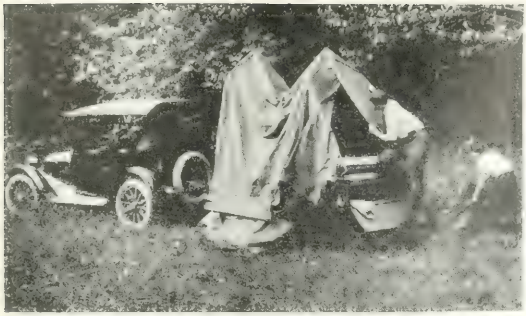
A tent of cloth is most commonly used, as it is light, cheap, readily made to fold compactly, and easily made insect proof. But the designer may employ stiff panels of sheet metal, plywood or composition. These exclude cold and dampness better and present a better appearance. A stiff, solid top is better than a cloth top, as it does not have to be raised so high to give full head room, and when lowered affords better protection for the contents of the trailer body. The lower the top of the trailer when camp is folded for traveling the better. It is preferable to keep the height above the floor within one and a half to two feet.

Sleeping Equipment

The beds, when in sleeping position, should be outside of the trailer body, while in traveling position they must be inside. These requirements, together with the necessity of raising and lowering the top, afford an opportunity for the exercise of much ingenuity. Simple mechanism for raising the top and extending the beds simultaneously by a single operation is indicated. Top and beds should be self-locking in position so there will be no need of further operations, such as tightening clamps, tying of ropes or buckling of straps.

Beds are one of the most important items. Sagless wire springs and silk floss mattresses are entirely satisfactory. The bed frames may be of hard wood or angle iron, and made to fold into the trailer body or to slide inward one above the other. Any bed less than four feet wide and six feet long will not afford the comfort it should for two persons. It would be better to make it 52 or 54 inches wide and 74 or 76 inches long. In that case the trailer body will have to be equally wide or the bed frame hinged to fold on itself. In any case it is important to construct the beds so that all the bedding can be left in place on them when closing camp, so that the beds will not have to be made up for sleeping when making camp again.

Whatever protective covering or top is used, it ought to be attached to the beds so that it will be extended automatically with the beds. This will not only avoid a separate operation but the beds will be fully protected if it should be raining when camp is set up. If the cooking outfit, food compartment and icebox are located under the floor of the trailer and accessible only from outside, it means a good deal of discomfort in case of rain and considerable work in carrying things inside and preparing a meal. Preferably the compartments should be accessible from both inside and outside. It is a great convenience to be able to stop when passing an ice wagon on the road and have a piece of ice put in the box without having to open the trailer, and to buy milk, fruit, vegetables and other provisions along the road and store them away with the least trouble. It also means much to be able to pre-



3—*Setting up a folding camp trailer is the work of only a few minutes*



4—*Everything complete*

pare an appetizing lunch, with hot or cold drinks, without opening the body of the trailer.

This suggests the need of some sort of kitchen cabinet in which stove and ice box have their places, and a one-hole or two-hole fireless cooker, if possible. Such a cabinet might be made in several sections hinged together so that they could be folded down on the floor or even under the floor when on the road and set upright when camping. Each individual section, of course, would have to remain in vertical position at all times. A water tank in the cabinet, with a faucet, will be a very desirable addition, as safe drinking water is not always available at places where camp is made and a long trip to find water before supper can be prepared is not relished. A capacity of two or three gallons is none too much; more is better.

Provision for Clothing

Provision for extra clothing and miscellaneous toilet articles is likely to be given too little attention. No great amount of space will be needed but suit cases, grips and small steamer trunks are unsatisfactory. Clothing gets mussed and creased in them, they are always in the way and it is a nuisance to keep putting things in and taking them out. A special wardrobe or wardrobe trunk in which clothes can be hung on hangers and which can stand upright when camping and lie flat when traveling would be handy and keep suits in the best condition for use at hotels or when walking on the streets in town. Space is so limited in a motor camp that it must all be utilized to advantage. The best way to do this is to arrange a place for everything. Small drawers in the wardrobe for toilet articles will keep them out of sight and from getting lost in confusion.

Space should be allowed in the trailer when closed for at least four folding chairs, a folding table, a folding toilet and tent, a fly tent and several implements such as a spade, an axe, a bucket, coil of small rope, etc. The fly tent adds fifty per cent to the comfort and enjoyment of a camp, for cooking and eating will want to be done out of doors most of the time and the fly affords shelter from sun and rain.

Development of a camping body to be mounted directly on the chassis of a motor vehicle presents many of the same problems as the trailer, plus others. There is a limited but worthwhile market for a strictly camping body for speed wagon chassis and this is a simpler undertaking than a camp body for passenger car chassis that can be used also for ordinary passenger purposes during all seasons. The speed wagon body may be larger and may even have a fixed top standing six feet above the floor, although this is objectionable. It may also be rectangular, with straight lines, and have panel sides, which simplifies the work of designing. The fact that the chassis has straight side frames with no kick-up over the rear axle is also an advantage from the standpoint of the designer and constructor.

The object to be aimed at is to evolve a body that will be suitable in appearance and comfort for touring purposes and that will embody all the equipment and conveniences of a satisfactory camp. Few persons will be willing to tour in a van-size body mounted on a heavy truck chassis, therefore width preferably should not exceed 60 inches nor the height from the floor the same. Length, to be in proportion, may be 8 to 9 feet. As a body of these dimensions would be entirely too small for use as a camp, ways need to be found to increase them so as to provide standing room and places for the beds so that they will not occupy all of the floor area.

The most obvious way to get headroom is by raising the top about a foot and a half. Simple as this idea is, its accomplishment presents many difficulties and the use of several mechanisms for the purpose is covered by patents issued and applied for. Those already covered by American and foreign patents include the following:

1. Upright supports formed in two parts, one part secured to the floor and the other to the top, the latter sliding against or within the former, and a system of steel cables and pulleys so attached to the parts of the uprights and to a shaft under the floor of the body that the turning of the shaft winds up the cables and raises the upright members attached to the top.
2. Upright telescoping tubes secured severally to the floor and the top, in combination with lever rods secured to the top and to corners of beds hinged on the uprights so that as the beds are lowered into horizontal position the rods force the top up.
3. Vertical screw rods attached to the top, worm nuts rotated on the rods by means of a shaft under the floor and gears to rotate the nuts.

Undoubtedly other constructions can be devised without infringing protected constructions. It is an interesting problem.

As in the trailer, the beds almost of necessity have to project outside of the main part of the body. There are various devices for sleeping in automobile bodies but they leave no room for dressing and undressing or for other use of the floor space, and they accommodate only two persons. It is not difficult in a commercial body to attach beds to hinged panel sides to let down into horizontal position, but a body of this type is not desirable nor readily marketable for touring.

Comfortable Riding Seats

Comfortable riding seats for four are wanted by day, with open body sides and with plenty of room for legs and feet. Beds six feet long will be in the way, whether they stand on edge or fold up inside the body.

A possible solution lies in making folding seats that can be opened into beds and moved from the interior to the outside of the body. Here again there is danger of interference with existing patents and applications, especially in the davenport bed class. Excessive weight of such combination seats and beds is to be avoided and some means found for easily shifting them from riding position and supporting them in sleeping position.

Then comes the problem of providing the covering to exclude rain and insects but admit light and air. Whatever material is used, some means of storing it out of the way and out of sight within the body when on the road is desirable. It is always to be borne in mind that the salability of a camp body depends largely upon its good appearance and the cleverness with which its real purpose is concealed. No one objects to a camp car looking like a camp when it is being used as such but he does not want it to look like a camp or a truck when it is used as a vehicle for touring. It seems probable that the demand will lead to the evolution of a new type of body having some of the characteristics of both the touring car and the light commercial vehicle, but it will need to be a happy combination and not a monstrosity. A rear door or doors may be admissible if not too obvious but there must be no evidence of beds, tent or other camp equipment.

As it is highly desirable to avoid the need of removing the camp body and storing it at the end of the season and substituting another for ordinary use, a great deal of study will need to be given to the problem of designing a convertible body. Any means adopted for raising and lowering the top must have tolerance enough to work easily and yet must not be so loose as to rattle when riding. Some way must also be devised to secure the top rigidly so that it will not sway and the joints creak when the car is in motion.

All the culinary, lavatory and wardrobe equipment should be so arranged that they can be installed and removed with a minimum of effort and time by the ordinary layman. One of the popular uses of a camp car will be for week-end trips at other than vacation times, yet owners will not want to carry the equipment in the car six months in the year.

It will be natural to take advantage of the presence of a supply of gasoline on the car to furnish fuel for a gasoline cook stove; of a storage battery to furnish interior lighting when camping, and of waste heat from the exhaust to heat water for laving and dish washing.

One of the difficulties is to make the camp car both weather and insect proof. Waterproofed cloth suggests itself as most feasible, but it is worth considering if some material of a different nature will not be preferable.

Excessive weight, structural weakness, rattle, leakage and high cost are dangers the designer needs to guard against.

There are some possibilities in the designing of a camp car for two that will be simpler and less expensive than a four-party camp car and for which there should be considerable demand. The bed might occupy the body space completely and the top would not need to be raised to give head room. In this case a cloth "lean-to" or tent could be provided to be attached to the top and side of the car, like some of the motor tents. This would make a serviceable dressing room, high enough to stand erect in with the ground, covered with a ground cloth attached to the tent, serving as a floor. In bad weather or when insects are very troublesome—as unfortunately happens frequently—cooking and eating could be done in the little tent. Incidentally, at meal time the running board serves excelently as a seat for two. The side doors would give easy access to the bed—far easier to get into and out of than the upper berth of a Pullman. If the design embraces a double-seat car, the four seat cushions laid flat and side by side, would form a comfortable and ample bed.

Coupe Type

Even a coupe type body may be designed to be extended rearwardly by means of rear doors and an extension top so as to provide cover for a full-length bed for two and a dressing space with full head room. If possible, space should be provided inside the closed body for a wardrobe trunk and a special dresser. These will be most convenient, saving repeated packing and unpacking of clothing and small articles.

It is not essential, in these two-party cars, to make arrangements for cooking and serving meals. Many will prefer not to bother with such work but will like to sleep in the car and get their meals at restaurants and hotels. Even so, they will be able to cut their living expenses on tour in half by eliminating hotel room charges and still get the benefit of living in the open day and night. Should they desire, however, to do real camping, they can at any time add a complete cooking and dining outfit, compactly arranged in a metal case to be carried on the running board.

As one studies the possibilities of the camping car and trailer in their various forms, they become fairly fascinating and, although the problems are many and difficult, the way has already been explored in a number of directions, the demand exists and is large in potentialities, and American genius is great.

Safety Code for Foundries Approved by Engineering Standards Committee

ADEQUATE provision for the protection of industrial workers in foundries in the iron, steel, tin, zinc, lead, aluminum and other industries is included in the National Safety Code for the Protection of Industrial Workers in Foundries which has just been approved by the American Engineering Standards Committee.

The approved code deals with foundry conditions only, omitting such subjects as building construction, exits, stairways, elevators, lighting, sanitation, etc., as these subjects are covered by other codes which have an official status before the American Engineering Standards Committee. The code consists of 124 sections, which are grouped under the following twelve main divisions: Entrances, floors, pits and galleries, gangways, aisles, foundry equipment, finishing and cleaning, heating, ventilation, operating rules, protection devices, employment of females, and recommendations.

The sectional committee which revised the foundry safety code and recommended it for approval by the A. E. S. C. included representatives of the National Founders' Association, the Association of Government Labor Officials, the United States Department of Labor, the American Foundrymen's Association, the National Association of Mutual Casualty Companies, the National Safety Council, the United States Bureau of Standards, the National Association of Manufacturers, the National Bureau of Casualty and Surety Underwriters, the American Society of Safety Engineers and the United States Public Health Service.

Demand for Motor Vehicles Reviving in Sweden

High tariffs made Swedish industry slump. Signs of increased business now. Adoption of gasoline rail cars being considered by many railway companies. American motorcycles popular. U. S. automotive representation at 1923 Jubilee will aid sales.

By E. C. Petrie

DURING the period of commercial prosperity there was a great demand in Sweden for motor vehicles. This may be grasped from the fact that the value of these imports for the two years 1919-1920 totaled Kr. 90,000,000.

The figures for the last two years were:

	Passen. cars	Value	Trucks	Value
1920	..9422	Kr. 56,649,964	2519	Kr. 14,634,524
1921	..4637	Kr. 22,143,194	1109	Kr. 5,403,980

The falling off in demand in 1921 is very noticeable. One of the causes of this is owing to the fact that large quantities of American vehicles imported into Denmark, and unsaleable there, were re-exported to Sweden during the year. This was particularly the case with the cheaper types, most of which were absorbed by the farmers of South Sweden. The proceeding was facilitated by the difference in the Danish and Swedish exchanges.

The Tidaholms Bruks Aktiebolag, one of the leading Swedish motor works, was prompted by this and other foreign activities to request the Government to take action to protect the home motor-car industry.

The result of the decline in trade inflicted great hardship on many dealers who, deceived by the artificially prosperous conditions which prevailed in 1919 and the beginning of 1920, saddled themselves with vehicles and a great quantity of accessories. Consequently prices have very much dwindled, and it is not surprising that the Swedish motor vehicle industry, which is more or less in its infancy, has been severely hit by the changed conditions.

In normal times there is little unemployment, and the standard of living is relatively high. The Swede is traditionally independent and will not be satisfied with tawdry goods. It follows that Sweden is normally a market for well-made high-class articles, and when economic stability returns there ought to be good openings in this country for well-constructed cars costing a reasonable sum.

AUTOMOBILE dealers in Sweden are experiencing a brisk revival of business, several of them having sold out nearly their entire stocks and anxiously awaiting deliveries of new lots ordered some time ago, according to a report received from Consul General Murphy, Stockholm, at the Department of Commerce.

A considerable drop in prices, together with a more favorable exchange rate, has allowed American cars to be sold at prices fifty per cent under those of last year, while still leaving a good margin of profit.

One dealer has already sold the greater part of a consignment of cars now en route and another having sold 100 American cars within the last sixty days has placed orders in the United States for an equal number.

Distances in Sweden are relatively great, and, notwithstanding a well-organized railroad system, it is obvious that services cannot be maintained so frequently as is the case in thickly populated countries. For this reason, the adoption of the gasoline-driven rail car is being considered by many of the railroad companies for use over the shorter lines.

It is essential for motor manufacturers to study local conditions in Sweden closely. Country roads are, on the whole, poor, and except in the south these roads can only be used during six months of the year for light vehicles. Even in the winter these skid badly on the icy surface after the snow has been beaten down by traffic. It follows, therefore, that, generally speaking, heavy motor transport is mainly confined to the cities and is only employed in the country districts during the dry summer periods.

A law was introduced last August containing provisions governing the width of tires, etc., of commercial motor vehicles. This law, the precursor of further legislation designed to preserve and improve Swedish roads, decrees that no vehicle weighing more than 2500 kilog. shall be permitted on ordinary country roads.

The speed of vehicles with solid tires is limited to 15 km. per hour and the width of vehicles to two meters. The width of tires must be calculated at 1 cm. for every 50 kilog. of weight on the tire up to 8 cm. or 400 kilog.

On the representations of owners of heavy vehicles and tires which would have been rendered obsolete by this decree, the operation of the law was suspended until Oct. 1, 1922, but in the case of vehicles registered before that date the law will not become operative before Oct. 1, 1924.

A bill was introduced last March for the purpose of taxing automobiles and tires, whether imported or manufactured in Sweden. The proceeds, estimated at Kr. 5,000,000, will most probably be granted to the communes for the upkeep of the country roads.

The proposed tax on motor cars and motorcycles is to be paid annually to the county government in which the vehicle is registered at the following rates:

Motorcycle without side car	Kr. 10
Motorcycle with side car	Kr. 20
Motor car with soft rubber tires for each 100 kilog. of the weight of the car	Kr. 8
Motor car with other tires for each 100 kilog. of the weight of the car	Kr. 50

Automobiles are to be liable to taxation as from the calendar quarter next after that in which they were entered for the first time on an automobile register.

The tax on soft rubber tires is to be Kr. 1.50 per kilog. The tax on imported tires is to be paid to the customs together with the duty. If an imported automobile is provided with tires, the tax on the tires is to be paid together with the customs duty on the automobile. The tax on rubber tires manufactured in Sweden is to be levied on the manufacturer by the Government of the county in which the manufacture takes place. For this purpose declarations of deliveries are to be made quarterly by the manufacturer, and the tax is to be paid simultaneously with the declaration. Rubber tires for automobiles are at present manufactured in Sweden by only two firms.

Taxation should come into force on Jan. 1, 1923.

The importation of motorcycles has practically ceased for the time being, owing to the fact that American machines were imported during 1919 and 1920 in large quantities at comparatively low prices until the market was overstocked. Whereas, the average imports from 1912 up to and including 1918 was about 500 per annum, imports in 1919 amounted to 3274 machines, in 1920 to 5975 and in 1921 to about 2500. At the same time the number of motorcycles in use rose from 9059 at the end of 1919 to an estimated number of about 19,000 at the end of 1921.

The reason of the success of the American machine is its comparatively low price in conjunction with a high horsepower which makes it suitable for Swedish roads. Moreover, the average Swedish driver favors a chain drive rather than a belt drive. The latter is apt to slip, especially in cold weather.

As country road surfaces are, generally speaking, extremely bad, lightly built machines are likely to shake to pieces. Some British machines are very suitable, but high prices have almost excluded them from the market. As a rule, 6 to 8 horsepower is regarded as the most suitable for Swedish roads. Lighter machines are mainly used for town traffic, and for this work the very light class of machine weighing less than 50 kilog. is popular.

The high price of gasoline has driven Sweden to attempt to solve its fuel problem. This is thought to be near solution, and should result in increased automotive sales. Last year 48,936,584 kilog. of fuel oil was imported into the country.

It is estimated that there are 5,000,000,000 tons of oil shale in the country. A plant recently put down at Hidings is now treating 100 tons of shale a day, and it is claimed that the product is capable of competing with all other kinds of fuel. Local peat deposits are also the subject of motor fuel research.

EXPERIMENTS are also being carried out in connection with the production of a new motor fuel. This is an alcoholic preparation made from raw materials produced in the country, and is said to be better and cheaper than benzine. This fuel will be shortly on the market, and much is expected from it.

There are now signs that the demand for automobiles in Sweden is reviving, for a considerable number of vehicles has been imported this spring. American manufacturers are maintaining a firm hold of this market, despite European, mainly German, competition. This is principally attributed to their well-developed selling organizations.

Gothenburg, the best-positioned port and the center of Sweden's economic activity, is the headquarters from whence a marketing campaign should be conducted in this field. Next year a Jubilee Exhibition is to be held to celebrate the tercentenary of the city's foundation. Arrangements are being made for holding a separate exhibition for automotive products, and if this project materializes it will probably include a section for foreign exhibitors. Possibly by that time Sweden will have fully recovered from the setback occasioned by the world-wide slump, and efficient representation at the Jubilee Exhibition should result in a permanent return to the large American sales that were a feature in Sweden during the immediate post-armistice period.

Austrian Market Dull

IN Vienna it is a matter of high finance and involved accounting to purchase an automobile. Prices on the types of cars prevailing on the Austrian market are nonchalantly quoted at prices ranging between 2,000,000 and 2,500,000 crowns, and they vary with the shifting exchange.

Consul Kemp in reporting to the Department of Commerce on the Austrian market for automobiles, which he concedes at present to be rather dull, due to the mountain climbing proclivities of the crown, and the internal condition of the country, says "American designs and engines are well appreciated by Hungarian motor enthusiasts." However, when dealing in millions the spirit of an enthusiast is likely to be dampened. But, continues the report, "some well-known American makes not too prohibitive in price might be sold on the market, although it is now completely controlled by German, Italian and Austrian manufactures."

Official figures give the present number of motor cars and trucks in Hungary as 3,640 of which 2,582 are in use. The Consul advises Americans when approaching the market to quote prices in dollars to obviate the necessity of employing a certified accountant and to avoid a possible loss in exchange fluctuations.

A FIGHT of marked interest to American motor car manufacturers is now being waged in India as a result of the unusually high tariff that has been imposed on motor vehicles. Motor cars in India are officially taxed as luxuries. The Ford is legally declared to be more luxurious than the most splendid carriage and pair of horses which abound in India. When a motor car is brought into India the customs count up its price, the freight paid for bringing it to the country and the cost of packing and insurance for the voyage and then levy a toll amounting to 30 per cent on the total as duty. For every 3000 rupees that a car costs landed in Bombay the customs take a tax of another thousand rupees.

Motor car dealers and business interests generally in India are making a vigorous effort to induce the Indian Tariff Commission to reduce the duty on motor cars.



Fuel Distillation

Editor, AUTOMOTIVE INDUSTRIES:

I read the article of P. S. Tice concerning fractional distillation with a great deal of interest and believe it to be a very excellent presentation of the subject. I cannot, however, agree with Mr. Tice in one or two minor details. For instance, the matter of identifying the components which go to make up a sample of gasoline is entirely beyond the range of any fractionation method. If we had only to deal with the gasolines of 20 years ago it would be quite possible to do as Mr. Tice suggests, but with gasolines of the present day which contain as high as 12 carbon atom members of various hydrocarbon series, I want to call your attention to isomerism.

There are, at least, over 100 different molecules that can be constructed, each one containing 12 carbon atoms and 26 hydrogen atoms and each one has a different boiling point by a few degrees or fractions thereof. You will readily appreciate, therefore, that going into this sort of a thing by fractionation it is utterly impossible to discriminate between various isomers of the same compound. In addition, present-day gasoline obtained from mid-continent crudes and California crudes contain many other series of hydrocarbons other than paraffins which renders the situation still more complex.

However, aside from this, Mr. Tice's work is to be commended from the viewpoint that a more accurate distillation method than the present one is highly desirable, particularly for research work. On the other hand, the present type of distillation apparatus which has been adopted by the American Society for Testing Materials as well as the Governmental Committee has the advantage of simplicity and cheapness, and it is expected to extend the use of this test for buying and selling gasolines, naphthas, kerosenes, gas oils, fuel oils, etc. With this diversity of usefulness in mind, I can hardly see the justice of discarding this test because it has a few shortcomings in favor of a more complex method which is adapted only for testing gasolines.

It is my personal opinion that with a few and proper modifications of the distillation method at present adopted as tentative standard, check results within very reasonable limits will not be at all difficult and for all commercial purposes this test will serve satisfactorily. Furthermore, accepting these data as a physical constant of the fuel used and applying to it the recent work of R. E. Wilson and Barnard it will be readily possible to determine therefrom all the desirable characteristics of the fuel that may be obtained by Mr. Tice's method. However, as I said before, I believe Mr. Tice has developed a piece of apparatus with real merit for research work and is quite commendable as such.

THOMAS MIDGLEY, JR.,
Chief Engineer,
Fuel Section, General Motors Research Corporation.

Oil Pumping

Editor, AUTOMOTIVE INDUSTRIES:

Your editorial in the last issue of AUTOMOTIVE INDUSTRIES on oil pumping is timely and should help to emphasize the points brought out by Messrs. Bull and Round in their Summer Meeting papers. One thing that you mention, however, I would like to comment upon, this being the tacit assumption that the amount of oil pumped is proportional to the pressure existing in the cylinder.

Ricardo disagrees entirely with you on this point, stating that the pressure in the cylinder over a range from a considerable plus to a considerable minus had no effect at all. While this is still debatable to a small degree, there is little doubt but that Ricardo is practically correct.

What really happens is that when the engine is pulling hard the oil is mostly burnt up as fast as it reaches the piston head whereas, at low throttle, the lower heat of combustion cannot burn the oil, which consequently accumulates. Of course this means that it is desirable to supply oil to the cylinders in proportion to intake manifold depression just the same, so the final conclusion you reach is unaffected.

The point is not without importance, though, because it explains why an engine which pumps oil badly is often made worse by using a heavier oil, especially with full pressure systems. Various investigators have found that if any given quantity of oil actually reaches the cylinders the amount pumped is but little affected by the viscosity. Heavy oils are almost always harder to burn that light oils and leave stickier deposits, so that if a certain quantity of oil is going to reach the combustion chamber anyway we should keep it as light as we can, for the cleaner it burns the longer it will be before carbonization begins to be troublesome.

Where a thick oil may sometimes help an oil pumper is by restricting the amount of oil to reach the cylinder. In a pressure system with the release valve untouched about the same bulk of heavy oil will be circulated as of light oil, hence changing the oil will not often do much good, but with a splash system the heavier body or higher viscosity can help somewhat because rather less will be splashed.

Cause and effect are very easily confused when thinking of lubrication, and just which is which is sometimes far from obvious. Even more than that, agreement is not universal by any means.

A. LUDLOW CLAYDEN,
Chief Engineer Gas Engine Research,
The Sun Co.

Motor Trucks to Move Mails if Railway Strike Comes

Post Office Department has 10,000 trucks ready to carry mails. Schedules and routes have been laid out. Only 50 per cent delay in 1st and 2nd class mails expected. Trucks already help in West.

THE railroad strike, if it comes, will not interfere with the transportation of the United States mails—thanks to the automobile industry. At best it can only slow the mails down about 50 per cent.

This is the assertion made by Harry H. Billany, Fourth Assistant Postmaster General, in charge of the automotive equipment, consisting of thousands of trucks, of the United States Post Office Department, and on whose shoulders the task of moving the United States mails will evolve, should the railway strike be called. Detailed plans have been completed by the Government for handling the mails. Thousands of trucks are ready, the Government official said, to a representative of AUTOMOTIVE INDUSTRIES. The Department has made plans for the acquisition of thousands of additional ones to be used the day that railway transportation service is tied up.

For more than two months statisticians of the department have been securing data and charting the United States, laying out tentative routes for automotive transports which will ply between mail terminals on schedule. These schedules have also been tentatively drawn up and the Post Office officials are ready to execute them on a moment's notice.

"Twenty-five, twenty, or possibly ten years ago, the prospects of a nationwide railroad tie-up would have meant a complete tie-up of the United States mails," Billany said.

"To-day, to the best of our judgment, it will mean not more than a 50 per cent delay in first and second class mails. But the big thing that we are interested in and that we shall be able to put over, thanks to the automobile industry, is that the mails will be delivered.

"There will be no stopping the mails. Ten thousand trucks are now standing idle, figuratively speaking, with their engines tuned up, awaiting to see what will be the outcome of the nationwide threatened strike.

"Within an hour after the last passenger train is tied up the trucks will be on the highways, loaded with mail, running on schedule between terminals that can be reached within a day's ride."

Trucks Contracted for by Government

Back of the truck transport fleet which the Post Office Department, in conjunction with the Agricultural and War Department, has mobilized, will be several thousand trucks, the services of which have already been contracted for by the Government.

Postmaster Billany admitted that the contracting of trucks, in anticipation of the strike, was the Government's trump card in the automotive transportation of the mails. Postmasters throughout the United States who are located at points designated as "automotive terminals" have been instructed, and in most cases have already executed their instructions, to sign up tentatively, of course, the necessary number of trucks to handle the mails from their terminal to the surrounding territory.

They have been assisted in this by the statisticians in the Department, who have compiled data, based on records available in the Department, showing how many trucks, of a designated capacity, will be needed to handle the mails in any given territory.

Mail Routes Already Charted

As an example, the postmaster at St. Louis, Mo., has been furnished with a chart showing how much first and second class mail is moved daily out of his terminal. The routes are to be short enough to permit a truck driver to leave his terminal in the morning, reach his destination at night, and return to his terminal the next morning.

Radiating from St. Louis in all directions, the chart shows just how much territory will be covered and the amount of mail that is normally handled, and the number of trucks that will be required to handle the estimated amount of mail which the officials are capable of determining to a surprising degree of accuracy, inasmuch as all mail is weighed out and into terminals, when shipped over railroads.

WITH the movement of the mails mapped out into territories, there remained the task of allocating the necessary automotive equipment required to handle the mail, and the routing of the best roads. The routing of the best routes has been largely left to the local postmasters who, because of their familiarity with conditions, are best able to map out the routes, which have been submitted to the Post Office Department, altered where necessary to make the tangled ends of the routes connect, and returned to the local postmasters.

The securing of the necessary number of automobiles, while uncertain, has progressed to where the Department believes that a sufficient number have been arranged for. Should additional trucks be needed, the local postmasters in charge of mail terminals will be given the authority to contract for additional ones.

"To date," said Mr. Billany, "the movement of the mails has not been hampered to any great extent, except in some of the Western States, where the roads were no doubt anxious to get an excuse to cease operation because of their heavy expenses. In these instances the Department has put into use several hundred mail trucks, and the success of these is what has led us to an optimistic viewpoint of the pending strike, and on which we base our opinion that the mails will not be slowed down more than 50 per cent."

How to Make Money by Being Honest

Factories which cut piece work rates suffer first when labor scarcity begins. Manufacturers who fail to protect dealers on price cut and new models reap a crop of increased marketing costs and decreased future sales. Fair-dealing in business pays.

By Harry Tipper

ABOUT a year ago, at the golf club of which the writer is a member, the honor system of handicapping was put into use. This system provides a card for each member on which are shown the five lowest scores, with the last score in an additional space, the average score, and the handicap. The handicap list is provided so that there will be no difficulty in arriving at the handicaps, and members are supposed to change these scores every time they improve, and to alter the handicap in accordance therewith. The scores required are exact scores and approximate scores. Most of the members are very faithful in their attendance to this duty, and after a good week-end of golf in the summer time, they can be found around the handicap board rearranging their own handicaps.

There are a few members, however, who do not play very much except in competitions, who make no changes in their handicap week in and week out until a competition forces a change. Of course, this is not of any particular importance, yet it is a source of a great deal of gossip in the locker room, and a never ending nuisance to the golf committee, who are trying to keep things straight. It has a tendency to ruin the co-operative spirit of the club, because it is one of those little advantages that may be taken of the other fellow without any apparent infraction of the rules. The moral obligation is evidently not understood by those who transgress in this direction.

Something of the same sort happens in business. Here and there in the industry one concern or another will take advantage of this or that situation in a way which destroys to some extent the confidence of the organization, increases the general suspicion, and affects the market—whether it is the market for labor, raw materials, or finished products.

Since the depression began, there has been a retrogression to the practice of cutting piece work rates, for instance, in manufacturing establishments where the prevailing rates offer the worker an opportunity to make money too freely, in the opinion of the management. Of course, there is no real and open piece rate price cutting going on to-day, but there are some factories in business where it is understood that a man had better not make more than a certain amount of money unless he wants his rate cut. Most of these cuts are executed through new time studies, and they are executed because there is a desire to take advantage of the situation for the benefit of the concern. The plentiful supply of labor which was obtainable a few months ago, led to an increase in this practice, which had almost disappeared, and it is still being continued in some factories.

Operators who are unwilling to carry a piece work price for a reasonable length of time after the price has been made, not only are unjust to themselves and the workers, but they are making it difficult to secure the desired results in the way of production economy.

The worker is intelligent enough to know when his piece prices are unsafe, and to imagine the reason in spite of the supposed reasons which may be given to him.

In any case, a piece price which cannot be sustained for a reasonable length of time—say six months or a year—indicates either one of two things:

1. Poor time and motion study analysis in the beginning.
2. The use of the piece work rate as a substitute for day wages without regard to the piece work necessities.

Temporarily, of course, the worker will abide by such decisions as are made by the manufacturer because of the necessity for a safe job. But the seeds of unrest have been sown wherever this practice obtains, and no co-operation can be expected by the manufacturer in the development of more efficient production or in the maintenance of a low turnover as the demand for workers increases.

IF a mistake has been made in the time and motion study, the mistake is clearly up to the manufacturer. This organization for this purpose should be sufficiently experienced, possessed of sufficient records, and capable of developing a wise time per piece which will permit of reasonable profit on the production cost. If the time per piece has been set so that a reasonable production quantity can be secured for the price, the additional earnings provided by the voluntary increase in pace on the part of the worker, net an additional profit to the manufacturer because they reduce the proportion of overhead going to the individual unit of production. In fact, all the charges other than the direct charges entering into this production are reduced in a definite proportion. Nothing is more irritating to the worker than the constant rearrangement of the piece work rate, and nothing destroys the morale of the supervisors and the executive staff in a factory so thoroughly as the necessity of conducting business along these lines.

The manufacturer has a moral obligation to deal decently with these workers and it is an economic blunder not to do so. It is fundamentally impossible to secure the greatest production value out of the unit of skilled labor unless the skilled worker is convinced that the management of the factory will deal squarely by him in his operations.

The service of the worker is no less when he voluntarily increases his pace so that his earnings are greatly increased. The price per piece is not increased because the piece work rate has taken care of that.

The actual total cost per unit of production is actually decreased, because the fixed charges and other overhead are spread over a greater number of pieces, and there is no reason for altering the piece rate within the time through which costs have been operated, and the net result is to destroy the possibility of maximum production pace, the most important element in reducing the production cost.

A somewhat similar situation is to be observed in the methods adopted by some of the manufacturers in dealing with their customers—the retailers. A number of cases have come up where retailers were not advised of changes in prices until a few days before the change was effected, although they possessed a considerable stock of the products bought on the old basis. Similarly, immediate and arbitrary action has been taken by the manufacturer in several instances, cancelling the contract with an agency for reasons which have not previously obtained, and in respect to which the retailer has had no warning.

Again, it is not only the question of the moral obligation imposed upon every manufacturer to deal squarely with his customers, but it is an economic blunder to throw a doubt and suspicion into the whole business of distributing the automobile, which is of the utmost importance. Business hesitation, limited by lack of sales activity, and other elements that spell poor business, and difficult times, arises mainly out of doubt and suspicion as to the outcome of the ordinary methods of doing business.

A dealer who has been caught with a stock on hand when the price was to be lower will buy hand-to-mouth for a very long period from the concern guilty of the practice. The dealer who has had a contract cancelled on him with practically no warning will hesitate to put himself completely into the hands of another manufacturing concern, and so the channels of distribution become clogged because it is not to the interest of the dealer to keep them clean and free.

There are other practices obtaining in the buying of materials which bear the same import in their effect upon the industry. If a company had no future obligations in capital, credit, etc., and had no desire to maintain a future organization, more effective than the present one, such practices would at least be executed on a basis where they would not reflect adversely upon the future of the business. Manufacturing concerns of large size and importance are sufficiently obligated by capital and credit obligations, in future commitments and necessities for the future business to be more important than the present business. That future business must extend itself 10, 15 or 20 years at least in order to permit the company to successfully meet all of the obligations arising out of its activity.

THE things which are happening to-day will not have any effect upon the manufacturing position at the moment, but the organization that has been cutting the piece work rates will be the first organization to suffer when labor gets scarce or when there are labor difficulties, and such an organization will find itself gradually in a less advantageous competitive position because of the added difficulty of making production economies in the face of the suspicion and the dissatisfaction of labor and turnover.

The same thing is true in the field of distribution. The retail field of the automotive business requires above all time to stabilize itself. It has been growing too fast and too far to have acquired the right kind of stability.

This stability must come of necessity from the increased understanding between the manufacturer and the retailer, and an increased confidence regarding the business between the two.

Consequently, all measures that suggest a doubt, create a suspicion, or question the integrity on either side, should be strictly eliminated because they are economically unsound and do not permit the stabilizing of the business along the right lines.

As the future obligation of business grows larger, the coincidence between the future obligation and the proper recognition of the moral obligation becomes closer and more apparent. This fact is one of the important facts of management which should be considered in the councils of all concerns doing business with large numbers of workers, large numbers of retailers, and millions of users.

Reports on Aeronautic Subjects

THE National Advisory Committee for Aeronautics has recently published a number of reports of interest to engineers and others in the aircraft industry. The most recent of these is the concluding one of a series dealing with aircraft instruments, especially those used for the purpose of navigation. Among the outstanding problems mentioned in this report are the need for navigating instruments suitable for long distance flights and for flying at night and landing in the fog, improvement of oxygen instruments for high altitude flying and the attainment of greater reliability and precision in all aeronautic instruments. This report bears the title "Recent Developments and Outstanding Problems." Other reports dealing with aircraft instruments are entitled "Aerial Navigation and Navigating Instruments," and "Aircraft Speed Instruments."

Reports dealing with various phases of aerodynamics include one on the "General Theory of Wing Sections." It outlines a simple method calculating the air forces to which wings are subjected at small angles of attack if their curvature is not too great and includes calculations of the elevator effect, general formula for any section, examples of zero angle, moment coefficient, etc.

Another report takes up the subject of "Lift and Drag Effects of Wing-Tip Rake" and describes tests carried out at the Washington Navy Yard on models of the R.A.F.-6, Albatross and Sloan aerofoils to determine the effectiveness of the conventional wing tip rake in improving aerofoil characteristics. Two degrees of rake were tested on each model, the trailing edge being always longer than the leading edge. The results are compared with values computed by standard formulæ.

"The Tail Plane" is the title of still another report which deals with calculations pertaining to this part. The author endeavors to simplify the present theory of longitudinal stability and to obtain one definite coefficient characteristic of the effect of the tail plane. It appears that the designer should avoid certain critical lengths of fuselage which give rise to periodic oscillations of the airplane. Suggestions as to the method and direction in which to carry out experimental work are included.

Copies of the various reports are obtainable from the National Advisory Committee for Aeronautics, Washington, upon request.

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Cheap Closed Cars Stabilize Industry

THE new body models so far announced this fall do not include any marked contributions to the cheap utility closed car movement. Last fall several closed jobs of this kind were announced for the first time. They caused considerable comment, because they seemed a step toward fulfilling a large latent demand on the part of the buying public.

The presence of this demand is clearly shown by the increased percentage of closed cars built each year since 1915. A survey made some months ago by AUTOMOTIVE INDUSTRIES showed that the percentage of total production comprised of closed cars mounted between 1915 and 1921 as follows:

1915	.015
1916	.015
1917	.04
1918	.07
1919	.10
1920	.18
1921	.25

Doubtless the cheap closed jobs introduced toward the end of last year will help make another increase in the 1922 proportion of closed cars. There is still much to be accomplished in connection with the design and manufacture of such models. A beginning has already been made, and it is to be hoped that no year will pass for sometime without some new models recording progress along this line.

The advantage to the manufacturer through the development of such jobs is twofold. Satisfactory, cheap closed cars will help increase sales because they open a certain latent field for sales and thus widen the market. Moreover, they tend to increase fall and winter buying and thus stabilize the quantity of sales and production throughout the year.

Smaller Wheel and Tire Diameters

MUCH comment is to be heard in trade and engineering circles concerning the new plans of tire companies looking to the marketing of several sizes of tires designed for use on 20-in. wheels. The Rubber Association and the Tire and Rim Association have definitely created standards for 20-in. wheels intended to accommodate 5, 6, 7 and 8-in. tires and some companies are now furnishing sample sets of these tires to truck manufacturers.

The former standard wheels were 24 in. diameter, and this size will, of course, be continued. The 20-in. rim has the advantage of lowering the center of gravity of a vehicle 2 in., a highly desirable accomplishment for certain classes of chassis, especially those intended for bus service. There is less material in the new series of tires than in tires of the same section made up for the larger rim, consequently they may be expected to sell at a lower price but have a correspondingly shorter life.

Just what effect this will have upon the market is problematical. Some foresee a greatly increased market for pneumatic truck tires, especially if changed conditions in respect to traffic regulation permit the use of higher speeds than are now generally permitted. First cost and cost per mile will, others think, have to be more nearly on a parity with that of the solid tire before any greatly extended use of pneumatics on heavy trucks is apt to take place.

The chief disadvantage of the 20-in. wheel from the point of view of the truck designer is the difficulty of fitting to it a brake drum of adequate size. Some truck engineers have criticized the tire industry for standardizing the new wheel size without first consulting the truck industry as to the effect on truck design involved. Possibly in some cases the brake drum problem can be solved by fitting propeller shaft brakes of larger dimensions. Smaller wheels and tires mean more revolutions per mile of the wheel and consequently a higher drum speed for drum of given size. Consequently, unless the drum size must be decreased more in proportion than the tire diameter, the difficulty may be more apparent than real.

Highways Sell Motor Vehicles

THE influence of highways on future car and truck sales is being recognized more fully every day by automotive executives. The saturation point for motor vehicles is the saturation point of transportation, and the scope and character of highways is a determining factor in the latter.

A country without any highways offers no market for motor vehicles. A city with narrow streets offers a smaller market than a city with broad boulevards. A territory with roads connecting important centers offers a better market for cars and trucks than one in which such ease of transportation is lacking.

The tremendous number of motor vehicles in certain areas is bringing constantly increasing traffic problems. If these problems are successfully solved, still more vehicles can be sold and used without difficulty. If they are not solved, the saturation point for vehicles will be just that much closer in these areas.

The future life of the automotive industry depends upon a proper solution of all of the problems relating to highways and highways transport. These, include highway finance, construction, transportation costs, education, safety and other problems of similar character.

Transportation studies, designed to find out the actual cost of motor haulage and its present and probable density, have already been conducted in Connecticut, Maryland and several other states. These preliminary investigations indicate clearly the line along which constructive work should proceed in the future.

The Bureau of Public Roads, together with various prominent state highway commissioners has been giving special thought to the matter of highway finance within the last few months. The N. A. C. C. Highway Committee has taken an active part in the work that is being done along this line. Further meetings to deal with finance are to be held in the near future.

The active cooperation of every executive in the industry is necessary if the best action is to be taken in handling each of these matters. The intensive activity of a small committee representing the manufacturers is already having a highly beneficial effect, but more widespread interest is essential to the attainment of maximum results.

July Made New Mark in Output Records

Total Production, Estimated at 246,000, Exceeded by Only Two Previous Months

NEW YORK, Aug. 15—The automobile industry has set another production record. Passenger cars and trucks produced in July numbered approximately 246,000 which is the largest July business and also the largest month in the history of the industry, the record month having been June, 1922, with 288,000 and the second, May with 256,000.

The July record brings total production for the year up to 1,403,000 and indicates that 1922 will be the industry's greatest year unless the railroad and coal strike situations, with their effect on supplies of raw materials and general business, exert a serious curtailing influence on manufacturing for the rest of the year.

August Will Show Decline

August production is bound to fall below the July record because of the natural midsummer decline in demand, and it may be still further affected by the coal scarcity which is rapidly approaching a crisis in the Detroit district. So far fuel shortage has not curtailed manufacturing but supplies on hand are being rapidly depleted and prospects are not bright for replenishment unless there is a sudden turn in the Detroit situation. Ford, for instance, is down to a two weeks' supply but is going ahead on full production pending possible relief. If coal is not made available, Ford and many other large plants will be forced to curtail production within the limitations of restricted power facilities available from Detroit public utilities.

No Excitement Over Prices

Outside the strike situation the industry is going forward with confidence of a brisk business throughout the remainder of the year, as indicated by the absence of excitement over price reductions in the highly competitive field, ranging principally between $500 and $1,500. It is significant that reductions have been confined almost exclusively to cars in the big production class, none at all having been made by manufacturers producing cars ranging from $2,000 up. Reductions have been made by manufacturers whose quantity production has enabled them to pass the benefits of manufacturing economies

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Business in Brief

Strikes continue to have a depressing effect upon industrial activities, particularly noticeable in iron, steel and some building materials. Iron and steel prices are going up, and in some cities premiums are being paid for building materials.

These strike conditions also have influenced general trade, despite the optimistic crop outlook, tending to hold down free fall buying, the advance of the fall season and the stimulus of market weeks, buyers' excursions and other aids to business activities.

In a retail way sales and building expenditures are below June, but above July, 1921.

Record crops of hay, potatoes and corn seem certain, and in nearly every other instance the other crops should be larger than last year's. In the way of prices, cereals are the lowest since last winter. Prices have eased, with farm produce leading.

As showing the effect of the scarcity of fuel, it is reported that at least 16 per cent of the furnaces in blast July 1 are idle now. Steel works are slowing down, although using much scrap in place of pig iron.

Railroads are buying freely, July being the most active month of the year, orders having been placed for 253 locomotives, 15,675 freight cars and 120 passenger cars. The railroads report 3,300,000 cars loaded in July as against the 3,451,000 in June, with the July car movement 300,000 cars, or 10 per cent of a year ago. In June the movement was 11 per cent ahead of 1921.

Bank clearings showed a loss of 13.9 per cent from last week, but a gain of 9.6 per cent over this week last year, the total being $6,088,912,000. New York shows a rise of 9.2 per cent over last year. Chicago gains 8.8. Thirty-two cities report gains, while ten are on the other side of the ledger.

Cleveland Tractor Takes Title to 38-Acre Tract

CLEVELAND, Aug. 14.—The Cleveland Tractor Co. has taken title from the Cleveland Trust Co. to the 38 acre tract which it occupies on Euclid Avenue.

At the same time the tractor company gave to the same bank, as trustee, a mortgage deed of trust for $2,000,000, securing an issue of $700,000 prior lien 6 per cent mortgage bonds and $1,300,000 subsequent lien 6 per cent bonds dated July 15, 1922, and maturing in two years. The bank took title to this tract several years ago for Rollin H. White when he first began experimenting with the caterpillar form of tractor.

Edison Able to Meet Daily Needs for Coal

Industry Will Continue to Be Supplied Until Priorities Ruling Is Effective

DETROIT, Aug. 16—The coal situation is no better or worse in Detroit than it has been for three weeks past.

The Detroit Edison Co. reports that it is about breaking even at this time, receiving daily shipments in about the quantity required for daily needs.

The resumption of work in many of the soft coal districts as a result of the Cleveland agreement is expected to end any difficulty in supply. The rub remaining, however, is of getting it shipped.

Industry Classed As Non-Essential

The priorities ruling of the Interstate Commerce Commission which would deny power to non-essential industries under which the automotive industry has been classed in Washington has not been effective here for the reason that no coal is being received through the agency of priorities yet.

Though priority applications have been filed most companies here are hustling for their own coal and any they are getting is through their own efforts.

Until such time as companies are unable to get coal except under the priority ruling the automotive industry will continue to be supplied, together with public requirements of all sorts. The Edison Company will make no discrimination and there is a possibility that conditions will not get any worse than they are now. This will mean that power users will be supplied in all their requirements unless action is taken by Congress to put teeth into the power of the coal administration.

Roads Will Make Deliveries

It is not expected that the priorities ruling will be generally effective. The attitude of the Louisville & Nashville Railroad that it will be held responsible under contracts it has made to supply coal is the attitude of all roads and unless the coal administration takes over the responsibility for such claims, the railroads generally will contest its powers.

The possibility of employing truck trains to bring coal into the city has not been seriously considered owing to the inaccessibility of most of the coal fields to truck travel in a vital emergency. It might be possible to bring in some coal to the city from districts not too far removed, but this would be only a measure of last resort. Getting empty coal cars to the mines is the big difficulty of the moment. Once the coal is in the cars most of the difficulty is over.

Executives in the industry are incensed over the action of the coal administration in placing the automobile as a non-essential. Without the activity in the automotive business of the year to date

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1923 Plans Provide for Greater Output

Companies to Expand Factory Room, Chiefly for Closed Car Production

DETROIT, Aug. 16—Despite the existence of the coal and rail strikes, the industry is proceeding unhesitatingly with its plans for expansion and increased production in 1923. The central thought in the general expansion program is to provide more room for the production of closed cars, though in some cases the expansion is to provide for increased output in all models.

In this expansion body and car makers are both participating, the former, however, on far the larger scale. By the spring of 1923 body manufacturers should be equipped with ample space to meet whatever demand for closed cars develops, and indications are at this time that the demand will run from 50 to 60 per cent of all cars produced. Demand in the cities, it is predicted, will run from 60 to 75 per cent for closed vehicles

A noteworthy feature of the closed car demand is that it has resulted in a general extension of business to body builders in all parts of the country. Hitherto the body business has been limited to a smaller number of builders—almost concentrated in a few hands. This condition has given way to a widely diffused buying, making for more individuality and variety in coach work and equipment.

Bodies are now coming into Detroit from all sections. Despite the scattering of production into many hands, and the addition of freight rates which must be borne, closed car prices are lower now than ever before. This is due to improved manufacturing methods and the development of new types which permit of a reduction in operations. Increased demand has permitted car factories to adopt better handling methods. More space in the car factories will result in closed car production on any scale required.

Arrow Motors to Change Its Name to "Courier"

TOLEDO, Aug. 14—The Arrow Motors Co. of Sandusky, which was incorporated to take over the assets of the defunct Maibohm Motors Co., will soon amend its articles of incorporation so as to change the name of the company to Courier Motors Co.

The company will manufacture a car to sell in the $1,000 class.

M. A. M. A. TO MOVE

NEW YORK, Aug. 14—The Motor & Accessories Manufacturers Association will move its headquarters on Oct. 1, having leased office room on the twentieth floors of the Fisk Building Broadway and 57th Street. The association will have 50 per cent more space than it at present occupies in Aeolian Hall, 33 West 42nd Street, where it has been located for the past 10 years. In making the move, General Manager M. L. Heminway was influenced to a certain extent by the fact that the Rubber association and other organizations with which the M. A. M. A. is in close contact are in the Fisk Building.

AUTO-LITE BRANCH FACTORY

TOLEDO, Aug. 14—The Electric Auto-Lite Co. has opened up a branch factory for the production of armatures for electric generators at Adrian, Mich., in the building formerly occupied by the Willys-Overland automobile agency. The present quarters have been leased for a year, with option of purchase.

It is expected that 75 to 100 persons will be employed.

ROLLS-ROYCE ON NIGHT SHIFT

SPRINGFIELD, MASS., Aug. 15—Rolls-Royce of America, Inc., will operate a night shift of 100 men in two departments. This change, necessitated by the fact that deliveries are considerably behind sales, will become effective as soon as necessary organization changes can be made. With this departure the weekly output of cars will be increased.

Foreign Markets Should Absorb Surplus of American Farm Products

By J. G. BAYERLINE,
President of the Columbia Motor Car Co.

Detroit, Aug. 15.

IF the United States is to be really prosperous in the next few years it is important that foreign markets be opened for the surplus crops that the farmers are capable of raising. Unless such markets are opened farmers will be limited in the amount of money their crops can be made to yield and consequently will be limited in their buying power.

Bumper crops are assured at this time, far more than the needs of the domestic market. I am told that bankers in Kansas are depressed over the prospect of finding sufficient markets abroad to take the surplus yield. Consultations are in progress now with New York bankers which are expected to determine the policy of the western bankers in dealing with the farmers.

The money owed to the United States by European countries bears an important relation to market for American products abroad. Several of America's most prominent financiers have advocated the cancellation of these debts as a means of stabilizing world conditions and reopening the markets to American exports. If this cancellation would restore the markets, it seems the logical thing to do.

If crop marketing is successful there is every reason to expect that there will be a large sale to farmers of medium priced automobiles. The progress in farmers' affairs finds many of them in improving their methods of life to be going in for better automobiles than the ones they first bought. The sale of a better automobile to any farmer opens the way to sales to all his neighbors.

With automobiles the farmer is not confined to his farm but is able to come into the city or town at frequent intervals. Coming to the city means more buying and buying of better goods. The farmer to-day is better dressed, and more discriminating generally than he was before the automobile enabled him to get in and out of the city frequently. Consequently every sale of an automobile to a farmer means the opening of opportunities for a much larger flow of business than would otherwise have been possible.

Competition for business in the lower priced automobile field caused by the entrance of new manufacturers will make owners of many people who have never owned automobiles and will be a stimulus to the industry all along the line. The more persons who become accustomed to the use and utility of automobiles, the more business there will be in higher priced cars later on due to natural progression.

Chevrolet Works on Plan for Michigan Frontenac

INDIANAPOLIS, Aug. 14—The fact that the Delaware corporation of the Frontenac Motor Co. of America, Inc., has been dissolved will have no effect on the work being done in promotion of the original Frontenac Motor Co. incorporated in Michigan in 1915 and still in existence, Louis Chevrolet, vice-president of the Delaware corporation says.

He stated that the dissolution was merely a step in the adjustment of the affairs of Allan A. Ryan. Frontenac of Delaware together with Ryan interests intended ultimately to take over the Michigan corporation.

Chevrolet states that he and his associates are working on a plan by which he hopes that the Frontenac Motor Co. of Michigan may be revived and become a producer.

WILLYS CASHIER DIES

TOLEDO, Aug. 14—Frank B. Jacobs, cashier of the Willys-Overland Co., died at Mercy Hospital following an operation for appendicitis. Jacobs had been employed in the Second National Bank before entering the automotive field with the Overland.

No Change Planned in Stutz Personnel

Program of Expansion Assured Following Schwab's Visit to Factory

INDIANAPOLIS, IND., Aug. 15—Charles M. Schwab, president of the Bethlehem Steel Corp., who obtained control of Stuz Motor Car Co. of America a few days ago, has announced that he will be actively interested in the Stutz management, but that the personnel of the Stutz organization will not be changed. A program of enlargement and expansion is said to be assured.

Prices Reduced

Coincident with the visit of Schwab and his announcement regarding the organization of the factory forces, a revised schedule of prices for Stutz cars also was made known with price reductions ranging from $200 to $500. The roadster is now $2,450, a $500 reduction; four passenger phaeton $2,790, a $200 reduction; the six passenger phaeton is $2,640, a drop of $350, while the coupe, now $3,490, represents a drop of $500. The price reductions carry with them full protection for all dealers on all models they now have on hand.

William N. Thompson, president and general manager, will be continued, said Schwab, as will the entire factory organization. Schwab said that the men who have guided the company through the recent uncertainty of the motor car industry are best qualified to handle the new control. "I am in entire sympathy with Mr. Thompson and his associates and have complete confidence in them," he said. "It is farthest from my thoughts to change the personnel. I hope the relations will be as happy as in all the industries and corporations with which I am associated."

Schwab's Statement

In his statement Schwab said:

It is not as if my associates and myself were acquiring a new property in the automotive field, and making our debut in the motor car industry by acquiring control of the Stutz. We have long been interested in the company in a substantial way. What is more natural than that under the circumstances we should desire to control the property as we do in the case of all the other properties with which we are identified?

Our plans for the Stutz simply embrace a continuation of the business on a basis that will permit it to proceed as it deserves to progress—to make the most of the possibilities which lie within its range of ability. We regard the Stutz as a valuable property—one that has potential possibilities that recommend it as deserving of the best thought and effort that can be put forward in its behalf. We are going to develop the Stutz along sound, substantial lines. We intend to make it attractive to the trade.

Although the Stutz company has never been embarrassed so far as its finances are concerned, and at present is in one of the healthiest conditions of any company in the business, in order to enable it to go forward at once with the development that we have planned for it, substantial finances have been provided which will be placed at the disposal of its executives to carry on their work.

Though I have been associated in my career with some motor car enterprises from a different angle, this is the first time that I have applied myself actively to the management of a company. I have been here many times and have studied the Stutz. I know the men who are with the Stutz. I have been in a position to watch them proceed. I have the sincerest admiration of their work, and I am convinced that if these Indianapolis men cannot put the Stutz where it belongs, there is not a group of men in the country who can do it.

Mr. Thompson will continue in full control of the policies of the company and will have the entire support of my associates and myself in all that he does, just as every other man entrusted with the development of the company will have our cooperation in every possible way.

PENNSYLVANIA WANTS POWERFUL RAIL CARS

PHILADELPHIA, Aug. 14—The Pennsylvania Railroad has announced that it is in the market for about twenty gasoline-driven cars that can be used on its branch lines, especially those on which the traffic is comparatively light.

Recent demonstrations of gasoline power cars of the bus type were regarded as satisfactory, but the motive power department desires something different—a car with power enough to draw a trailer when necessary.

The company, it is said, plans to install a gasoline car on its Bustleton branch. A shuttle train now is running between Holmesburg Junction, on the New York division, and Bustleton. Two cars are needed for this work. The Cresheim branch is another where gasoline power cars could be used to advantage.

Brill Is Now Operating at 65 Per Cent Capacity

PHILADELPHIA, Aug. 14—The J. G. Brill Co., this city, is now operating at 65 per cent of capacity, with 1700 employees, as against 45 per cent of capacity two months ago. An order for one hundred cars has been booked from Detroit and the company also is working on a large volume of orders from various street railway companies.

The company now is constructing 26 gasoline power cars, similar to the type recently tried out by the Pennsylvania Railroad Co., here. They will be of the same power as that car.

Some of the lines these cars are built for are the Maine Central, Cambria & Indiana, Fonda, Johnstown & Gloversville, Great Northern, Central National, Frisco, Seaboard Air Line, Western Pacific, Chicago & Great Western and Tennessee, Alabama & Georgia.

Former Saxon Plant Leased by Columbia

With This Addition Company Will Have Capacity of 300 Cars Daily

DETROIT, Aug. 15— Columbia Motor Car Co. has leased the plant formerly occupied by Saxon Motor Car Co. in this city and will begin using it in the manufacture of its light six and de luxe model Columbias by Sept. 1. With the addition the company will have capacity for 300 cars daily and expects to step up its production gradually to this figure, reaching 200 daily soon after the first of the year.

The additional plant was taken over almost fully equipped for car assembly purposes, having two assembly tracks and other essentials. In the beginning it is planned to move several of the company's departments into the added buildings, and to use it largely for the building of the larger Columbia models. In taking it over, the company said it was not planned to perform any operations now being contracted for.

Demand for Columbia models was reported to be very brisk in practically all sections of the country, and reports from dealers in the farm district were to the effect that farmers would be large buyers in the medium-priced car field. Only one condition beclouds the generally bright outlook, the prospect of a failure of demand from foreign countries for the surplus crops.

Barber Sees No Let Up in Present Car Demand

TOLEDO, Aug. 14—"Every indication points to a continuance of the present heavy demand for cars," declared A. C. Barber, general sales manager of the Willys-Overland Co., returning from a trip through New England and North Atlantic States.

He says:

We are convinced that there will be no slackening off in demand for cars, particularly if the present industrial unrest is smoothed out, as we are all hopeful that it will be.

The present rush of orders will be maintained at almost an even level for some time to come. Settlement of the strikes and return of the farmer will make this an assured fact.

Barber reported that closed models are in big demand and that rural dealers are reporting farmers as a big factor in local buying.

EMPLOYMENT LESS

DETROIT, Aug. 14—A slight decrease in employment during the week is reported by the members of the Employers Association. The total of 181,733 is 686 less than a week ago. At that time there was a decline of 1075 from the week preceding.

Duesenberg to Add New Line of Bodies

Plans Addition to Plant to Provide for Increased Car Production

INDIANAPOLIS, Aug. 14—The Duesenberg Automobile & Motor Co. of this city will break ground at once for the erection of an additional building which will be used as an assembly plant as well as for the fitting-up and finishing of cars. The announcement made by General Manager Chester Ricker also stated that Duesenberg will shortly add a line of Fleetwood bodies to be ready for fall delivery.

No price announcements have yet been made regarding cars with Fleetwood bodies, but it was definitely stated that there would be no decrease in Duesenberg prices now or in the near future. It is intimated that price raises might be necessitated because of refinements and added quality of finish, details and appointments. At present almost all equipment usually supplied as extras to cars in the higher priced field are furnished in the standard Duesenbergs.

Increased production is what is being sought in the additional building and the desire to carry on all processes of manufacture and finisn in the company's plant. Some work has been done in outside buildings recently, but the new addition will remove this necessity. Since the first of July the production figures of the plant have been greatly increased, the plant being able to turn out 45 per cent as many cars as it had in the entire previous part of the year. This was brought about by reorganizations and by more efficient methods put into operation. The pace set in July is being kept up.

Variety of Body Styles

The Fleetwood line when offered will have a variety of body styles in both open and closed jobs. There will be five and seven passenger phaetons and roadsters as well as town brougham, sedan, inside drive cabriolet with Fleetwood bodies. When the new building is ready about the first of the year it is hoped that production can be raised to four cars a day, these to include both standard models and the Fleetwood line. Factory officials insist that while production has been increased by rearrangements and better methods, the Duesenberg policy of building what are to all intents and purposes custom jobs will be continued with every car turned out by the plant.

NEW ROTARY ENGINE

BUFFALO, Aug. 14—A new rotary engine soon will be manufactured in Buffalo, according to an announcement by L. F. Donnelly, an official of Champion Rotary Motors, a new $6,000,000 organization. Donnelly said several plant sites are under consideration. The company's production for a time will be limited to the manufacture of the engine, details of which have not yet been made public. The other incorporators, besides Donnelly, are D. J. O'Neil and L. F. Lindal.

Donnelly said the new company would be operated in connection with the Augustine Automatic Rotary Engine Co., but added that none of the Augustine officials is a member of the Champion organization.

SHORT LINE IN SOUTH WILL USE RAIL CARS

CHATTANOOGA, TENN., Aug. 15—The management of the Tennessee, Alabama and Georgia Railroad has announced that it will use gasoline propelled cars upon its system. The first cars will probably make their trips about Sept. 1.

This is one of the first roads in the South to use gasoline propelled equipment, and the experiment will be watched with interest by the officials of other short line roads.

Buick Special Delivery Cars for 1923 Changed

FLINT, MICH., Aug. 14—The 1923 Buick line of special delivery cars will consist of six body types on the chassis used for the four cylinder Buick models. Mechanical changes have been made.

Crowned fenders have been added together with drum type headlights, a redesigned radiator, which sets much higher, rubber bumpers on the rear axle, special anti-rattle hood catches, silent over-running generator clutch and a new glass switch face. A transmission speedometer drive, a lengthened gearshift and a transmission lock have also been included in the new models.

Felts have been placed around the valve stems to carry oil to the stems and guides, and a new system of generator brushes and brush arms has been used to prevent squeaks. The clutch has been refined, and the clutch hub changed from malleable iron to drop forged steel. The size of the strut and truss rods has been increased. Brakes have been improved.

The new prices range from $840 to $935, varying with the type of body and equipment.

MARMON CHANGES PHAETON

INDIANAPOLIS, Aug. 14—A new seven-passenger phaeton is now being produced by the Nordyke & Marmon Co. The hood has been lowered slightly, the body lines from front to rear have been straightened, the length of the body has been increased by an inch and the overall height has been reduced by four inches. The "panorama" top is of the stationary type and is featured by the absence of bows. The price is $3,185.

Merger Heads Visit Company's Factories

Associated Motors Head Says Kentucky Wagon Will Bear Heavy Burden

LOUISVILLE, KY., Aug. 14—Every square foot of the fifty acres of the Kentucky Wagon Manufacturing Co., one of the outstanding units of Associated Motor Industries, the new $80,000,000 automobile merger, soon will be alive with activity, Will I. Ohmer of Dayton, Ohio, chairman of the board of directors, said on the occasion of his visit here.

Ohmer is in Louisville with Louis Ruthenburg, former resident of this city and president of Associated Motors, to inspect the wagon plant with a view to forming plans for production and coordination with the eight other constituents of the corporation.

The Kentucky Wagon company will carry a large share of the burden of the corporation, according to Ohmer, making truck bodies as well as wheels for cars and trucks produced by the corporation.

The wagon manufacturing company began making the Dixie Flyer automobile seven years ago, in addition to the Old Hickory truck. The automobile production rapidly assumed great importance, it was pointed out, but wagon making has never been discontinued in the wagon division of the plant. This year's program, which probably will be under way by winter, calls for a larger production of wagons, Ohmer says.

R. V. Board will continue as president of the Kentucky Wagon Manufacturing Co., as well as serve as vice-president of Associated Motor Industries. James R. Duffin, president of the Inter-Southern Life Insurance Co., is a director.

Call at National Plant

INDIANAPOLIS, Aug. 12—Will H. Ohmer, chairman of the board of directors, and Louis Ruthenburg, president of the Associated Motor Industries, visited the plant of the National Motor Car & Vehicle Corp. with George Dickson, president of the company and vice-president of Associated Motors, which recently absorbed the company.

NEW STANDARD BUS

DETROIT, Aug. 14—The Standard Motor Truck Co. has brought out a new ten-passenger bus, the general body construction of which is similar to that of the British char-a-bancs. The regular Standard Model 75 truck chassis will be used for this bus job. The price is $2,500.

TEMPLAR ADDS COUPE

CLEVELAND, Aug. 14—A new four-passenger coupe has just been added to the Templar line. The standard 118 in. wheelbase chassis is used. The price is $2,650.

Packard Car Finds Good Market Abroad

Export Department Reports Its Allotment Is Oversold Three Months

DETROIT, Aug. 15—Packard Motor Car Co. has oversold its allotment of single and twin six passenger cars for export three months. Announcement of a big increase in export business by the factory was to the effect that the export department could have used four times as many cars as were alloted to it.

Heaviest demand for Packards comes from Australia with Cuba a close second. The fact that it takes from 10 to 12 weeks for the delivery of a car, because of the cross country and long ocean shipment, seems in no way to deter Australian people. Alvan Macauley, president of Packard, said: "The single six apparently has an especially big appeal in Australia," he continued.

French Demand Heavy

Packard recently appointed a new representative in France and the first shipment to that country since a period some time previous to the war was made. French demand has been heavy, it was announced, although an almost prohibitive duty on foreign built cars makes the cost to the purchaser almost double that for which the same car sells in the United States.

Several shipments of both single six and twin six cars have been made to Switzerland, a new territory for Packard sales. The distributor in Switzerland also has included in his territory the southern part of Germany where, he recently informed the factory, there are bright prospects for business, despite the more or less unfavorable general financial outlook.

Catering to Foreign Buyer

In commenting on the increase in foreign business, Macauley said:

The American manufacturer has been told for years that he must cater more to the wishes of the foreign buyer if he hopes to get business. The student of export trade has said repeatedly that the American manufacturer has been allowing other countries to capture markets of the world because he insisted on turning out his products exactly the same for export business as for domestic consumption. The American attitude, we have been told right along, has been that if an article was good enough for America it was good enough for the rest of the world.

In many countries the automobile driver wants a right-hand drive. In most foreign countries he demands a speedometer with metric symbols and he wants wire wheels. He wants other little changes from standard American cars most of which seem trivial perhaps, but which to him are big. While we have not gone into the business of making special cars for export, Packard Motors Export Corporation, our export division, has been meeting these little requests and the factory has redesigned our cars to permit a right-hand drive, all of which has played a big part in the heavy demand we are experiencing from all over the world.

To illustrate, the English people demand a right-hand drive. Wednesday we shipped six chassis to England. Duty on complete cars is so heavy in England as to make the price of American-built cars practically prohibitive. When chassis alone are purchased, giving English workmen employment in the building of bodies, the duty is such as to permit us to compete with the English manufacturers.

Argentina is recovering from a business slump, Macauley said, and a large number of cars have been shipped to that country recently. Japan, the Phillipine Islands, New Zealand, China, San Salvador and Venezuela also have been good buyers despite civil war in China and a business depression in Venezuela.

Packard has been entering Bombay, India, one of the strongholds of European automobile manufacturers, and a number of cars have been shipped there recently. The Bombay representative recently wrote that prospects for considerably heavier business were good. Macauley and other factory executives said there seems to be a much better feeling over general business throughout the world, with prospects bright for America entering into a strong foreign buying movement very shortly.

Edison Able to Meet Daily Needs for Coal

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it is pointed out that many of the industries classed as essential would be operating at a low figure or not operating at all.

Though there is talk of a session of automobile executives to form plans to dispute this ruling there has been no action and will be none unless conditions become acute. Regarding the coal administration ruling placing coal for domestic use second on the priority list it is felt that this is ill advised as there will be no need for coal for house heating for at least several months. In the meantime much coal for industrial purposes could be accumulated and the workers of the city would have money to buy coal when they needed it.

Increase Radiator Size Consul in Syria Advises

WASHINGTON, Aug. 15—The building of larger radiators, or the installation of certain appliances on cars sold in Syria has been recommended to the American exporter of automobiles to that country by Consul Frederick Q. Bird, located at Beirut, Syria.

European automobile manufacturers already have come to recognize the need of extra water supply systems in their cars and are now making shipments into that district to meet the requirements of the Syrian purchaser. To date only one American firm has made any effort to meet this local condition but its efforts have been rewarded with a considerable increase in the number of sales, the consul reports.

Tractor Shipments Exceeding Year Ago

Production, Association Review Says, Is Hampered by Scarcity of Labor

CHICAGO, Aug. 12—The monthly trade review issued by the National Association of Farm Equipment Manufacturers notes that up to July 15 tractors were moving fairly well and that the sale of general farm equipment, including gas engines, was at least equal in volume to the corresponding period of last year. Speaking of the business done by jobbers in the equipment lines, the review says:

Generally speaking, it is reported from 50 to 75 per cent of normal, although a few of the firms whose goods they handle are doing a normal business. During July and August a slowing up of trade is not unexpected, due to the seasonal character of the goods sold, but jobbers anticipate that the period will show an improvement over last year unless the railroad and coal situation complicate matters unduly.

Lighting Plants' Output Low

Sale of farm lighting plants is reported far ahead of last year, although still below normal. Production is said to be at a low point, shipments being made out of stock to a great extent. The eastern and central states are said to be showing the most interest in lighting plants.

Conditions in the gas engine industry are said to be improving, with the betterment more noticeable in the industrial field than in farm engine lines. A majority of manufacturers reported tractor and thresher shipments ahead of those for last year. Production, the report says, has been increasing since the first of the year and would be greater were it not for the difficulty of securing labor. Tractor sales are said to have been well scattered throughout the agricultural states.

Expansion Reflects Conditions

RACINE, WIS., Aug. 14—Due to the greater activity and improving prospects in both the automotive as well as the tractor and farm implement industries, the Belle City Malleable Iron Co. has undertaken a plant enlargement program involving an investment of $750,000 spread over a period of about 18 months.

The present plant will gradually be replaced by more modern structures. The first work is to build and equip a large addition to the annealing department. This will be 260 ft. long and occupy the site of the office building. The building also will contain a new producer gas plant to serve the malleable furnaces.

A new administration building will also be erected at once. The present construction involves about $400,000 and will be completed about Jan. 1, it is estimated.

Plants in Cleveland Gained During July

Industry Sets Pace in Volume of Business and Number of Men Employed

CLEVELAND, Aug. 15—Production in Cleveland automobile factories and accessory-making establishments increased slightly in July over June, according to the report of the labor relations committee of the Cleveland Chamber of Commerce.

The number of employees in 18 concerns reporting was 2.7 per cent greater on July 31 than on the last day of June.

The automobile industry continued during July to set the pace in volume of business for all others in Cleveland, according to this report, which shows that the industries of Cleveland as a whole had 4.6 per cent fewer employees at the end of July than they had at the close of the previous month.

The automobile concerns reported 10,996 employees, as compared to 10,710 on June 30.

The iron and steel industry of this city has been hardest hit of all the local groups. It showed a loss in employees in the monthly period of 11.6 per cent.

The building industry has been helped by the demand for residences and business places, employment increasing 4 per cent. Metals and metal products other than steel showed a gain in employees of 5.4 per cent.

Portuguese East Africa Offers Market for Cars

WASHINGTON, Aug. 15—A potential automobile market, especially for lighter makes of cars, is reported in Portuguese East Africa by the American consul at Lourenço Marques. The territory covers 426,712 square miles and only 172 motor cars are registered in the province. Of this number 150 are in the City of Lourenço Marques, a place having 18,355 inhabitants, of which 6500 are white.

Preference for American cars is indicated by the proportions sold there, although the field is practically a virgin one for the foreign automobile importer. Operating expenses are much greater than in the United States, gasoline being about 50 per cent higher.

POSTPONE BARTON AXLE SALE

MILWAUKEE, Aug. 15—The sale of the physical assets of the defunct Barton Axle Co. of Barton, Wis., has been postponed until Sept. 2, at 10 a. m. Attorneys for the receiver, Henry J. Dressel, and for the creditors' committee, F. G. Eppley, chairman, asked delay because a prospective purchaser has failed to comply with the terms of his bid and is no longer interested in the property. A minimum bid of $80,000, with a cash payment of $2,500 at the time of sale is prescribed by the circuit court.

JULY OUTPUT PROVED 39 PER CENT BETTER THAN SAME MONTH LAST YEAR

NEW YORK, Aug. 14—With the figures 90 per cent complete, reports to the National Automobile Chamber of Commerce indicate that July production of passenger cars and trucks approximated 246,600 which exceeded July 1921 by 39 per cent and the best previous July which was in 1920 by 20 per cent. The decrease under June of 14 per cent is seasonal and expected. The following table shows the factory shipment figures for the first seven months of 1920, 1921 and 1922.

	Carloads			Driveaways			Boat		
	1920	1921	1922	1920	1921	1922	1920	1921	1922
January	20,057	6,485	15,357	29,283	3,185	7,479		93	144
February	25,505	9,986	19,636	43,719	7,507	10,173	....	99	180
March	29,236	16,287	27,753	57,273	9,939	16,917		75	560
April	17,147	20,187	31,334	64,634	14,197	22,381		1,879	2,960
May	21,977	18,608	33,416	74,286	15,193	23,827	....	2,381	7,406
June	22,516	20,269	34,230	60,746	18,834	33,857	8,350	3,947	7,737
July	23,082	19,514	28,412	52,342	15,533	28,022	8,702	3,726	6,855

Factory shipments for the other months of 1920 and 1921 follow

	Carloads		Driveaways		Boat	
	1920	1921	1920	1921	1920	1921
August	23 386	20,350	34,060	14,290	7,095	3,565
September	20 804	20,150	24,431	13,550	5,469	3 580
October	17,209	17,323	14,127	11,257	2,519	2,300
November	13,253	14,061	9,497	10,509	659	1,385
December	11,802	12,100	6,469	7,500	89	134

July Made New Mark in Output Records

(*Continued from page 336*)

on to the public. There is entire absence of indication that there is to be an epidemic of price cutting, or anything approaching a price war. A contrary indication is found in the fact that Durant Motors has guaranteed prices to Aug. 1, 1923.

Reports from various parts of the country indicate that the public has shown a normal reaction to the price reduction announcements. Sales have been stimulated slightly on most of the lines reduced while there is a temporary stagnation in some of the competing lines due to a natural holding off attitude on the part of purchasers. However, there are indications that the public is already beginning to see the reductions in their true light of a passing on of production economies by manufacturers able to do so. The much larger increase on closed models than on open cars promises well for fall and winter business.

SHALER COMPLETES PLANT

WAUPUN, WIS., Aug. 14—The C. A. Shaler Co., manufacturer of vulcanizing apparatus, headlight lenses and other specialized lines of garage and repair-men's and owners' equipment, has completed its new plant, erected to replace the works destroyed by fire early in the year. Operations were reinstated as quickly as the various departments were finished and the plant is now running at its maximum capacity.

New York Registrations Show Decline During July

NEW YORK, Aug. 12—Registration figures as compiled by Sherlock & Arnold, publisher of the Automobile Sales Analysis, for the ten counties in and around New York City for July show a total of 8494 as compared with 9068 in June and 9431 in May. For the first seven months this year, registrations aggregated 48,073 as against 30,422 for the same period last year.

In the medium and low priced class four cars lead the field with three others some distance behind but considerably ahead of those following them. Nine cars are well in the lead in the higher priced cars.

A summary of registrations for the first seven months in the high, medium and low priced classes is as follows:

	High Price	Medium and Low Price
January	283	2,017
February	273	2,231
March	632	6,334
April	862	8,428
May	961	8,470
June	865	8,203
July	678	7,816
Total	4,554	43,519
Total (1921)	2,879	27,543

OHIO TIRE CHANGES NAME

FORT CLINTON, OHIO, Aug. 14—Purchasers of the Ohio State Rubber Tire Co., which was sold recently at receiver's sale for $150,000, have changed the name of the concern to the Wildman Tire & Rubber Co. The new company will be incorporated for $250,000, of which $200,000 will be common stock, no par, and $50,000 preferred. Directors are named A. Twynham, Akron; H. B. Orr, Bay City; Mich.; F. J. Reichert, Port Clinton; W. A. Tynham, Akron; N. B. Orr, Bay City; F. J. Langenau, Cleveland.

Northwest Promises Billion Dollar Crop

Farmers Expect to Have Money for Automotive Equipment This Fall

MINNEAPOLIS, Aug. 14—Here's some crop news that will interest the automobile truck and tractor manufacturer. The Northwest farm products crop for 1922 is going to total more than $1,000,000,000. This is the opinion of E. G. Quamme, president of the Federal Land Bank at St. Paul, who has returned from a trip through the territory. He says production costs will be less than in recent years, much less because the farmers have been carrying their operations on with economy.

"With fair prices, therefore, it should be a good money crop for the farmers of the Northwest; in fact, the best we have had in years," Mr. Quamme said.

Yields Above Average

With harvesting already underway the wheat output in Minnesota is safe. Yields are to be above the average for 50 years of 13½ bus. to the acre. The quality is to be higher than for many years. The rye has been harvested and it is a tremendous high quality crop. Potatoes and corn look well. Although the Minnesota crop is large and the Dakota crop promises to be equally good, in other areas yields have been cut down enough to make good prospects for the Minnesota and Dakota grains.

E. W. Dedker, president of the Northwestern National Bank, one of the influential banks in this part of the country, a conservative talker, said: "This is an agricultural country and good crops mean good prices. I have no doubt that this year's crop will boost Minneapolis business and hasten the return of prosperity."

Best Small Grain Crop

C. C. Webber of Deere & Webber Co., agricultural implements and automotive equipment, said: "It is a fact that this is the best small grain crop for many years and that other crops are uniformly good. This will go a long way toward putting the farmers on their feet, financially speaking. Collections will be easier this fall, and new business will be given added impetus next spring. Prosperity for everybody won't come in a day, but a good crop this year will be a long step toward it.

"North Dakota probably will produce the greatest and most valuable crop of any state this year. It is fair to assume that the agricultural products of that state alone will be worth approximately $200,000,000, and that the value of all the farm products in this section will be more than a billion dollars."

M. O. Grangaard, secretary of the War Finance Corp., said: "If the crop materializes as it looks, it will have the effect of restoring more stable conditions than have prevailed in two years in the business life of the territory. The liquidating ability of the farmer, of course, will depend on the price he receives for the crop. With reasonable prices, a good crop, such as is in prospect, is bound to stimulate buying in the country, and this naturally will be reflected in the cities. In my opinion a general stimulus will come out of the situation."

E. J. Fairfield, Lindsay Brothers Co., wholesale farm machinery and twine, said: "A feeling of security has come over business in the Northwest, where everything depends on agriculture. Without any question we now are on the high road to business recovery, and we will have arrived after the farmer threshes his crops. The crop is better than we had hoped for."

British Trailer Converts Truck Into Six-Wheeler

WASHINGTON, Aug. 15—The construction of a new type of trailer attachment by British automobile manufacturers has been reported to the automotive division of the Department of Commerce. The new attachment will convert an ordinary truck into a practical six-wheeler, this being accomplished by the use of a conversion attachment, fitted to the rear of the truck by a universal joint.

One of the features of the innovation is that the wheels of the trailer follow in the track of the truck wheels. The trailer wheels are controlled by a separate brake. The new arrangement is said to increase the capacity of a truck 100 per cent with but a small increase in the cost of operation.

New Bethlehem Contract Is on Perpetual Basis

NEW YORK, Aug. 14—The Bethlehem Motors Corp., manufacturer of the Bethlehem truck, has developed a contract with dealers which will be on a perpetual basis, automatically renewable year after year, so that Bethlehem dealer connections will be permanent connections of the new corporation.

The new contract provides for a stipulated number of deliveries during the first year—the number of trucks specified being on a conservative basis, in many instances only half the quantity the distributors and dealers estimate their territory will absorb. If the quota in the first year is taken, the contract continues for the second year, with an increase of 25 per cent in delivery specifications for the second year period, and a similar increase each year thereafter.

A sliding scale of discounts is used, the chassis and parts discounts depending on the size of the territory and the number of deliveries to be taken during the first year.

Under the new form of dealer relationship, there will be no renewing of contracts at stated intervals, but instead, changes that may be advisable from time to time will be made in the form of appendices to the contract proper.

Chicago Mayor Asks $3,000,000 for Buses

City May Embark Upon Extensive Experiment in Municipal Operation

CHICAGO, Aug. 12—A week after the settlement of Chicago's street car strike which completely tied up street and elevated railway transportation for six days the city is continuing to operate a number of the buses it placed in service to help in relieving the emergency.

This is the chief tangible result of the strike, although the prompt and dependable service rendered by motor vehicles made an exceedingly favorable impression upon owners and non-owners alike and established an interest in automobiles and trucks and good will toward them which dealers are counting upon to make sales much easier for the next few months.

Strike Affects Business

A remarkable feature of the strike was the fact that there was no immediate increase in sales. Retail motor car business was somewhat duller during the week of the strike than in any week for some months. This indicated that the motor vehicles, approximately 200,000, in and around Chicago were sufficient for immediate transportation needs and further that unsettled business conditions accompanying a city-wide strike affected the automobile business as well as the general merchandising.

The city administration proposes to operate buses on an extensive scale and has asked the city council to appropriate $3,000,000 to buy buses. This matter has been referred to the transportation committee of the city council and the chairman of the committee has announced that a careful study of the possibilities of bus transportation will be made within the next few weeks. The result of this study is likely to determine whether or not Chicago will embark upon an extensive experiment in municipal bus transportation.

Japan Puts on Market New Electric Side-Car

WASHINGTON, Aug. 15—A new type of electric side-car has been placed on the Japanese market, the American consul at Kobe, Japan, has notified the automotive division of the Department of Commerce. The car is being advertised as being of Japanese manufacture, although most of the parts are reported to be made in Germany, with the bodies built in Japan.

The motor is a one-half horse power electric engine of a reversible type and may be charged by the ordinary electric current through a transformer. The present type is being confined to one seater models, as this is reported to be adaptable to economical operating conditions and to the narrow roads.

Men of the Industry and What They Are Doing

Chapin Goes to Europe

Roy D. Chapin, president of the Hudson Motor Car Co., and Mrs. Chapin sailed on the Mauretania Tuesday for a two months' tour of England, France and Germany.

Tire Officials Sail

W. O. Rutherford, vice-president of the B. F. Goodrich Co., left for a six weeks' business and pleasure tour of France, Germany and England on the Mauretania Tuesday, accompanied by L. D. Brown, treasurer of the company. Rutherford is also first vice-president of the Motor and Accessory Manufacturers Association and chairman of its Foreign Trade Committee. They will study general trade conditions and the tire and rubber industry in Europe, their plans including a visit to the Goodrich plant at Colomb, near Paris, and the headquarters of the company in London.

Hoagg Advertising Manager

K. K. Hoagg has been appointed advertising manager of the Hyatt Roller Bearing Co., motor bearings division. Hoagg has spent nine years in engineering and sales work for the company. His new work will require supervision of the advertising, sales promotion and commercial research work for the division.

Butterfield Back with Owen

Clayton W. Butterfield has been appointed manager of the sales and service department of the new Owen Dyneto Electric Corp., Syracuse. Butterfield held a similar position for four years in the old Dyneto corporation. He left it in the spring of 1920 to accept the post of sales manager of the Herschell-Spillman Motor Co. at North Tonawanda. The past year Butterfield served as assistant general manager of the Apex Motor Corp. and resigned to return to Syracuse.

Remington Directs Advertising

Charles F. Remington, vice-president of the Fred M. Randall Co., Detroit, has been named director of advertising and publicity of the Detroit Air Cooled Car Co.

Randall Has New Connection

O. R. Randall, connected for some time in an executive capacity with the Hanson Motor Co. of Atlanta, has resigned to become general sales manager for a large soft drink bottling company in Atlanta.

Mead Rejoins Federal Rubber

George J. Mead, who resigned last year as chief plant layout engineer of the Federal Rubber Co., Cudahy, Wis., has been recalled to take charge of an extensive plant enlargement program which the Federal company is putting under way and which will cover a period of several years. Mead for eight months had charge of experimental, development and production engineering for the Motor Player Corp., Chicago, manufacturing electric motors and reproducing devices for player-pianos. He now resumes a connection with the Federal company lasting more than eight years. Mead is a mechanical and civil engineer.

Burnett with Homer McKee

Leo N. Burnett has resigned as advertising manager of the LaFayette Motors Corp. of Indianapolis and will join the copy and planning department of the Homer McKee Co., Inc., advertising agents, Indianapolis, early in September. Burnett has directed LaFayette advertising since the inception of the company three years ago and was previously advertising manager of the Cadillac Motor Car Co. of Detroit.

Camm With Western Iron

John A. Camm, for twelve years director of sales of the Kearney & Trecker Corp., Milwaukee, a large manufacturer of milling machines and other machine tools, has resigned to become president of the Western Iron Stores Co., Milwaukee, which will develop its machine tool department under his direction.

Fox Promotes Hackethal

B. F. Hackethal has been appointed chief engineer for the Fox Motor Car Co. of Philadelphia. He was previously acting in the capacity of consulting engineer for the company.

Huntoon Changes Companies

Harry Huntoon, two years in the engineering department of Deere & Co., Moline, Ill., has been appointed plant engineer at the International Harvester Co.'s tractor plant in Chicago. He will be associated with R. R. Keith, former works manager for the Universal tractor.

Hendrick Leaves Fisk

George B. Hendrick has resigned as assistant sales manager of the Fisk Rubber Co. to become sales director of the W. L. Douglas Shoe Co., Brockton, Mass.

SERVICE ASSOCIATION GROWS

DETROIT, Aug. 16—The Automotive Electrical Service Association, composed of electrical service stations in various parts of the country, has built its membership from 62 to 250 during the past year, according to reports read at a meeting of the board of governors here.

The governors discussed plans for furthering the work of the association whose object is to make specialized electrical service work available both for dealers and owners.

New "Sales Executive" Published by A. E. A.

Folder Will Be Sent to Manufacturer and Jobber Members of Association

CHICAGO, Aug. 15—The Automotive Equipment Association has come with its third publication, *The Sales Executive*. The publication, a four-page folder, will be sent to sales executives of both manufacturer and jobber members, with the object of assisting them in their work of co-operating with the association's merchandising campaign. In the first issue it is announced that the publication will be continued "if it meets with the approval of the men who plan and direct sales for the members of the association."

Other publication efforts of the association are *The Leader*, general organ of the association, published under the direction of Commissioner William M. Webster, and *The Automobile Equipment Merchandiser*, which, like *The Sales Executive*, is edited by Ray W. Sherman, merchandising director. *The Merchandiser* goes to salesmen of association members, both in the manufacturer and jobber fields.

Passing on Ideas

In announcing the new publication, Sherman says that the merchandising department has been "handicapped because of our inability to get into the sales idea business the way we feel we should." He then speaks of ideas which have been sent in by sales executives, but for which previously there was no means of distribution, adding that "If the good idea of one good sales executive could be passed along and used by the sales executives of the 497 other sales executives in the A. E. A. it would be like firing 498 business-building shots at the trade instead of one." The new publication will try to accomplish this.

The first issue reproduces sales promotion advertisements of two manufacturers and one jobber and reports work done by various sales executives in various parts of the country in the merchandising campaign.

COMMITTEE FOR GILLETTE

MILWAUKEE, Aug. 14. — Official notice is being published to stockholders, creditors and bondholders of the Gillette Rubber Co., Eau Claire, Wis., that a joint meeting will be held at the general offices at the plant on Sept. 1, at 2 p. m. for the purpose of considering the matter of the appointment of a committee or committees for the protection of the interests of creditors or stockholders. The notice is signed by R. W. Hutchens, secretary.

Dealers Optimistic After Tire Meeting

Feel That Manufacturers Have Sincere Desire to Help Solve Problems

NEW YORK, Aug. 12—Out of the meeting of the committee of the National Tire Dealers Association and executives of the Rubber Association, held here this week, will grow a spirit of co-operation that will result in the ultimate solution of the mutual problems of both, according to a statement made by R. F. Valentine, president of the dealers' association.

Cordial Reception Given

"We feel gratified that the opportunity was given us to present directly to the manufacturers the aims and objects of the National Tire Dealers Association," said Valentine. "The reception accorded us and the consideration and discussion which was given the various merchandising problems were such as to indicate a sincere desire upon the part of the manufacturers to help dealers solve their problems."

Valentine would not give any details at this time of the progress that was made. Arrangements were made, however, for future meetings to which both organizations will send representatives to discuss problems that arise.

The tire dealers were represented at the conference by R. F. Valentine, R. J. Walters of Baltimore; George J. Berger, New York City, and Frank Zeman, Chicago. The manufacturers had at the meeting G. F. Shugart of the United States Tire Co.; John V. Mowe of Kelly-Springfield; E. H. Broadwell of Fisk; H. C. Miller of Goodrich; L. J. Plumb of Madison; W. W. Duncan of Hood; Phelps of Kenyon; DeLisser of Ajax; W. O'Neil of the General; Waddell of Goodyear, and Fairbanks of Firestone.

The price question was not discussed.

Questions Taken Up

The dealers made these requests:

That the national and commercial accounts be eliminated:

Compel car agencies to sell all change-overs at regular list prices or turn the tires into the nearest branch at cost:

Increase the price of tires to the car manufacturers to a basis that will insure a reasonable profit and take away incentive for resale at retail.

Discontinue publication of all lists other than consumers' price list:

Classify retail distributing agencies and proportion the discounts in the ratio of the value of each classification:

The retail hardware, drug, confectionery and grocery stores to be put in one class; the wholesale groceries, hardware and department stores to be put in another class and the legitimate tire dealer in a third class:

And hold purchasers of equipment to actual requirements and effect such an arrangement that will absolutely prohibit these same car manufacturers and their agencies from disposing of any stocks at less than regular prices.

The dealers' program provides for the elimination of every tire whose quality is not proved, or where there is any question of the policy and methods of the manufacturer; an appropriation of not less than 2 per cent of gross business for advertising purposes and absolute loyalty to the manufacturer whose goods are sold.

Westcott Is Expanding Production of New Car

SPRINGFIELD, OHIO, Aug. 15—Quantity production of the new seven passenger Westcott car was started at the plant of the Westcott Motor Car Co. Monday. The few cars that have been built so far have been sent to Cincinnati, Cleveland, Chicago and Oklahoma City.

Difficulty in securing materials was partially overcome during the past week with the result that shipments of Westcotts were better than at any time this month. Officers of the company say they expect a further increase in output during the remainder of August. Indications are that this will be the company's best year in point of sales, sales so far exceeding last year's by more than 50 per cent.

The Kelly-Springfield Motor Truck Co. is enjoying a ready sale of its new model. The plant is gradually speeding up and increasing its force.

The Steel Products Engineering Co. booked orders during the past week for ten sets of Liberty stub tooth gears for aeronautical engines. The plant is gradually getting back to its old time swing. The government order for balloon equipment is about one-fourth finished, and shipment will be made within the next three months. A number of skilled machinists was added to the force recently.

WILLYS-OVERLAND'S REPORT

TOLEDO, Aug. 15 — Willys-Overland Co. and subsidiary companies for the five months ended May 31, 1922, report net loss of $1,661,262 after charges and depreciation. The net sales aggregated $28,281,981 and the operating profit $847,714. The consolidated balance sheet for these companies, with the exception of the Wilson Foundry & Machine Co., shows inventories of $15,263,759; accounts receivable, $858,075, and cash, $7,703,713. Among the liabilities are included notes payable of $18,334,035 and accounts payable of $3,860,685.

AIR REDUCTION EXPANDS

MILWAUKEE, Aug. 14—A new oxygen plant, representing an investment of $135,000, is being established in Milwaukee by the Air Reduction Sales Co., Inc., New York, to serve Northwestern territory. This is part of the general enlargement program adopted by the company since it absorbed the Davis-Bournonville and National Carbide interests. In Milwaukee the company has purchased the plant of the Petit Manufacturing Co.

Republic Truck Gets New Working Capital

Details of Plan for Readjustment of Capitalization Being Worked Out

NEW YORK, Aug. 15—Following a conference between C. H. Poppenhusen, representing the bankers' committee, and M. N. Buckner, representing the note holders' committee, it is announced that ample working capital has been secured for the Republic Motor Truck Co., Alma, Mich., which will permit of the carrying on of the business. Details of the plan providing for a readjustment of the company's capitalization and indebtedness are now being worked out, but as yet Buckner has not made an announcement.

It is said that, although the truck company showed a deficit for the first five months of the year, a small profit was shown in June, and had it not been for the railroad strike July would have turned in a profit of $75,000.

Government Given Rebate on Road Work Equipment

WASHINGTON, Aug. 15—The Bureau of Public Roads announces that a saving of several thousand dollars in rebates will be made by the government in the recent shipment of automobiles and trucks, allocated from the War Department to the Agricultural Department, and then transferred to the several states.

Because of the fact that the trucks and passenger cars were for use in the building of good roads, and all of them second hand, the Interstate Commerce Commission, at the behest of the Agricultural Department ruled that such automobiles and trucks shipped for use in road building, and which were second hand, could be shipped as "contractor's equipment" and as such would take a lower rate. The saving between the automobile rate and the contractor's equipment rate will average about $280 per railroad car.

Goodyear Stockholders Await Answer to Suit

AKRON, O., Aug. 15—Stockholders of the Goodyear Tire & Rubber Co., who are backing Mrs. Laura L. T. Weiss of Cleveland in her four actions filed in the Akron common pleas courts attacking from many angles the entire $85,000,000 refinancing and reorganization plan of the company as negotiated in May, 1921, now are marking time awaiting the preparation and filing of answers to the four petitions, by the Goodyear company and the many defendants involved.

Practically all of the defendants named are barking interests which were connected with the Goodyear program of refinancing.

Strikes Have Aided Truck Manufacture

Shippers Steadily Turn to Motor Transport—Parts Plants at Capacity

MILWAUKEE, Aug. 14—The rail-coal strike has had a silver lining in that it has stimulated production of motor trucks and other commercial vehicles. Shippers are steadily turning to motor transport, feeling that even if the rail strike is settled within a short time, it is not unlikely that it will re-occur, and they have now had so much experience with difficulties of railroad operation through the whims of labor that they intend to fortify themselves against the perplexities which a situation like that now existing creates.

More Men Employed

Passenger car factories in this territory are employing more men at the middle of August than at any time this year. They are adding skilled help as rapidly as it becomes available. This class of labor is very scarce, although there seems to be a plethora of semi-skilled men, many of whom will not work unless placed in skilled jobs at the pay of such class of positions, and decline to step into their proper semi-skilled class.

Parts manufacturers and makers of equipment, both for car builders and the automotive merchandising trade, are running at capacity and have unfilled orders which will require present capacity until the end of the year. There are a few exceptions, of course, but as a rule factories are not able to keep deliveries on a basis equivalent to contract specifications or current orders.

Tire factories are running at capacity as well and look for no decline in operating schedules.

Local Conditions Improve

The "shuffling of the cards" and the "new deal" in prices has undeniably been responsible for a very marked stimulation of consumer interest in passenger cars during the past week. As usual, a good many prospects who did not gratify their desires to buy a new car in April, May and June, were perfectly willing to wait until after Aug. 1, the beginning of the new season, to see what the manufacturers would bring out for 1923, and what the price would be.

Few people if any believed that new prices would be higher; in fact there was an undercurrent of gossip and even some well-authenticated reports that the new season would witness a further reduction. Consequently those who waited are now coming into the market and the sales curve is taking another upward swing.

Motor truck demand is increasing steadily. The call is largely for specialized equipment rather than the standard types. This embraces passenger carrying trucks, freight trucks with special body designs; contractors' and highway construction cars, etc.

Retailers of automotive equipment are experiencing an active call for miscellaneous goods for old as well as new cars, despite the fact that more and more passenger car manufacturers are putting cars through with every foible of the customer satisfied.

British Conquer Egypt Through Dealer Policy

WASHINGTON, Aug. 15—Conquest of the automotive market in Egypt is being made by the British automobile manufacturer who has adopted a dual policy toward Egyptian automobile exporters in an effort to secure a larger share of their business.

Paramount of the two methods which are being adopted to sell more automobiles in that country is the policy of shipping to reputable dealers on consignment in order to compete with other markets. The other medium is to allow their Egyptian importers the benefit of price reductions on cars in stock, when such reductions are made in Great Britain.

The automotive division of the Department of Commerce has been advised that as a result of these two changes in selling cars in Egypt that British automobile manufacturers are effecting a considerably larger sales volume.

Automotive transportation of all kinds in Egypt, particularly with regard to taxicabs and commercial vehicles, received a considerable impetus during 1921. There are over 1600 passenger cars, of which 234 are taxis, and 120 trucks in Alexandria, while in Cairo there are registered 2200 passenger cars.

European Cars Appeal to Japanese Importers

WASHINGTON, Aug. 15—European exports of automobiles to Japan are increasing, while United States exports are decreasing. This is attributed to the growing popularity in the Japanese market of European cars because of their low fuel consumption and low horsepower, the United States commercial attache reports to the automotive division of the Department of Commerce. June exports of American passenger cars to Japan dropped to 10 as compared with 176 in May and 116 in April. Truck exports dropped from 128 to 86.

MILLER HAS NEW CORDS

AKRON, Aug. 14—A new line of cord tires called the Wedge Tread, in sizes ranging from 30 x 3½ to 35 x 5 is announced by the Miller Rubber Co. The 30 x 3½ clincher lists at $12.50, the 30 x 3½ straight side at $13.50, the 32 x 3½ at $19.25, 31 x 4, $22.20; 32 x 4, $24.50; 33 x 4, $25.25; 34 x 4, $25.90; 32 x 4½, $31.45; 33 x 4½, $32.15; 33 x 5, $39.10; 35 x 5, $41.05. The new Rellim fabric sells at $9 for the 30 x 3 and the 30 x 3½ at $10.

Tariff Bill Loses Reciprocal Proviso

Question Will Be Brought Up Again When Measure Reaches Conferees

WASHINGTON, Aug. 16—Taking a final vote on the proposal, the Senate has eliminated the House provision in the tariff, providing a reciprocal duty on imports of automobiles, automobile bodies, automobile chassis and motorcycles when the duty is greater than 25 per cent, the rate carried in the bill.

The proviso which was struck out called for the imposition of a duty equal to the duty imposed by the country of export, not to exceed 50 per cent.

Senator McCumber, chairman of the committee on finance, who asked that the committee amendment striking out the House provision be agreed to, said that the request was based on the desire that all the matters of reciprocal tariffs go before the committee of conferees.

Gasoline Probe Halted, Giving Way to Tariff

WASHINGTON, Aug. 15—The Senate gasoline probe which has been under way for more than two months has been temporarily halted, pending the passage of the tariff bill. Members of the Committee on Manufacture, which is conducting the probe, state that the investigation will be resumed as soon as possible.

An offer to testify in the probe was received yesterday from W. C. Teagle, president of the Standard Oil Co. of New Jersey, by Senator McNary, acting chairman of the committee. Teagle's invitation will be accepted, according to Gilbert E. Roe, in charge of the probe, who states that the Standard's head leads the list of those who would be subpoened. The only witness heard to date is R. L. Welch, secretary of the Petroleum Institute.

"In the aggregate the automobile users of the United States have already profited by the investigation in lower prices, but it is the expectation that gasoline prices will not only be lower but will be more stable," Roe said.

RICO INJUNCTION DISSOLVED

PITTSFIELD, MASS., Aug. 15—Judge Burns of the Superior Court has dissolved a temporary injunction by which the Rico Ignition Co. was restrained from the manufacture of certain coils on the ground that an officer and employees of that concern were alleged to have made unfair use of information they had gained from the J. & B. Co., with which they were formerly connected. In issuing his decree Judge Burns said that "The respondents should not be put out of business pending final determination of this action on its merits."

New Job Announced by H. C. S. Motors

Shows Many Refinements in Engine, Chassis and Body—Prices Increased

INDIANAPOLIS, Aug. 15—The new H. C. S., known as Series IV, is announced by the H. C. S. Motor Car Co. Mechanically the new job has many refinements in engine, chassis and body. In the engine more power has been secured by enlarging the bore from 3⅝ to 3¾ inches.

The gear ratio has been lowered, pistons have been lightened and connecting rods improved, and to the ignition system has been added an automatic spark advance. The Brown-Lipe transmission and clutch have been adopted. The rear axle, too, is new, two double rows of annular ball bearings now being used in the rear of the main driving pinion instead of one and to avoid sticking brakes strong pull-back springs have been added.

Body changes are many. All the seats are wider and the backs higher, with deeper upholstery, with Marshall upholstery springs making for easy riding quality. The floor boards of the tonneau have been leveled for more leg room. There is a large rectangular plate glass window in the rear of the passenger compartment and an option of black enameled or dual toned hand buffed leather is given in the open models and of mohair or broadcloth in the closed ones.

The new list prices show an increase of $75 on the open models and $325 and $400 on the closed ones. New prices are as follows:

	Old Price	New Price
2-pass. roadster	$2,400	$2,475
4-pass. phaeton	2,400	2,475
Sport sedan	2,850	3,250
Standard sedan	3,150	3,475

Columbia De Luxe Series Replaced with Elite Line

DETROIT, Aug. 16—The Columbia Motors Co. has replaced the de luxe series of six-cylinder cars with the Elite line. The principal mechanical change consists of the substitution of the Continental 8R engine for the 7R engine used formerly. Five body models are included in the series—five passenger phaeton, two passenger roadster four passenger sport, four passenger coupe and five passenger sedan.

AMAZON MAKES CUTS

AKRON, Aug. 14—Price reductions are announced by the Amazon Rubber Co., the cuts being on the heavy duty non-skid cords and the air bag cushioned non-skid fabrics. The excise tax is included in the new prices. Reductions on some of the popular sizes in cords are as follows: 30 x 3½, from $18 to $15.95; 33 x 4½, from $33.40 to $30.05; 34 x 4½, from $45.20 to $39.50. Fabrics: 30 x 3½, from $13.95 to $10.50; 31 x 4, from $21.75 to $20.65. In the larger sizes in the fabric line the old prices are retained.

DISCUSS TIRE PRICE CUTS

CHICAGO, Aug. 12—The monthly meetings of the Midwest Rubber Manufacturers Association were resumed here this week when representatives of 35 firms met at the Morrison Hotel. The meeting was presided over by W. W. Wuchter of Omaha, president of the association. Recent price reductions by the large tire makers were discussed informally. Production by the firms represented is satisfactory.

Higher Prices Follow Changes in Mitchell

RACINE, WIS., Aug. 14—Following the addition of two new body styles and a decision to increase prices because of refinements and general improvements on all models, the Mitchell Motor Car Co. has issued the following list of new prices:

	Old Price	New Price
3-pass. roadster	$1,490	$1,750
4-pass. sport	1,690	1,850
5-pass phaeton	1,490	1,750
7-pass. phaeton	1,690	1,850
4-pass. coupe	2,050	2,325
5-pass. sedan	2,275	2,525
5-pass. phaeton (complete)	——	1,790
5-pass. phaeton (standard)	——	1,590

NOMA MAKES INCREASES

NEW YORK, Aug. 14—Noma Motors of New York announces an increase in prices, ranging from $300 to $500, affecting the whole line of C models. The prices are as follows:

	Old Price	New Price
2-pass. speedster	$2,000	$2,500
Foursome	2,100	2,500
6-pass. phaeton	2,200	2,600
5-pass. sedan	3,200	3,500

AUBURN LISTS DOWN

AUBURN, IND., Aug. 14—Reductions ranging from $50 to $200 are announced by the Auburn Automobile Co. The new list is as follows:

	Old Price	New Price
2-pass. roadster	$1,575	$1,575
5-pass. phaeton	1,575	1,475
4-pass. sport	——	1,895
4-pass. sport (except equipment)	2,195	1,995
7-pass. phaeton	1,615	1,545
Coupe	2,275	2,275
Sedan	2,395	2,345

NEW LINCOLN PRICES

DETROIT, Aug. 17—The Ford Motor Co. has reverted to a 136-in. wheelbase for all models of the Lincoln car. The coupe was the only model having a 130-in. wheelbase. Prices have been decreased $200 on the sedan and increased $500 on the coupe. The new list is as follows:

	Old Price	New Price
Sedan	$4,900	$4,700
Coupe	3,900	4,400

Says Lease Used Old Parts in Its Trucks

Condition Said to Have Been Hidden—Trade Commission Issues Complaint

WASHINGTON, Aug. 17—Charging that in the assembling of automobile trucks it used worn or second-hand parts and sold the completed product as new trucks without disclosing the true origin and facts concerning the building of the trucks, the Federal Trade Commission has issued a complaint against the Lease Motor Co., Inc. The complaint also is directed against its subsidiary the Acoma Motors Co., Inc. Both companies are located in Long Island City.

The Lease company is engaged in the business of repairing motor cars and trucks and in the rebuilding and selling of automobile trucks. The Acoma concern is principally a sales agent for the Lease company in the distribution of the latter's trucks. In the advertisement and sale of these trucks, the complaint alleges, the public was misled and deceived and it is charged that the practice was an unfair method of competition as against concerns competing with them.

The respondents are given 30 days in which to answer after which the case will be tried on its merits.

Charges Denied

NEW YORK, Aug. 17—"The Lease company will put in a defense on Sept. 28," says Robert Lease, president of the Lease Motor Co. against which the Federal Trade Commission has issued a complaint, charging the use of worn or second-hand parts in the assembling of trucks which later were sold as new. "We deny the charges. I feel that they originated with a couple of export houses with which we have had some friction. We build trucks and we never have used worn or second-hand parts in their construction, as charged.

"The Lease company has been in bankrupty since April 1, with Eli Newman as the receiver. It is about to be sold to a new concern, the Panther Motor Truck Co., which will manufacture trucks in the Long Island plant. The matter has been brought to the attention of the court which yesterday signed the order permitting the sale."

ROAD FILM READY

WASHINGTON, Aug. 15—A series of one-reel motion picture films illustrating modern practice in the construction of the various types of highways, as being best adaptable to automotive use, has been prepared under the direction of the Bureau of Public Roads and are now available for free distribution upon application to the United States Department of Commerce.

The films are issued for the purpose of fomenting greater interest in building good roads.

Stock Sale Brings Government Charges

Officials Connected with Dragon Motors and Caterpillar Company Indicted

CHICAGO, Aug. 15 — Indictments against officials of two firms for alleged frauds within the automotive industry have been voted by a United States grand jury here and made public by Assistant United States District Attorney Harry F. Hamlin. The firms are:

Dragon Motors, capitalized at $1,000,000; officers indicted, Herman Neidick, Joseph Stein and Hyman Edelman.

Caterpillar Manufacturing Co., Ltd.; officers indicted, Charles Weidman, W. C. C. Weidman, John A. Seibert, E. J. Anderson and M. E. Poehly.

In both cases misuse of the mails in the sale of stock or "territorial rights" is charged. It is charged that stock of the Dragon Motors was sold through the mails by the Neidick Financial Corp. on alleged fraudulent claims that the company was manufacturing one automobile a day, that it possessed assets of $592,772 and that orders were on file for $600,000 worth of taxicabs. It is charged that about 300 persons lost sums ranging from $100 to $5,000 through investment in the Dragon Motors.

The Caterpillar Manufacturing Co. is charged with having sold through the mails territorial rights for a "marvelous tire rejuvenation invention." It is alleged that territorial rights were sold at from $100 to $1,000 and that investors were told they could restore old casings and sell them for a guaranteed service of 5000 miles at $5 each.

Want Uniform Motor Law for California

SAN FRANCISCO, CAL., Aug. 15—A uniform motor vehicle law, providing for the operation of capacity loads on trucks, general promotion of motor truck and motor stage traffic, and the safeguarding and preservation of the highways, will be sought through an initiative measure on the ballot at the November general election by the California Motor Transport Association, of which Fred Mott, of Fresno, is secretary.

Mott has just completed a tour of the state collecting data. Following the presentation of the results of his survey to the organization, the California Motor Transport Association adopted a platform which is to form the basis, either of an entirely new law, or of amendments to the present Motor Vehicle Act.

The platform is summarized by Mott as follows:

1. A uniform state vehicle law controlling weight, tire and other operating conditions as well as uniform tax and the classification of existing highways throughout the state.

2. Extension of police powers to enforce such a law to the California State Highway Commission and to all those charged with the maintenance of roads.

3. That the weight limit of truck and load for four-wheeled vehicles be 24,000 pounds; for six-wheeled vehicles with three axles, 32,000 pounds; and for truck, four-wheeled trailer and loads, total gross weight of 42,000 pounds.

4. That the license, or tax, on motor trucks be increased not to exceed 100 per cent of the present amount, in lieu of any other motor vehicle tax, and that those operating as common carriers and enjoying a special privilege, should pay an increased tax of not to exceed 100 per cent over and above this amount, together with an increased tax on passenger motor vehicles of not to exceed 100 per cent.

5. That measures for public safety, such as proper lighting, signaling devices and connections for trailers be incorporated in this law.

6. That the penalty include a clause making a jail sentence obligatory, in the case of a habitual offender.

Ford's July Production Surpassed June Record

DETROIT, Aug. 14—Ford production figures show that July production approximated 152,000, which surpasses June, when a Ford record was hung up in retail sales of cars, trucks and tractors. Sales for June totaled 148,439 vehicles, an average of 5709 daily. Of this total 132,950 were sold in the United States, 6054 in Canada and 9435 in Europe.

Another record is shown in the report of total sales for the first six months of 1922, a total of 652,261 being reached. In this period truck sales were approximately 85 per cent better than in the 1921 period. At the Rouge plant 436 Fordsons were completed on July 22, a high water mark.

Hydro-United Tire Co. Placed in Receivership

PHILADELPHIA, Aug. 14—Receivers for the Hydro-United Tire Co., of Pottstown, Pa., have been appointed by the United States District Court of the Eastern District of Pennsylvania, which has named John P. Hall and Ephriam Lederer.

The receivership was sought for, it is said, for the purpose of conserving the assets of the corporation and working out its affairs for the best interests of all the parties concerned.

Officers of the Hydro-United Tire Co. are: President, Charles A. O'Neill; vice-president, J. H. Phillips; treasurer, W. H. Reagan, and sales manager, A. V. Tisdale.

ARGENTINA ROAD PROGRAM

WASHINGTON, Aug. 15—Active steps for the construction of a national highway transport system in Argentina are reported to have been taken with the appointment by the First National Good Roads Congress of a permanent committee to obtain legal sanction of the projects of the Argentina Congress. Among these projects is the construction of 106,875 miles of good roads.

Louisiana Is First In Roads Under Way

Program Outlined by State Is Reported to Be 89 Per Cent Complete

WASHINGTON, Aug. 17—Progress report on the Federal aid highway construction program shows that on July 31, last, 14,348 miles of highways had been completed and paid for; 3951 miles completed and not yet paid for, and that 14,912 miles are under construction. Of the last named figure 56 per cent of the projects are completed. Reports made to the United States Bureau of Roads show that the states completed 600 additional miles of good roads during the month of July. Including projects not yet under construction, but which have been authorized under Federal aid, approximately 40,000 miles of road building comprise the Federal-states program for the fiscal year ending July, 1925.

Maryland at Bottom

The State of Louisiana ranks first in the progress being made on good roads under construction, her program having been 89 per cent completed. Her program contemplates the construction of 254 miles of good roads during the fiscal year ending July 31, 1923. Maryland, the figures show, is at the bottom, with a program of 29.7 miles, of which but 15 per cent is completed.

The largest amount of construction on roads is being done in Texas, where 1484 miles are under construction. Iowa comes next with 1043 miles, and Nebraska is a close third with 985 miles. In the State of Rhode Island but 6.6 miles are under construction for the year, of which 55 per cent have been completed.

American Tires Lead in Siamese Markets

WASHINGTON, Aug. 15 — Between 1,500 and 1,600 passenger automobiles are in operation in Siam, according to a report received by the Department of Commerce from Consul J. P. Davis, Bangkok. About 75 per cent of these passenger cars are on metric clincher tires, about 20 per cent on inch clinchers and 5 per cent on inch straight-side tires. Straight-side tires are offered for sale in the Siamese market by the French Michelin company, as well as by American companies. American clincher tires are also freely available. American-made cars are still being brought into the Siamese market on metric clincher tires.

The total number of motor trucks in Siam does not exceed 150. About 10 per cent of the trucks use pneumatic tire equipment, the remaining 90 per cent requiring solid tires. The most popular tires in the Siamese market by nationality are American, British, French and Italian.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Loans on call during the week covered a range of 3½ per cent to 5 per cent, as compared with 3 per cent to 5 per cent in the previous week. In time money a firmer tone was evident, due, doubtless, to the drawing down of balances by interior banks. The quotations were 4 per cent to 4¼ per cent for 60 and 90 days' and 4 and 5 months' maturities, and 4¼ per cent to 4½ per cent for 6 months', as compared with 3¾ to 4 per cent for the shorter maturities and 4¼ per cent for 6 months' in the previous week. The prime commercial rate continued at 4 per cent.

Unfilled orders on the books of the United States Steel Corp. at the end of July totaled 5,776,161 tons, the largest total of any month since the close of April, 1921. This amount compares with 5,635,531 tons at the end of June and with 4,830,324 tons at the end of July last year, and is equivalent to 5½ months' production at 75 per cent of rated capacity (approximately the rate at which the corporation has been shipping in the past few months). Despite restricted acceptance of new orders, the increase in unfilled tonnage during July was 140,600 tons, equal to 11 per cent of the monthly capacity.

According to returns from 30 companies which produce about 87 per cent of the country's output, steel ingot production in the United States during July totaled 2,487,104 tons, or a decrease of 5 per cent from the total for June. This compares with 2,634,477 tons in June, and 803,376 tons in July, 1921, which was the low point following the decline which started in the middle of 1920. The 5 per cent decrease in July's production was due principally to the coal and railroad strikes, as many furnaces were forced to bank and the transportation of coal was hindered.

The Government's Aug. 1 condition reports promise unusually good crop yields. The forecast of the corn crop indicates 3,000,000,000 bushels for the fourth time in history, and the total indicated grain yield is greater than the average of the record production of the war years. Other crops, including potatoes and tobacco, are particularly good, and the crop yields bid fair to be a powerful factor in the continuance of the upward trend of general business conditions.

DOUD BUYS PRECISION

PHILADELPHIA, Aug. 15—The Precision & Thread Grinder Manufacturing Co. has been acquired by A. T. Doud of Philadelphia. Doud, who is president and treasurer, was formerly mechanical engineer for Hale & Kilburn Co. of Philadelphia, general superintendent of the Speakman Co., Wilmington, and works manager of the Diehl Manufacturing Co., Elizabeth, N. J. During the war he served as general manager of the Hero Manufacturing Co., Philadelphia, producing gas masks, and later became manager of manufacturing for the American Tube & Stamping Co., Bridgeport Conn.

F. V. Doud is secretary. C. A. White is a director. F. Rodger Imhoff, formerly sales manager, will be associated with the new organization as consulting engineer. The company will be reorganized in all departments.

China Has Large Stocks of Automobiles on Hand

WASHINGTON, Aug. 15—There is no market for automobiles in China at the present time. Local dealers are reported as having large stocks on hand with no purchasers. The average Chinese automobile dealer usually handles two or three makes of cars, the commercial attache in Shanghai reports, and American exporters are advised that the outlook for import automobile business to that country during the next six months is anything but promising.

"The one redeeming feature of the automobile business in China," says the report, "is the fact that good road movements are gaining in popularity and are spreading throughout the entire empire. With good roads the automobile business will stage a 'come back,' but at the present time, and possibly for six months to come, the outlook is not bright."

Best of All Years Enjoyed in Belgium

WASHINGTON, Aug. 15—The general use of automotive equipment in Belgium during the past twelve months is the greatest in the history of the automobile industry in that country. No figures are available as to the increase throughout the entire country, but registrations in the Province of Antwerp furnish some tangible idea of the growing popularity of the automobile, truck and motorcycle.

The recent registration of motor vehicles, passenger cars and trucks in Antwerp is 4800, representing an increase of 60 per cent over that of last year, while the use of motorcycles has increased 250 per cent during the past year.

A report on the conditions of the automobile industry in that country has just been sent to the automotive division of the Department of Commerce. There is an active demand for all kinds of automobile accessories, the report states. It is suggested, however, that American manufacturers can profit best by giving agencies to independent accessory dealers and not to garage owners or distributors.

This is explained by the fact that distributors and garagemen do not, as a rule, sell to any but their old customers and make no effort to cover the assigned territory or secure business outside of the usual run of automobilists whom they serve.

FINANCIAL NOTES

Marlin-Rockwell Corp. and subsidiary companies for the six months ended June 30, 1922, report a loss of $34,479 carried to the surplus account. Net sales, inclusive of intercompany sales, amounted to $2,223,011, from which $1,339,193 was deducted for manufacturing cost. The balance sheet shows current assets amounting to $3,567,674, of which $408,966 is cash in bank and on hand; $159,254 in notes and trade acceptances receivable and $582,255 in accounts receivable. Current liabilities are reported at $2,486,606, of which $1,511,606 represents notes and accounts payable and $975,000 a syndicate loan maturing July 7, 1923.

H. H. Franklin Manufacturing Co. stockholders now number more than 6,000 according to F. A. Barton, secretary and treasurer. This represents an increase of 20 per cent since the first of the year. The $5,000,000 offering in capital stock now being subscribed will be devoted to financing of the new Franklin four. Barton states that total monetary subscriptions for common and preferred are almost equal in amount. For the first time in Franklin history, common stock which has always been closely held, is being offered to the public. The company is increasing its plant force at the rate of 150 men a week.

Gray & Davis, Inc., $1,000,000 first mortgage 7 per cent convertible sinking fund gold bonds offered at 100 and interest, have been heavily oversubscribed. The company for the six months ended June 30, 1922 showed net earnings before depreciation, Federal taxes and interest charges of $208,562. This was at the annual rate of five and three quarter times the annual interest requirements of $70,000 on the $1,000,000 first mortgage 7 per cent bonds.

India Tire & Rubber Co. reports that the net volume of business for the last seven months totaled $1,088,000, an increase of 46½ per cent in dollars and 80 per cent in units over the figures for the same period last year. Net earnings amounted to $214,419.37, or 30 per cent on the total outstanding preferred and common stock for that period of six months. At the present time the company is turning out 600 casings and 800 tubes daily.

J. I. Case Threshing Machine Co. is reported back on a money making basis following a deficit of $1,493,431 for last year. This deficit was due to a drop in its gross sales from $34,547,000 in 1920 to $17,255,000 in 1921 and the lowered value of inventories. The company was able to come through 1921 without public financing and at the close of May of this year its total debt of $7,280,000 was more than $4,000,000 less than May, a year ago.

White Motor Co. has declared the regular quarterly dividend of $1 a share payable Sept. 30 to stockholders of record Sept. 20.

SALES IN SPAIN ARE GOOD

WASHINGTON, Aug. 15—Automobile sales in Spain during the month of June are reported as being exceptionally good, according to advices received by the automotive division of the Department of Commerce. June imports from the United States indicate the increased sales. During that month 239 passenger cars and 62 trucks were imported, compared with 141 passenger cars and three trucks during the previous month.

British Endeavoring to Recover Position

Chief Automobile Executives Confer in Connection with Foreign Markets

WASHINGTON, Aug. 18 — British manufacturers of automobiles are reported as having taken up in a "serious" way the possibilities of recovering some of their foreign trade, the automotive division of the Department of Commerce has been cabled by Trade Commissioner William H. Park at London. Conferences between the executive heads of the principal automobile manufacturers have recently been held for the purpose of considering ways and means of securing a larger share of the world's automobile export trade, of which the lion's share is coming to the United States.

In a report on the situation there, the Trade Commissioner says:

To Effect Economies

"British motor manufacturers are now giving serious thought to the possibilities of recovering some of their lost foreign trade. Although it is recognized that the high costs of production, with consequent high selling prices, along with the vagaries of exchange, will prove a great drawback, the manufacturers are determined to effect economies in some way.

Ways and means of competing in the world's mart of foreign automobile business are being considered at meetings of the various automobile heads. Their first concern, if they compete successfully with American manufacturers, is increased production and decreased cost per unit. Much depends upon the attitude of labor—whether or not labor will assist by accepting reductions in wages, adjustment of war bonus, and what is called a more reasonable attitude on the part of trade union leaders toward the manufacturers. It is necessary that labor co-operate in order that manufacturers here in England may make some definite plans for the future.

Output Has Improved.

"While the output of cars, motorcycles and cycles are improved during the past month, much remains to be done before the large works can restart their large complement and conditions once more become normal. Signs of activities are becoming more apparent in most departments of the automobile trade.

"Business in the heavier models is still slack, but the demand for light cars, of the more popular models is satisfactory. The output of these cars will be considerably as soon as complete balance is restored in the shops."

OLIVER RIM RECEIVER

ATLANTA, Aug. 15—Following the recent filing of a voluntary petition the Oliver Rim Co., manufacturers of automobile rims, has been declared in bankruptcy by the Federal courts here, and W. A. Fuller, of Atlanta, has been named receiver. An involuntary petition against the company has been denied.

INDUSTRIAL NOTES

H. & M. Body Corp., of Racine, Wis., owned jointly by the Mitchell and Hupp motor car companies, has started work on the construction of a new battery of dry kilns costing about $130,000 to provide a more adequate supply of lumber and other wood stock for the body shops. The plant is overcrowded with orders for open as well as closed bodies, the volume of which is such that maximum operations until Dec. 31 are assured.

Sharon Pressed Steel Co. has elected the following new directors: L. B. LeBel, Edward O. Peck, Harold G. Mosier and A. E. Swan, to fill vacancies created by the retirement of W. L. Ulmer, W. H. Watkins, L. L. Knox and W. J. Parker. The officers of the company are H. W. Torney, president, A. E. Swan, vice-president, T. A. Pierce, treasurer, Harold G. Mosier, secretary and D. L. Santee, assistant secretary.

Globe Steel Tubes Co. has been incorporated in Delaware, following a change in control of the major interest in the Globe Seamless Steel Tubes Co. of Milwaukee, with a capital stock consisting of 5000 shares of preferred at $100 each, and 100,000 shares of common without par value. The company is a large producer of seamless tubing for automotive purposes, high pressure boilers, and similar uses.

Haskelite Manufacturing Co., Chicago, has appointed James J. Dunne, formerly with the Crowell Publishing Co., as its representative in the territory east of Buffalo and Pittsburgh from the Canadian line to Virginia. His headquarters will be in New York City. The Hein-Nolan Lumber Co., Brooklyn, and P. Michel & Co., New York City, will continue as the eastern distributors.

Stover Signal Engineering Co., which recently moved its plant and offices from Cleveland to Racine, Wis., is now in quantity production of a line of three models of automatic signals for motor vehicles designed according to the latest ideas having reference to standardization of types and colors.

S. C. Johnson & Sons Co., Racine, Wis., manufacturer of wax finishes, varnishes, paints, etc., for motor cars, etc., let contracts during the week for a 3-story fireproof addition to its plant.

Lancaster Tire & Rubber Co., Columbus, reports that sales to date show an increase of approximately 100 per cent over the same period a year ago. The factories are operating double shifts.

Sam W. Hay's Sons, Pittsburgh, has been appointed representative of the Diamant Tool & Manufacturing Co., Inc., of Newark for nine counties in Pennsylvania.

IN NEW QUARTERS BY MARCH

FORT WAYNE IND., Aug. 15—Work on the erection of the big truck plant of the International Harvester Co. here is going forward so fast that it is now stated as probable that trucks will be turned out of this plant by the first of next March. Building operations have been started by the Greater Fort Wayne Development Co. in constructing homes in the vicinity for plant employees.

METAL MARKETS

Pressure upon steel producers, especially so upon sheet mills, for shipments on account of tonnages contracted for earlier in the season continues to be exerted by automotive consumers who, however, appear to be holding fresh buying in abeyance pending a clearer view of the outlook. There is considerable jockeying for position between buyers and sellers, the automotive demand being once more the pivotal point in the steel situation. Professions of reluctance on the part of sheet makers to assume further obligations because of the uncertainty of operations are accompanied by expressions of regret at the manifest tendency of automotive purchasing agents to withhold additional business for the time being.

It is significant that the steel industry once more looks to the automotive consumers of its products to furnish the bridge for a safe crossing from the present uncertainty to the generally hoped for return of prosperity. Operations of those mill units that produce automotive requirements are not permitted to suffer more than it is utterly impossible to avoid under prevailing conditions. Advices from Youngstown early this week indicate that, although a decrease in operations had been expected, the week would witness an increase in the operations of independents, especially so in the bar output. It is only natural amid an absence of representative fresh buying the small tonnages that have been bought in the last few weeks to "fill in"—all material urgently needed by consumers—were booked at "full" prices.

With these small transactions as a basis the market for some products shows modest advances, ranging from $2 to $3 a ton over those that prevailed on August 1. This is especially true of cold-drawn steel bars for which makers now ask 2.25c. base Pittsburgh, as compared with 2.10c. earlier in the month. Cold-rolled strip producers also quote higher prices for early shipments. On contracts that permit of material being turned out in orderly sequence, this adding to the backlog rather than upsetting the program of operations, unchanged price levels would apply. Sheet prices have undergone no change. Isolated instances of premiums for rush shipments of limited tonnages come to light here and there, but most of the small lots of sheets that were sold at premiums came out of warehouse and jobbers' stocks. Sheet bars appear to be in sufficient supply to permit of a continuance of operations of sheet mills at present rate, and the price level of $35 remains unaltered. Producers of full-finished automobile sheets appear to have a sufficient quota of orders on their books to keep their mills in operation for the remainder of the current quarter.

Pig Iron. A minimum of business is being transacted at the irregular prices now in vogue. Imported iron and more and more scrap are being resorted to as makeshifts pending more settled conditions.

Aluminum.—With the end of the tariff debate in the Senate apparently in sight and the provision for executive control of rates seemingly destined to become part of the new customs law, aluminum interests are more on the alert as to the effect of these conditions on the market. There is very little likelihood of eleventh hour shipments from abroad as European producers are not in a position to furnish much in the way of sheets beyond what they now have on their books.

Copper.—Some producers are asking a fraction over 14c., but this level continues to be the general market price for electrolytic.

Calendar

SHOWS

Aug. 26-Sept. 1—Toronto, Ont., National Automobile Show held in conjunction with the Canadian National Exhibition.

Sept. 4-9—Indianapolis, Automobile and Accessory Show in conjunction with the Indiana State Fair, Auto Show Building, under the auspices of the Indianapolis Automobile Trade Association, J. B. Orman, manager.

Sept. 23-30—New York, Closed Car Show, Grand Central Palace.

Oct. 21-28—Washington, D. C., Annual Closed Car Salon. Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8-13—Body Builders Show, Twelfth Regiment Amory, under the auspices of the Automobile Body Builders Association

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Sept. 1922 — Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Associação Automobilista Brazileria.

Sept. 15-30—The Hague, Automobile Show.

September — Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.

Oct. 4-15 — Paris, Automobile Show, Grand Palais.

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 10 - Dec. 19 — Brussels, Automobile Show, Palais de la Cinquantenaire.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

CONVENTIONS

August 28-Sept. 2 — Detroit National Safety Congress.

Sept. 18-23, 1922 — Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

Sept. 13, 14, 15—Buffalo, Lafayette Hotel, Annual credit meeting, Motor and Accessory Manufacturers Ass'n.

Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

Aggressive Policies Required in Hungary

Foreign Manufacturers at Present Are in Control of Market There

WASHINGTON, Aug. 15—There is a total of 3640 passenger cars and trucks registered in Hungary, the automotive division of the Department of Commerce has been informed by the Department's commercial attache. Of the total number but 2562 are in actual use, and of those in use 2159 are registered in Budapest. In the order named the Italian Fiat, Austrian Daimler, and German Mercedes and Benz are the preferred makes of cars.

American designs and makes of automobiles are well appreciated by Hungarian motor dealers who predict that if the market was vigorously worked that American cars could be sold in that country despite the fact that the market at the present time is controlled largely by the Italian, Austrian and German manufacturers.

However, nothing can be expected in the way of sales until direct representation is arranged for in Budapest, it is stated. An increased interest is being shown in automotive transportation, but the local automobile industry is in its infancy and has made no attempt to compete with foreign motor vehicles in supplying the market demand; the consul reports.

Trucks Carry Mails in Northwest Crisis

MINNEAPOLIS, Aug. 15—Removal of scores of trains by the railroads of the northwest, because of the strike and coal situation arising therefrom, is going to mean the use of motor trucks in the tenth division of the Railway Mail Service for carrying mail. Truck routes are being laid out for use when needed. This includes Minnesota, the Dakotas, Wisconsin and Northern Michigan. Superintendent E. F. McBride already has put mail trucks in operation in Northern Minnesota and parts of the Dakotas, where railroad service has been reduced to an every other day basis. The trucks carry the mails on the off days.

In case the emergency arises motor truck routes will be operated from post-offices on trunk lines. While branch railroad service may be reduced at any time, the department is not expecting an immediate tie-up on main lines. Government-owned trucks are to be utilized where possible. Electric lines and motor buses will be utilized also. Contracts already are printed for postmasters to employ motor trucks where there are no vehicles belonging to the government.

Bus lines are profiting by the reduction in train service to Lake Minnetonka and suburban points. The Boulevard Transportation Co. to Lake Minnetonka and beyond has added 12 buses. Hourly service is given to some points, which is better than train service on a regular summer schedule. The Jefferson Highway Transportation Co. has put on two more buses to St. Cloud, 100 miles. Two buses have been put on between this city and Willmar, Minn., to replace Great Northern train service removed.

Philadelphia Reports Sales of Cars Active

PHILADELPHIA, Aug. 12—Sales of passenger cars have been reasonably active during the week just passed and truck sales show signs of improving. Automotive equipment, except in the smaller units, is spotty and slow. Probably the acceleration in truck sales is due, at least in part, to the wide publicity given to the use of trucks during the recent coal strike, and the railway difficulties.

Bodymaking, especially for trucks, shows some signs of improvement. Sales of tires are slow.

Swedish Dealers Sell Almost Entire Stocks

Now Await Deliveries of New Shipments—Prices 50 Per Cent Lower

WASHINGTON, Aug. 14—Increased activities in the Swedish automotive market have been reported to the Department of Commerce. Dealers have sold out nearly their entire stocks and are now awaiting deliveries of new shipments.

Market prices are reported to be approximately 50 per cent lower than they were last year. This is accounted for largely by the favorable exchange rate and the fact that a great many American cars have reduced their foreign prices.

According to Swedish import figures approximately 1000 American cars have been sold in Sweden during the past six months, compared with less than 100 cars imported from Germany. During the month of June a total of 1014 passenger cars and motor trucks and 204 motor cycles were imported.

U. S. Exports Increase

Exports of motor vehicles from the United States have increased steadily since the beginning of the current year, starting with 43 passenger cars and one truck in January and increasing to 802 passenger cars and 303 trucks in May. From January to May a total of 1420 American cars were imported into Sweden, compared to 639 the same period in 1921.

The unit value per car decreased from $1,182 in 1921 to $562 in 1922. Trucks exported from the United States to Sweden increased from 52 with a unit value of $1,920 during January-May, 1921, to 361 with a unit value of $927 during the same period in 1922, while Swedish imports of motor vehicles were smaller.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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Conditions Favorable for Selling in the South

Offers great potential market for automotive products. Larger cities certain to take cars. Good cotton crop prospects indicate brisk fall buying in all sections. Truck market fair in cities, poor on farms. Tire prices demoralized. Tractor market improving.

By James Dalton

HERE is the first of the series of articles about conditions in the South which we announced last week. Mr. Dalton has just returned from a trip through the important commercial centers and in this article he tells something of what part of the South is a good market for automotive products and some of the sections which offer the best sales possibilities.

Future articles will discuss:

The southern dealer and his relations with the manufacturer.

Credit and general conditions in the South.

Highways and their relation to motor vehicles, especially trucks.

Why Henry Ford wants Muscle Shoals.

As an automotive market the South possesses wonderful possibilities. It is a good market to-day and in the next decade it will be one of the best in the United States, if not the best. Sales in the larger centers are not by any means dependent solely on cotton or other crops. The South isn't broke and it's willing to spend its money for the things it wants.

Industrial development of the great territory south of Mason and Dixon line has just begun, but even to-day it's difficult to find a town which isn't more or less of a manufacturing center. It's hard to realize, but it's none the less true that there are more cotton spindles in the Carolinas than there are in Massachusetts. Almost any town in the South with more than 5000 population can tell a real romance of industry.

The North never has looked upon the South as anything much but an agricultural district. Practically the only city which is known universally as a manufacturing center is Birmingham. There probably are few people in the North who ever have heard of Johnson City, Tenn., or La Grange, Ga., or Huntsville, Ala., as textile centers.

While the South is coming fast commercially and will grow still faster each year, it is undeniable that cotton still plays an exceedingly important part in its affairs. Diversification of crops is being preached and the propaganda is bearing fruit everywhere, but it has been undertaken generally only in Alabama and North Carolina. Cotton, therefore, still is the great money crop and it probably always will be, but the time will come

when the failure of a single cotton crop will not plunge seven or eight states into gloom.

It is true that as an automotive market the South is "spotted," but if any passenger car companies are not doing a good business in the cities and towns there is something wrong with their dealers or their products. The character of the dealer and the service he gives probably has more to do with sales in that section than it does in other parts of the country.

Sales of automobiles are good in such cities as Atlanta, Birmingham, Memphis, Chattanooga, Knoxville, Nashville, Winston-Salem, Roanoke, Richmond and New Orleans as well as scores of smaller cities. They have been good since May and there has been nothing like a mid-summer decline.

SALES in the rural sections depend entirely upon the crops, particularly cotton. The great staple of the South exerts an undeniable influence, also, on business in the cities. Cotton, up to a certain point, determines the morale of at least a half dozen states.

The outlook for cotton is better to-day than it has been for a long time. In some sections it was late getting started and in most districts the boll weevil is doing more or less damage, but the outlook is in no sense discouraging. The South has come to look upon the weevil as an unwelcome but permanent guest. It has been in Texas so long, for example, that the planters there do not worry about it particularly.

Big planters, bankers and business men in the South are a unit in making this statement:

"Cotton is making much better than an average crop. It is improving day by day in some districts and is deteriorating in others. The size of the harvest will depend in considerable measure upon the weather for the next few weeks, but the outlook is highly encouraging.

"If the cotton crop this year aggregates from 11,000,000 to 11,500,000 bales, which there is every indication it will, and if the price remains around present levels, the entire South will enjoy a period of great prosperity and will offer a splendid market for motor vehicles."

Expectations of a good-sized crop are founded on crop reports carefully compiled each week. Predictions of a good market are based upon the fact that there has been a carry-over of only 4,900,000 bales from the last crop and that the prospective demand will be at least 15,000,000 bales. It will be seen, therefore, that with a crop of around 11,000,000 bales the planters scarcely can fail to get a fair price which would be between 20 and 25 cents. Thoughtful men in the South would prefer to have cotton stay around that level rather than rise higher. If it goes much above 25 cents they fear it would result in another period of inflation.

The cotton districts, naturally, will offer the best markets for automotive vehicles if the crop is good and prices fair. The tobacco sections of Kentucky and North Carolina will rank next as markets and the rice and cane fields of Louisiana will rank third.

It does not follow that every county in the South will be a good market for automotive products. Cotton may be good in one county and the crop may be a failure in counties on either side of it, because of the weevil or other local conditions. It is evident, therefore, that a careful analysis must be made of local conditions if manufacturers are to spot the best markets.

Careful study and analysis of marketing possibilities appears to be more important in the South than in almost any other section of the United States. Conditions are more diversified and they differ from year to year. A county which may be a good auto-

Assuming that crops will be good, as they probably will be, generally speaking, the following outline will give a birdseye view of some of the best prospective markets in several States:

North Carolina

The eastern section is one of the best truck markets in the South.

The prosperous Piedmont section.

Winston-Salem is the center of one of the best manufacturing districts in the South. It has many textile mills and is surrounded by a rich cotton and tobacco country.

Durham is a tobacco center.

Hickory has important wagon manufactures.

High Point is the southern furniture center.

All the smaller towns in this territory also are promising markets as well as the farms.

South Carolina

Not quite so good as North Carolina as a whole but ranks second in cotton production.

The northwestern corner of the State, in which are located Greenville, Spartanburg and Newberry, is the best field for development and offers good sales possibilities. Greenville has become one of the textile centers of the South and practically all the towns in this territory have cotton mills.

Georgia

Prospects in the northern part of the State are fair; in the central part they are not so good and in the south fine. It ranks third in cotton production.

Sea island cotton and other cotton of exceptional quality is grown in the Savannah district and the outlook for a good crop is exceedingly bright.

Bulloch county, north of Savannah, of which Statesboro is the county seat, will be a good market.

Savannah, the trading center of the finest cotton belt, is an important distribution and shipping center.

Atlanta, in itself an important manufacturing city, is one of the leading distribution and financial centers of the South. It is a good market to-day and will continue to be, regardless of crops.

Albany has had a building boom. It is the center of a good cotton district as well as of the pecan growing industry.

Gainesville, Columbus and La Grange are textile centers.

Fort Valley and the district south of Macon have had wonderful peach crops.

Tennessee

Practically the entire State holds good promise. Its crops are more diversified than those farther south and they are all good. Middle Tennessee is a fine farming country with wheat and live stock.

Chattanooga is an important manufacturing city which is growing rapidly. It has important iron industries and ranks second in the country in the production of boilers. Hosiery manufacturing has become very important and is expanding rapidly.

Knoxville and Johnson City in the mountains have had booms.

The district around Nashville and Clarksville and up into Kentucky grows much tobacco and the crop has been good with good prices prevailing.

Memphis, in the southwestern corner, with large parts of Arkansas and Mississippi tributary to it, is one of the richest distribution centers in the South.

mobile market this season may have a crop failure next year and offer nothing. One county may have good crops and provide many car buyers while counties on either side of it may have crop failures.

Georgia, for example, is divided roughly into three parts—north, central and southern. The extreme north is mountainous and undeveloped. A little farther south is a fairly good fruit country but practically all the section north of Atlanta, except perhaps the larger towns, can be safely disregarded as a market.

The central section, with Atlanta in the extreme north of it, is fairly good sales territory. Atlanta is in a class by itself. It has a great deal of wealth and is one of the great financial as well as manufacturing centers of the entire South. Cars always can be sold there.

With a good cotton crop there will be sales prospects in every village and on almost every plantation south of Macon clear to the Florida line and along the coast from Savannah south.

A similar analysis can be made in almost every Southern State, but some are more spotted than others. Practically all of Tennessee, Alabama and Mississippi are good. Cotton is grown in all sections of Alabama and Mississippi, and while the crop is not by any means uniform, there will be good markets in all sections of these States unless there is very rapid deterioration. Alabama is making greater progress than its neighbors in diversification of crops. There is no great staple in Tennessee.

Summarizing sales possibilities for passenger cars in the South these statements can be made with a reasonable degree of assurance:

All the larger cities are good markets for cars in all price classes, especially between $1,000 and $2,500.

The smaller cities offer fair prospects for low and medium-priced cars and will be good markets if the crops mature satisfactorily.

Some live prospects for low and moderate priced cars can be found in most villages, especially among merchants and professional men who are beginning to collect bills they have carried on their books for two years.

The farms will offer myriads of prospects for cheap and medium-priced cars if the crops, especially cotton, are as good as they promise to be.

SO far as trucks are concerned, there is a fair market for them in the larger cities and towns, but very little on the farms except for those in the lowest price classes. Manufacturers are using more and more fairly heavy trucks. Merchants are using lighter vehicles for delivery purposes. The market is vastly better than it was a year ago, but still leaves much to be desired. Comparatively few farmers are using trucks, but contract trucking of crops to market is developing in the rural districts. The fruit industry is fairly well motorized, but most Southern farmers contend they need trucks only for three or four weeks of the year at most.

The tractor market is not brisk, but it is getting steadily better for those in the lighter class.

City markets for automobile accessories and supplies are good but large stocks are not carried.

There is a rapidly broadening market for garage equipment and supplies in rural sections.

The tire market is good but prices are absolutely demoralized and dealers are selling them for anything they can get, which returns even a very small profit. There are few exclusive tire dealers and most of them operate battery sales and service stations. Tires and accessories are sold at many of the gasoline filling stations.

So far as automobile service is concerned there is vast room for improvement.

Alabama

As a whole, one of the best prosects in the South. Cotton is grown throughout the State, but in the south especially, and its prospects in most sections are good.

Birmingham, in the center of a rich coal and iron field, is one of the leading manufacturing cities in the South and exceedingly prosperous. Its non-union coal fields have operated at top speed all through the strike.

The valley of the Tennessee River in the northern part of the State is good.

Huntsville and Decatur in the north are textile centers. The Merrimack Mfg. Co. of Lowell, Mass., has built the first unit of a huge cotton mill at Huntsville at a cost of $1,000,000.

The district west of Montgomery, of which Selma is the center, is in the famous "black belt," which refers to the character of the soil and not the population, and is the richest farming section in the State.

Mississippi

The State as a whole will be one of the best bets in the South for motor vehicles if crops make good.

The Delta section, in which are Yazoo City and Jackson, raises the best long staple cotton in the South.

All the territory of which Memphis is the trading center, including Greenville, Greenwood, Clarksdale and Helena, Ark., raises cotton and offers good sales possibilities.

Kentucky

The entire State promises well but the tobacco sections will be best.

Arkansas

Prospects are better than they have been for some time but not especially bright. Little Rock is a good merchandising center.

Texas

The State ranks first in the production of cotton and good crops mean general prosperity in all the cotton sections. The west central part promises to be the best market in the entire South.

Sherman and Paris and the district down to Dallas is wonderful farm country and it also has oil.

The district south of Dallas, including Waco and Corsicana, is rich in farms and oil.

Burnet county, north of Austin, is a good prospect.

There is a new oil field in Orange county and all the old oil fields are good but not as good as they have been.

Houston is a good trading center.

The country south of San Antonio along the Rio Grande has been enriched by irrigation and is producing wonderful semi-tropical crops.

Louisiana

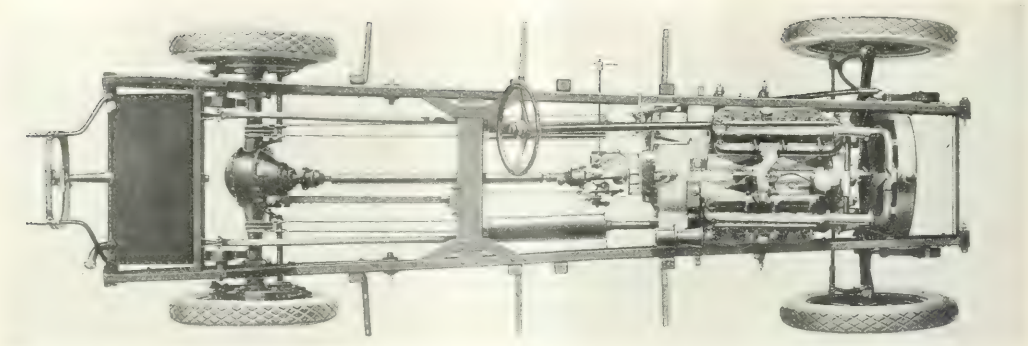
Conditions are more or less spotted but the rice and cane sections will be unusually prosperous. The cotton crop also promises well. Various towns are rapidly becoming industrial centers. New Orleans is very prosperous. The State as a whole is well worthy of study, there are many districts in which cars can be sold.

Virginia

Conditions in the State have improved greatly in the past year. Crops promise well and the State is developing rapidly in an industrial way. Richmond, Roanoke and Norfolk are good markets and all their factories are busy.

Oklahoma

The State ranks fourth in production of cotton. Conditions are somewhat spotted but sections with good cotton crops will be good.



Plan view of chassis showing new frame construction. The tubular cross members and straight side rails mark a departure from previous practice

1923 Peerless Carries Semi-Elliptic Springs

Platform spring suspension type abandoned in new models. Nearly every unit in car has been altered in some detail. Frame design more rigid and easier to produce. Wheels are smaller. Nine body types in line. Metal eliminated from closed car models.

By J. Edward Schipper

A NEW line of Peerless cars thoroughly refined mechanically and improved from the standpoint of appearance has been put on the market for 1923. The car is longer, having a 3-in. increase in wheelbase, and lower due to the redesigned straight line type of body, underslung springs and smaller wheels. There are nine types of bodies now offered on the 128 in. wheelbase, standard chassis.

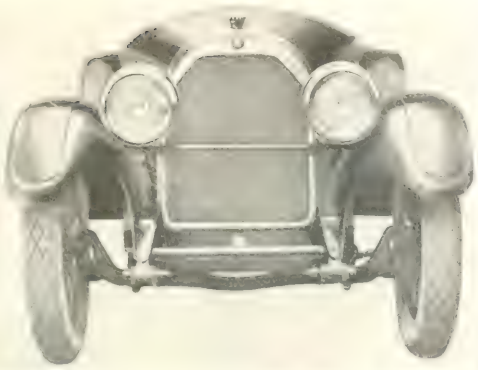
The most striking difference from last year's models is the change to the semi-elliptic type of springs. The Peerless car has long been known for its use of the platform type of suspension and was one of the two makes of American cars which clung to this type of spring. This radical change in their suspension, together with a line of bodies of extremely modernized type, is of particular interest in view of the length of time that the platform spring and the rather high bodies have been Peerless ear marks.

Practically every unit from one end of the chassis to the other has been altered in some detail. While the engine has not been materially changed as far as the fundamental specifications are concerned, there are, nevertheless, a number of alterations of importance. By removing the tire pump from the front end of the engine, it has been possible to shorten the fan shaft, allowing the engine to be moved forward in the frame, thus giving a larger space in the front body compartment and greater accessibility to the steering gear and connections. A larger oil strainer screen has been installed as an independent unit in the lower half of the crankcase. This screen can be removed for the purpose of cleaning without taking down the under half of the crankcase. An oil drain plug has been installed on the lower left side of the crankcase, this plug being removable for the purpose of draining oil with a special wrench furnished with the tool kit which obviates the necessity of getting under the car to drain the oil reservoir.

The front gearcase has been altered to suit the new method of front engine support, and because of the transfer of the tire pump from this point to the transmission gearcase. The front engine support has now been installed on the frame cross-member in a universal socket. Lubrication of this is obtained from an Alemite oiler. The water pump has been redesigned, the important features of the new pump being its larger capacity and the double bearings, one on each side of the rotor. This, in connection with a larger packing nut, increases the life of the pump and makes it more accessible in taking up wear. The capacity of the new Fedders honeycomb radiator is $7\frac{1}{2}$ gal. In recent tests the temperature maintained was under 178 deg. while ascending the Uniontown hill. The radiator shell is of brass with several coats of nickel plate.

A slight alteration has been made in the exhaust line, the pipes now being carried down at the front end of the engine, instead of the rear, to permit of cleaner engine design, as well as to keep the heat from the front compartment of the car.

The former electrical units have been supplanted by the Delco system for starting, lighting and ignition. The distributor has been placed at the front end of the engine, now being bolted to the rear side of the timing gear housing and driven from the fan shaft gear. This location is more convenient when making adjustments. All wires have been placed in conduits. The distributor is an automatic type provided with a governor and equipped with double breaker contact points.



The front end of the Peerless presents a very different appearance from previous models

Practically no alterations have been made in the clutch, with the exception of a somewhat lower compression rate on the clutch spring to give a softer pedal action. Oilless bushings have been installed for the clutch release parts. To take care of the installation of the tire pump, the transmission gearcase has been altered. A hose connection has been provided at the left dust shield to facilitate the operation of the pump which is now started by inserting a screw driver in the slotted head that protrudes through the floorboard. A quarter-turn is sufficient to engage the pump gears. Another alteration in the gearset is due to the installation of a transmission lock immediately back of the shifting lever. A 250 key change has been supplied to comply with the standard of the National Insurance Association, thereby giving the owner the benefit of a reduction premium on his policy. Both the clutch and service brake pedals have been altered from adjustable to permanent to give a cleaner appearing front compartment. The gear shifter lever has also been redesigned to permit greater comfort in making speed changes, and the foot and emergency brake levers have been changed in regard to length and shape for the purpose of rendering less pressure necessary when applying the brakes.

Heavier construction is now used for the propeller shaft, this now embodying a tubular shaft equipped with Spicer universal joints protected by metal housings and lubricated by Alemite oiler. New type Timken axles both front and rear are employed, the front axle being drop forged from special alloy steel with integral yokes and spring perches. The steering knuckle is fitted with roller thrust bearings at the upper end, to promote ease in steering.

The rear axle now incorporates the straddle mounted pinion shaft in which there are two Timken bearings with the pinion gear in the center instead of the two bearings on one end and the gear in the outer position. The rear axle has been provided with a pressed steel torque arm having a fabric connection at the front end instead of the usual spring type of connection, thus eliminating any necessity for adjustment or any possibility of rattle at this point. The rear end is fastened to the rear axle housing by a pin encased in brass bushings, lubricated by the Alemite system. This same system is employed for lubrication of the axle shaft bearings and the spring shackles through tubes which are connected on each side of the rear axle near the brake drum. The brakes are $15\frac{1}{2}$ in. in diameter and $2\frac{1}{2}$ in. wide. The internal brake is a new design having no adjustments other than the brake rod, which takes up wear on the lining.

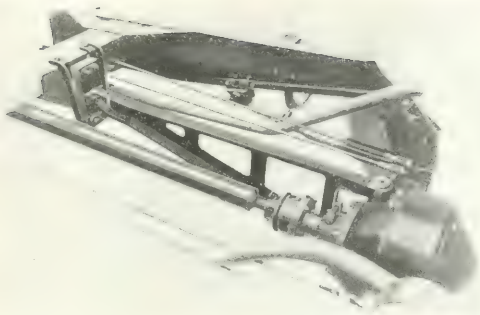
An entirely new design of frame is incorporated, this being more rigid and a better production job than the previous model. The side members are straight and have a maximum depth of $7\frac{1}{2}$ in., thus eliminating truss rods to support the frame. Among the new features are tubular cross members, front and rear, pressed into the frame to take care of frame twist. In addition, there are also a radiator and engine front support cross member, a cross member which takes care of the brake rocker shaft and also the front end of the torque arm and a rear cross member for the front gasoline tank support. The new frame, due to the added cross members, is lighter, but stiffer than the previous design. The springs are carried directly underneath the side members and in this way eliminate the side member twist due to offset brackets, etc.

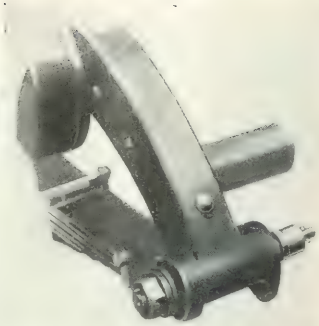
Smaller wheels are now used, the rims being 32 by $4\frac{1}{2}$ in., permitting the use of 33 by 5 in. tires. The former size was 33 by $4\frac{1}{2}$ front and 34 by $4\frac{1}{2}$ rear. The wheels are of the Kelsey metal felloe type with twelve hickory spokes for both the front and rear wheels. The springs are semi-elliptical front and rear. The front springs are 41 in. long and $2\frac{1}{4}$ in. wide, containing nine leaves for all body types. The rear springs are 60 in. long and $2\frac{1}{4}$ in. wide, containing eight leaves for the lighter bodies and nine leaves for the heavier types. The spring shackles are heavy and adjustable to compensate for wear. The size of the spring bolts is $\frac{7}{8}$ in. and are designed for adjustment without the use of spacers or cotter pins for locking them when making the adjustment.

A Gemmer steering gear with $9\frac{1}{2}$ to 1 ratio is used in these models. The steering gear is equipped with a solid walnut corrugated wheel 18 in. in



New five-passenger berlin limousine. No metal is used in the closed bodies of the Peerless line





(Left) Pressed steel torque arm. Note flexible coupling at front end of arm

(Right) Detail of new construction showing tubular cross members and Alemite lubricating system

diameter. The spark and throttle control levers are mounted on the upper portion just above the wheel proper. With the 9½ to 1 ratio, a turning radius of 41 ft. to the right and 44 ft. to the left is provided.

The chassis equipment has been improved throughout. The battery is now an Exide, 6 volt, 120 amp. type carried in a special compartment on the right side of the frame, access being had by removal of the cover which is set flush with the dust shield. This new location is, of course, quite accessible. The horn is now a Kellogg, motor driven type, mounted on the right rear engine frame. It is operated by the convex shaped button located at the extreme upper terminal of the steering column. The head and cowl lamps are of Guide design and manufacture. The rear lamp provides a special combination tail light and stop signal. The stop signal switch is connected with the service brake pedal. The tail light also illuminates the dial on the gasoline tank and a trouble lamp of the reel type is mounted on the front face of the dash under the hood on the right-hand side. The tire carrier is now of the ring type and supported by the rear cross-member. It is designed to carry two extra tires, which are protected against theft by locks, the barrel of which is integral with the carrier.

Nine types of bodies are mounted on the standard 128 in. wheelbase. These include a four-passenger touring phaeton, seven-passenger touring phaeton, two-passenger roadster coupe, four-passenger Victoria coupe, four-passenger suburban coupe, five-passenger town sedan, seven-passenger suburban sedan, five-passenger berlin limousine, four-passenger opera brougham. All of these bodies are new, not only in appearance, but in construction. The open cars have several unique points of construction which may be mentioned.

Open Body Details

The four and seven-passenger phaeton are equipped with a permanent type of top constructed of steel tubing, with white ash strips, heavily padded and provided with the usual weatherproof top material. Although this is somewhat along the lines of the regular folding top, it presents an unbroken surface to the eye. At the rear the top is fashioned in the shape of the gypsy quarter curtain and a bevel plate glass window is provided. The rather solid construction of the top permits of good fitting for the curtains. These open with the doors and give an enclosed body which is substantially weather-proof.

The open bodies are equipped with a ventilator made integral with the top of the cowl and operated by a lever located just beneath the instrument board. The use of the ventilator makes possible a windshield of special design, the lower panel of which is unusually narrow in order that the intersection of the two glass panels will not come within the direct range of the driver's vision. The lower panel is removable and the upper panel is adjustable in or out. The mounting on the instrument board incorporates all of the units in three symmetrical ovals, two of glass and one of metal. All of the smaller tools, such as are used for changing tires and making minor adjustments, are carried in a pocket in the left front door. If it is desired, the tools can be taken from the door as one unit, for they are fitted to a removable panel. The larger tools are carried under the front seat.

Additional equipment on these cars includes a rear vision mirror and a windshield wiper, hand operated. The four-passenger phaeton is equipped with a weather-proof trunk mounted on the rear. The open cars have the following optional paint colors: maroon, suburban blue, dust-proof grey. The body, hood and wheels are in colors and suitably striped to accentuate the lines of the body. The running gear and fenders are black. Special color combinations are available at additional cost.

Closed Cars Have Soft Top

The closed cars are all of the soft top variety, no metal being used in their construction, but in its place a covering of wood strips padded and finished with a glazed top material to eliminate the drumming noise. The upholstery used in the five-passenger sedan is a mohair velour offered in a variety of patterns. The coupe, limousine and brougham are upholstered in cloth. The ceilings and walls above the belt line are covered with materials that harmonize in texture and color with the upholstery. The carpets used in the closed car interiors are of wool and match the upholstery. The driving compartment of the limousine and the brougham is finished in bright enamel leather with corrugated linoleum on the floor. Dome lamps are standard equipment and the sedan, limousine and brougham carry corner lamps in addition. In place of the standard cowl lamp, the brougham is equipped with distinctive designed coach lamps on either side of the body just back of the driving compartment. The windshields differ from those furnished on the phaeton in that both the upper and lower glass panels are adjustable. A leather covered glass visor is fitted as standard equipment and the finishing colors are the same as those mentioned in connection with the open car.

SMALL Chinese firms have found it cheaper and more efficient to hire a truck than to employ the necessary number of coolies, says Consul General Edwin S. Cunningham, Shanghai, in a report to the Department of Commerce. A Shanghai newspaper has estimated that the expense of operating one truck for a day would be about $31. To do the same amount of work sixty coolies would be required at a cost of from $36 to $48 for labor alone, exclusive of all other expenses.

New Vim Truck Redesigned Throughout

Four-cylinder, 4 x 5 in. engine gives maximum speed of 52 m.p.h. Capacity is 1000 to 1500 lbs. Thermo-siphon cooling employed. Electrical equipment is standard. Both service and emergency brakes are located on the rear wheels. Wheelbase is 108 in.

By Donald D. Blanchard

A NEW Vim truck, which bears no resemblance to the former model of that name, is now being produced by the Vim Motor Truck Co. of Philadelphia. The new model is a speed job and is conservatively rated at from 1000 to 1500 lb. capacity. It has ample power and shows unusual hill climbing ability.

The four-cylinder, L-head engine is a rugged, heavy duty design. The cylinder dimensions are 4 x 5 in., giving it a rated horsepower of 25.6. On the block, the engine shows an actual horsepower of almost 39 at 1600 r.p.m. The compression is 53 lb. The maximum speed of the truck is 52 miles per hour. The engine is run-in and given a dynamometer test at the factory.

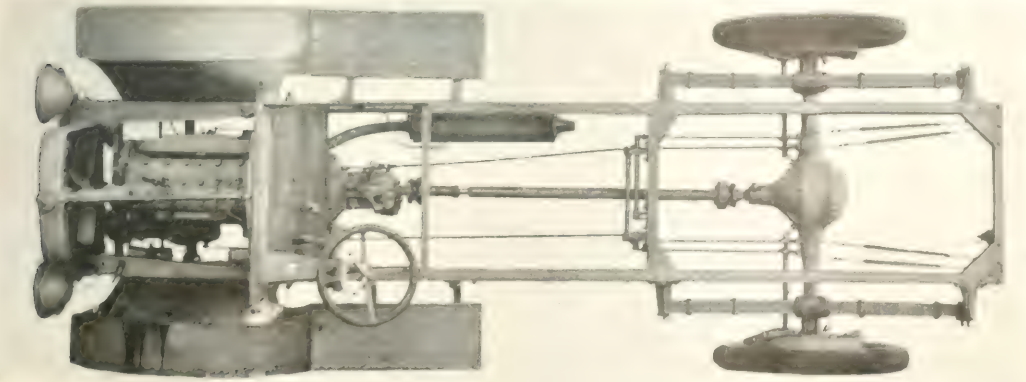
The crankshaft is of vanadium steel and is balanced both statically and dynamically. It is carried in three main bearings all 2 in. in diameter. The front bearing is 3 3/16 in. long, the center bearing 3¼ in. long, and the rear bearing 3 5/16 in. long. The upper halves of the main bearings are bronze-backed. The connecting rod bearings are 2 in. in diameter and 2¼ in. long. The rods are drop forgings of I-beam section and are clamped to the piston pins, which are 1⅜ in. in diameter. The piston pins work in removable bronze bushings in the pistons. The pistons have three rings, two above the pin and one below. These rings are ¼ in. wide.

The valves and valve operating parts are located on the right side of the engine and are entirely enclosed. They are made readily acessible, however, by the removal of two cover plates, each of which is held in position by a single stud bolt. There are four spiral timing gears. The right hand gear drives the camshaft and the one on the left drives the combination generator and distributor through a coupling.

Oil is supplied to the main and connecting rod bearings under pressure. The oil pump is driven through spiral gears from the rear end of the camshaft. The pump is located at the extreme rear of the sump and at the lowest point. Consequently it is supplied with oil under all conditions. Oil draining back into the crankcase is filtered before entering the pump. The pump is of the gear type and develops about 10 lb. pressure at 1000 r.p.m. of the engine. An oil pressure gage is located on the dash and there is a bayonet type of oil gage for measuring the quantity of oil in the crankcase.

FUEL is fed to the 1-in. Zenith carbureter by gravity from the tank under the seat. The intake and exhaust manifolds are cast integrally, a hot spot being provided to heat the mixture. Air entering the carbureter is preheated by passing through a stove on the exhaust pipe. Due to the fact that the carbureter and manifolds are on one side and the ignition system on the other side of the engine, the powerplant has an unusually clean appearance and is very accessible.

Cooling water is circulated by thermo-siphon. The radiator is of the tubular fin type. The radiator core is

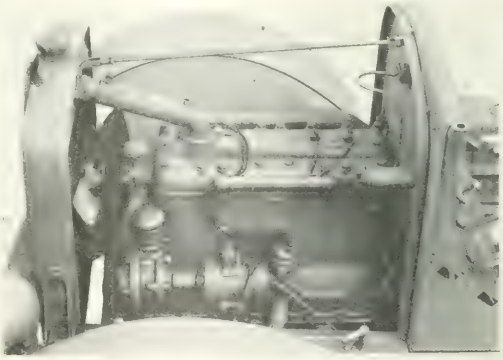


Plan view of new Vim truck chassis. The engine is supported at the front by a forged steel cross member. The steering column support carries ammeter and lighting and ignition switch

carried in a pressed steel shell which is spring supported on the frame. The outlet and inlet connections on both the radiator and engine are removable so it is not necessary to touch the hose clamps to break the connections at any of these points. The fan is driven from a pulley mounted on an extension of the shaft which drives the generator. The fanshaft may be adjusted vertically to take up slack in the fan belt. The capacity of the cooling system is $7\frac{1}{2}$ gallons.

ELECTRIC starting, lighting and ignition are regular equipment. The starting motor and combined generator and ignition unit are Westinghouse and the battery is a Willard. The system is a 6-volt, ground return type. The generator is mounted on a bracket on the left side of the engine. The starting motor, which has a screw shift is located on the right side underneath the air intake pipe leading to the carbureter. The lighting and ignition switch and the ammeter are mounted on the steering column support. Single contact bulbs of the following sizes are used: headlights 18 cp., and taillight 2 cp. The diameter of the headlight lens in 9 in.

The clutch and gearset are a unit with the engine. The clutch is a multiple dry disk type with five driving and five driven disks. A clutch brake is provided. The disks are faced with asbestos, 8 in. outside diameter, 6 in. inside diameter and $\frac{1}{8}$ in. thick. The gearset provides three speeds forward and one reverse. The ratios are 3.24 to 1 in low, 1.66 to 1 in second, 1 to 1 in high and 4.16 to 1 in reverse. The mainshaft in the gearset is mounted in ball bearings and the countershaft in plain bearings. A power take-off is provided for tire pump only.



View of engine showing generator mounting

The propellershaft has two metal universal joints of the self-lubricating type. The rear axle is semi-floating and has a road clearance of $9\frac{1}{2}$ in. Spiral bevel reduction gears are used, the ratio being 4.7 to 1. Torque and propulsion are taken through the springs. The sleeves surrounding the pressed steel axle housing and carrying the spring chairs extend far enough toward the center of the axle so that the rubber bumpers on the bottom of the frame side members strike them and not the axle housing. The differential ring and pinion are mounted as a unit so that the complete carrier may be removed from the housing without disturbing the adjustment. The pinion shaft is supported by two roller bearings, both forward of the pinion.

THE side members of the frame are pressed steel channels 5 in. deep with $1\frac{3}{4}$ in. flanges. The frame is braced laterally at five points. The front cross member is in front of the radiator and protects it in case of collision. The second cross member is a steel forging which serves as the front engine support. The flywheel housing acts as the third cross member. Brackets are riveted to the frame to which the front engine support and the supports on the flywheel housing are bolted. The fourth cross member is at the point where the front hangers for the rear springs are attached, and the fifth connects the rear ends of the side members.

The springs are semi-elliptic front and rear. The front springs are 2 in. wide and 38 in. long, and have nine leaves with two rebound plates. The rear springs are $2\frac{1}{4}$ x $50\frac{1}{2}$ in. and have ten leaves with three rebound plates. The spring bolts are applied to the hangers by means of clamping bolts which eliminate the possibility of their working loose. Spring bolts are hardened and ground, and are oil lubricated.

Both service and emergency brakes are located on the rear wheels. The brake lining dimensions are as follows: external service brake—length 48 in., width $2\frac{1}{2}$ in., thickness 5 32 in.; internal emergency brake—length $46\frac{5}{8}$ in., width $2\frac{1}{4}$ in., thickness 5 32 in. Springs are provided in the brake operating mechanism to take up wear in clevis and shafts and to eliminate rattles automatically.

The steering gear is a worm and wheel type. The steering wheel is 18 in. in diameter. Hand spark and throttle controls, and horn button are located on top of the steering column. The carbureter choke is also located on the steering column. The turning radius of the truck is 19 ft. The wheelbase is 108 in. Wood wheels with 32 x 4 in. cord tires on Firestone rims are regular equipment.

The length from the back of the driver's seat to the end of the frame is $76\frac{1}{2}$ in., and to the center of the rear axle $44\frac{1}{4}$ in. The maximum allowable body overhang is 10 in. and the maximum body width between rear wheels is $46\frac{3}{4}$ in. The driver's seat is $44\frac{1}{2}$ in. wide. The extreme width of the frame is 30 in. and the distance from the ground to the top of the frame, assuming the truck is fully loaded, is $27\frac{1}{4}$ in.

The dash is built of one main plate of 11 gage sheet steel to which the floor board supports are hot riveted. Chassis equipment includes electric headlights with approved lenses, tail light, motor driven horn, complete set of tools, front fenders, gasoline tank, runningboards, jack and pump.

THE open express body is ruggedly constructed. The uprights are made of ash and the steel sides are bolted to them. The tailgate is 12 in. high and is supported by covered chains. The seat is comfortably upholstered. The inside loading dimensions are: length $85\frac{1}{2}$ in., width at floor $44\frac{1}{2}$ in. and height $55\frac{1}{4}$ in. This body is painted dark olive green with natural wood wheels and black trim.

The panel body is intended for general merchandise delivery. The frame of this body is ash reinforced with steel. The wood floor is provided with metal skids. The rear doors have glass windows. The body is painted a dark olive green with black trim and natural wood wheels. The inside loading dimensions are the same as for the express body.

The Vim Co. is now controlled by an entirely new organization. The new truck is being produced at a new plant located in the Nicetown section of Philadelphia. The units entering into the construction of the truck are for the most part manufactured elsewhere, but they are in most cases produced exclusively for use in this model.

The price list on the chassis is $995. Fitted with the open express body, the price is $1,185 and with panel body, $1,210. Front fenders and runningboards are furnished with the chassis, but the driver's seat is not included.

Modern German Car Chassis Have Unique Details

Fan and water pump impeller on opposite ends of same shaft in some cases. Special facilities for ready adjustment of brakes on the new Benz six. Mercedes has rigid central frame cross-member. Unconventional rear springs used to improve riding qualities.

By Benno R. Dierfeld

CLOSE examination of present-day German passenger cars reveals a number of interesting details which are worthy of note by American designers. Several of these details are described in the following pages.

It is a well known fact that in the usual layout of fan and radiator, the fan is effective only over the central portion of the core, especially when the radiator is of pointed type. In some German cars using pointed radiators it is customary to provide a cowling of sheet metal between the radiator and fan, the latter operating in the outlet of the casing. The construction used on the Ehrhardt car is shown in Fig. 1. This is said to give uniform air flow through all the radiating surface.

On N.A.G. cars the fan bracket of aluminum is fitted with an eccentric bearing arranged to facilitate tightening the fan belt. The construction employed is shown in Fig. 2. To adjust the belt the four nuts through the flange which supports the fan bracket are loosened and the whole bracket is turned around in a recess cast in the water jacket of the forward engine cylinder. When thus tightened the clamping flange bolts are again set up. In this case the shaft on which the fan is mounted carries on its inner end a pump impeller which turns in the water jacket and assists in causing the water to circulate.

The water pump arrangement on the new Benz six-cylinder car is shown in Fig. 3. In this case the pump is driven directly off the timing gears and is in tandem with the magneto, which is driven from the rear end of the pump shaft. The left hand end of the T-fitting just back of the pump is connected to the radiator, while the other end, connected to the pump discharge, conveys water to the cylinder jacket. A short vertical shaft ending in a wing nut serves to operate a drain cock in the base of the pump.

WHEN the water jacket of the engine is at a considerable distance from the radiator a rather long connecting hose is required, and this has a tendency to make the general appearance of the engine less sightly than it would otherwise be. To avoid this drawback the water inlet pipe on the N.A.G. car is cast integrally with the timing gear case cover as shown in Fig. 4.

Fig. 5 shows the arrangement of the oil filler cap and oil level gage. These two are placed close together to enable the person who is putting oil into the engine to readily determine when the desired oil level is reached. The cover for the filler opening is hinged and provided with a spring which tends to hold it shut, thus avoiding the use of a screw cap.

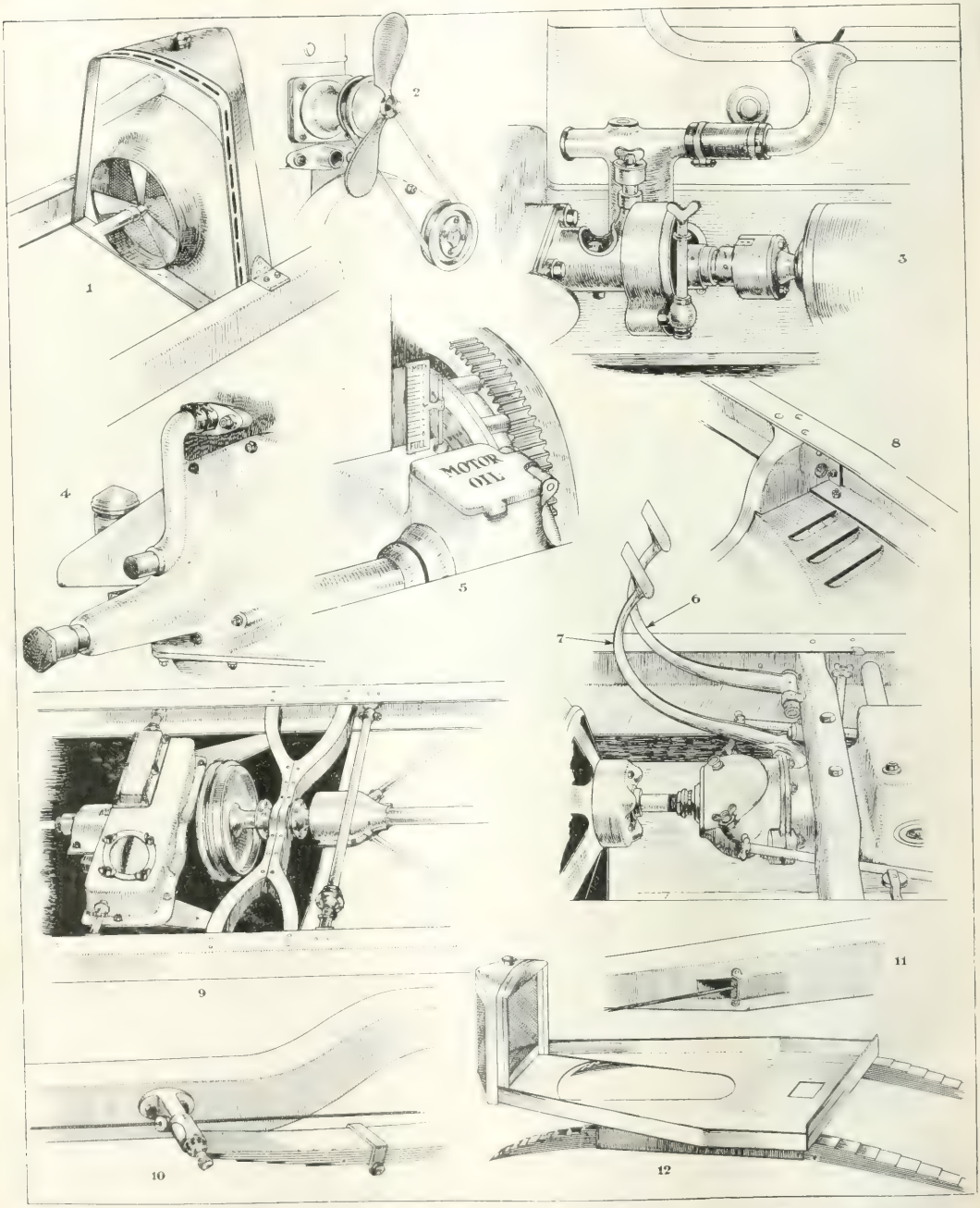
In German cars it is quite usual to carry the clutch pedal, brake pedal and hand brake lever on a common shaft supported between the two side members of the frame, but in the new Benz six-cylinder car the clutch pedal is supported from an aluminum case which encloses the clutch brake. This clutch brake casing is supported on the front end of the gearset and is provided with a cover which can be easily removed by loosening two wing nuts, as can be seen from Fig. 6. The two rods with cross handles projecting under the frame member on each side of the gearset are provided to facilitate adjustment of the wheel brakes, an adjustment usually effected at the wheels. This arrangement is said to be more readily accessible and cleaner than an adjusting device located in conventional manner.

FIG. 7 shows the brake pedal arrangement on the same Benz car. The pivot for the pedal is only a short shaft with bearings attached directly to the frame cross members. Directly behind this cross member can be seen the cross handle arranged in an accessible position for adjustment of the transmission brake. This layout of brake and clutch pedals is said to be lighter and much more easily dismantled than one in which a common cross shaft is employed.

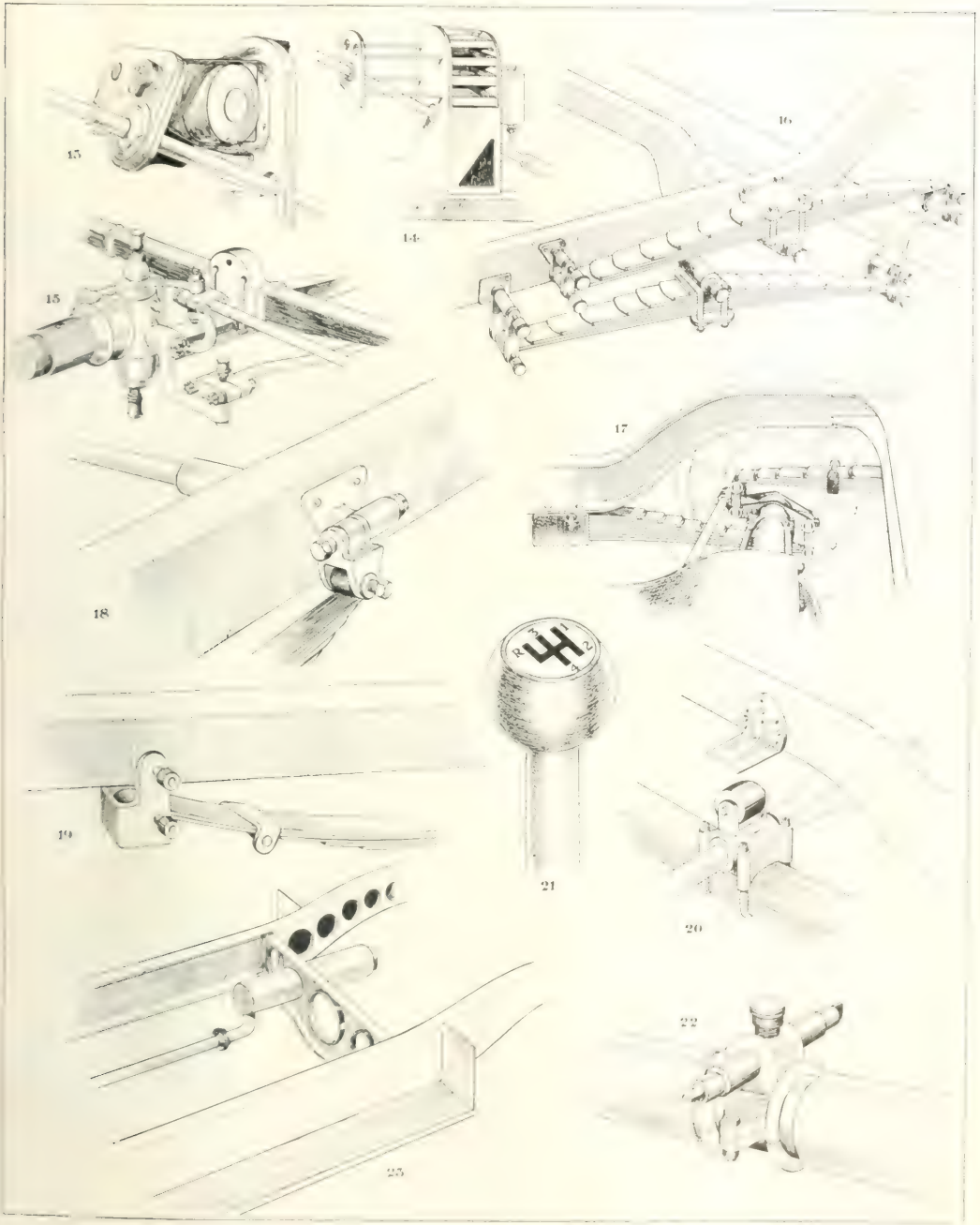
In Audi cars the arrangement shown in Fig. 8 is used to prevent the space under the floorboard from becoming dirty. It will be noted that the under pan of the engine is extended to the central cross member of the frame which supports the rear end of the gearset. This under pan has louvres on both sides of the gearset opening to the rear, thus facilitating ventilation of the engine compartment.

In Mercedes cars the design of the central cross members of the frame is quite different from the conventional as will be seen by reference to Fig. 9. The cross member in question is made up from two channels bent into the shape of a double Y. This member is arranged to take the thrust and torque imposed upon the tubular member which encloses the propeller shaft.

A number of German cars employ cables for operating the wheel brakes. Guides for the cable are provided in some cases, that used on the Aga small car being shown in Fig. 10. In this case the guide is combined with the bracket for the front end of the rear spring and contains



1—*Fan cowling used on Ehrhardt car.* 2—*Combined fan and water pump with eccentric adjustment used on N. A. G. cars.* 3—*Pump layout on new Benz six.* 4—*Water inlet pipe on the N. A. G. is cast integrally with timing gear case cover.* 5—*Oil filler and oil level gage on Dux car.* 6—*Clutch pedal arrangement and brake adjusting rods on Benz six.* 7—*Brake pedal and brake transmission adjustment on Benz six.* 8—*Underpan on Audi car is extended to central frame cross member.* 9—*Rigid central cross member used in the Mercedes chassis.* 10—*Combined brake table guide and spring bracket used on Aga small car.* 11—*Brush wire cable guide on Maybach car.* 12—*Frame and spring arrangement on the light N. U. G. two seater chassis*



13—*Oil tank mounting on Mercedes chassis.* 14—*Drawers for tools, etc., in double dash of the Steiger car.* 15—*Double steering knuckle arms on Audi chassis.* 16—*Double rear spring arrangement on Fulmina car.* 17—*Double quarter elliptic springs used on rear end of Horch chassis.* 18—*Spring bracket with swivel joint on N. S. U. chassis.* 19—*Spring shackle of pressed metal used on Brennabor car.* 20—*Adjustable bumper striker on Hansa-Lloyd.* 21—*Gear shifter knob with gate marking used on Hansa-Lloyd.* 22—*Speedometer drive on Hansa-Lloyd.* 23—*Method of supporting muffler on Maybach chassis*

a graphited bushing of special metal. In the case of the Maybach car the cable is guided in a soft wire brush arranged in a slot cut in the curved frame side member. This brush is said to remove rust and dirt which accumulates on the cable. See Fig. 11.

IN the case of light cars the frame and spring arrangement present difficult problems. These are met in the case of the N.U.G. chassis designed for carrying two persons by use of the construction shown in Fig. 12. The frame consists of two side members of channel section connected by a floor sheet about ⅛ in. thick. The front and rear quarter-elliptic springs are fitted into the ends of the side members as shown. The floor sheet is cut away to accommodate engine and gearset, and forms the foundation of the light two seater body. This design is said to be cheap and light and to meet all requirements of the light car user.

The space between dash and instrument board in the Mercedes chassis is utilized for an oil tank containing fresh lubricant for the engine, as shown in Fig. 13. A double dash, illustrated in Fig. 14, is used in the Steiger car. Into this space are fitted drawers of different sizes which are convenient for carrying tools, etc. These are made accessible by lifting a portion of the cowl.

Inasmuch as breakage which sometimes occurs in the arms of the steering knuckle is apt to result in serious accident, special precautions are taken by the designers of the Audi chassis in which two steering knuckle arms are provided as shown in Fig. 15. Breakage of one of these arms can occur without affecting steering of the car.

Variations in the design of rear springs are becoming more common. One of these, shown in Fig. 16, is used on the Fulmina car. In this case two half elliptic springs are employed, one above the other, but slightly offset, as shown in the sketch. This construction is said to result in unusually good riding qualities. Breakage of one of the two springs can occur without putting the car entirely out of commission. In the Horch car the spring design shown in Fig. 17 is used. This consists of two quarter elliptic springs of different lengths fastened respectively to the side member and rear cross member. The thin ends of the spring are connected by shackles to a balance beam arranged to turn freely on a bronze sleeve fitting over the axle tube. This construction decreases unsprung weight and is said to result in good riding qualities. The N.S.U. car is provided with rear spring brackets intended to relieve the spring from twisting strains. There are two spring bolts arranged at right angles as shown in Fig. 18. Torsional deflections of the frame are not communicated to the spring in this case on account of the fact that the spring is free to move about a fore and aft axis. This arrangement is said to increase the life of the spring as well as to improve riding qualities.

A strong and light spring shackle is employed in the Brennabor car. It is made from a single piece stamped from heavy sheet stock, as will be noted from Fig. 19. This shackle is easily manufactured and its construction is such that it tends to protect the spring bolt against entrance of grit. The striker for the rubber bumper on the Hansa-Lloyd car is provided with three sets of holes which enable it to be bolted in three different positions and thus accommodate different weights of body or load. See Fig. 20.

Ball and socket gearshift levers are rather rare in German cars, one reason for this being that most cars have four forward speeds so that gearshifting without a gate involves some difficulties. To offset this disadvantage the Hansa-Lloyd gearshift lever handle is provided with an ivory plate inserted on its upper surface, which explains by the use of black lines, laid out in the form of a gate, and numbers the motion required in shifting the different gears. See Fig. 21.

THE type of speedometer drive employed on the Hansa-Lloyd is shown in Fig. 22. On the front end of the universal shaft there is mounted a worm wheel. The mating worm situated above is arranged to drive the flexible shaft of the speedometer. Either end of the worm shaft can be used for this purpose.

In the Maybach car the muffler is securely supported from a wide cross member which has a circular opening through which the muffler is inserted, Fig. 23. The muffler is provided with a flange which bolts to the cross member, this rigid mounting being such as to prevent rattles which often occur with less secure mountings.

Lomar Shock Absorber

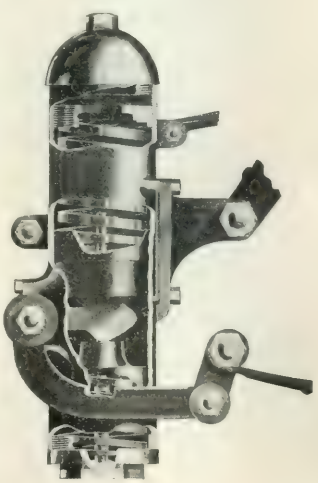
A NEW shock absorber of the supplementary spring type is being manufactured by the Lomar Mfg. Co. It consists of a steel cylinder closed at both ends, in which are located two coiled springs of alloy steel, the free ends of which are located inside cupped plungers, and between the two plungers there is a cam-ended lever arm.

From the eye of the spring, connection is made through the usual shackles to a pair of lever arms mounted on the same shaft as the lever arm inside the cylinder. The upper of the two springs in the cylinder cushions the shock received by the axle and the lower spring cushions the rebound.

Both coiled springs can be adjusted as to pressure by means of nuts in the ends of the cylinder. The cam above referred to acts on the upper plunger through a roller, so as to reduce friction and wear.

One-half pint of heavy oil poured into the cylinder is pumped to the top of the device and flows back by gravity, lubricating all working parts.

The standard finish of the shock absorber is black enamel with nickel trimmings.



Lomar supplementary spring type shock absorber

Fundamental Data for Use in Hot Spot Design

Experimental tests on six-cylinder car, weighing 3200 lbs, give valuable results. Data are not conclusive, but comprise new material of definite interest. Commercial application considered.

By C. S. Kegerreis

THE term "Hot Spot" is commonly applied to all forms of devices where the mixture is heated by means of the exhaust gases. Usually the entire mixture of fuel and air is so treated, and in many instances where this method is used an appreciable power loss is apparent. It is felt the ideal "hot spot" only heats and vaporizes the fuel after metering and on admixture with the air a fog mixture is effected.

One of the main purposes of a hot spot is to effect proper distribution of the charge. Dependent upon this factor is the state of the mixture at start of distribution. An immense amount of time and effort has been expended in designing manifolds for distribution of wet mixtures. Few have been successful. Tests have proven that with correct vaporization many distribution troubles were non-existent. Many designs result in excellent vaporization, but the point of application of the heat is wrong. Thus, proper vaporization must immediately follow the metering, and if these two factors are correct, then distribution is exceptionally simple.

To be commercially practicable any hot spot manifold must embody the following points:

1. Minimum temperatures to allow high power.
2. Effect distribution of foggy or dry mixtures of equal quantity and quality to each cylinder.
3. Allow instant acceleration without hot spot flooding.

If these requirements are fulfilled the fuel must be vaporized away from the air stream or else exceptionally fine atomization must be employed. This development deals with the type where all the fuel is vaporized away from the air stream and allowing for no atomization. If the atomization factor is desired, the final results can be applied by evaluating the fineness of the fuel particles in any case.

The data in the presentation is used only as a basis on which to show the method of computation and in all cases it is the result of tests gathered from various sources. No attempt is made to consider any but the main fundamentals and to show that it is possible to eliminate some experimental development.

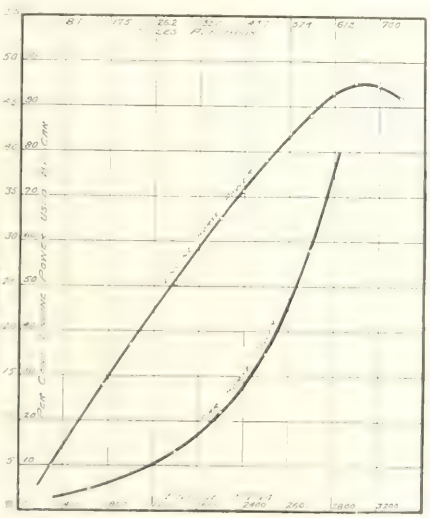


Fig. 1—Engine and car brake horsepower

The author wishes to express his appreciation to H. H. McCarty and W. B. Sanders, graduate students, for their assistance in assembling the data and making the computations of the results plotted in the graphs.

The engine and car used as a basis for the design is a composite of several. The vaporization data presented is taken from "Manifold Vaporization and Exhaust Gas Temperatures" (S.A.E. Paper). Other empirical results are derived from various tests wherever available.

The specifications of the composite engine and car is as follows:

Six-cylinder engine—$3\frac{1}{4}$" bore, $4\frac{1}{2}$" stroke.
Piston displacement—211.6 cubic inches.
Weight of car—3200 pounds.
Gear ratio—4.5 to 1.
33" wheels.

The performance which can be expected from this car is shown in Fig. 1. The values are approximate for operation on a paved level road. Information such as the thermal and volumetric efficiencies are necessary in connection with Fig. 1, to compute the fuel flow rate under the various operating speeds and loads. This data is presented in plot form in Figs. 2 and 3. It is true that the thermal efficiency varies with respect to speed at constant load, but for the purpose in view data is presented of a commercial engine at only one speed. We now have sufficient data for evaluating the fuel flow under any operating speed and load of the car or engine. The car data is presented in terms of engine r.p.m. Fig. 4 shows this relation for three engine conditions, low (0.1 load brake) half and full loads and also for car operation on a level road.

It is now found that there are three main factors which determine the hot spot area. They are heat, rate of fuel

[1] Annual meeting paper, March *Journal S. A. E.*, 1922. By O. C [illegible]

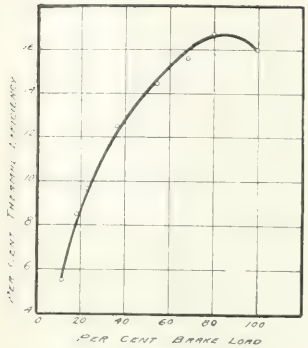
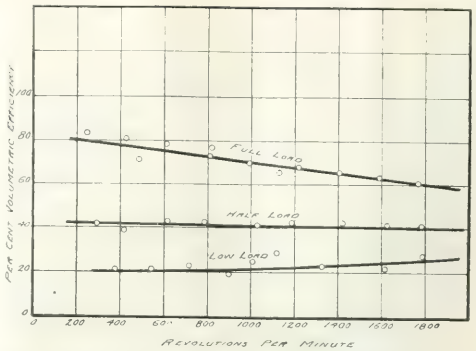


Fig. 2 (left)—Brake thermal efficiency at mixture ratio of .0800 pounds gasoline per lb. dry air (1000 r.p.m.)

Fig. 3 (right)—Volumetric efficiency of six-cylinder engine



vaporization and flow rate of fuel. The source of heat utilized is, of course, that of the exhaust. As the speed and load of the engine is changed, not only the amount of heat rejected in the exhaust, but the temperature of the exhaust is changed. Results from investigations at Purdue show that there is a definite relationship between this temperature and the fuel flow rate to the engine, considering a constant mixture ratio fed to the engine. Developing and recomputing this data for the sample engine this relation is presented graphically in Fig. 5.

In the original tests the curve was derived by plotting the results from tests at all conditions of speed and load operation with a constant ignition timing and mixture ratio. This data available, the results can be applied with a fair degree of accuracy to any ordinary powerplant. This has been done in Fig. 6, and the four points considered are shown. The question of heat being ample for the vaporization of the fuel is more difficult to evaluate and requires very complete tests. Several authorities agree that the supply is sufficient for designs of small utilization. That being the case, the larger engines would also provide an ample amount as the increased efficiency and design factors should not cause such a large change.

If the heat rejected to the exhaust is sufficient, and the temperature of the exhaust gases being a function of the fuel flow rate in throttling engines, some of the complexities vanish, leaving only one other variable—the rate of fuel vaporization. Distillation data does not suffice when applied to hot spot design. Distillation information tells us the relative volatility of any fuel and what temperatures are necessary for evaporation to dryness, yet it is the rate of vaporization per unit area with which a hot spot is concerned. The Station determined these rates for several fuels, the gist of which was published in the aforementioned[2] S.A.E. paper. The results for ordinary commercial gasoline of 56.5 Be′ is redrawn in Fig. 7.

A small difference at the lower temperatures causes a big change in the vaporization rate per square inch. At the maximum rates noted (about 500 deg. Fahr.) solid material was deposited showing that there are temperatures that are undesirable for hot spot use. Temperatures above this or in the spheroidal state are entirely free from this deposition. To more closely compare the results in Fig. 7, with the usual method, the distillation data follows:

Initial boiling point	96° F.
10	162
20	210
30	247
40	272
50	295
60	313
70	335
80	356
90	381
Max.	425

[2] Reprinted in AUTOMOTIVE INDUSTRIES, June 8, 1922.

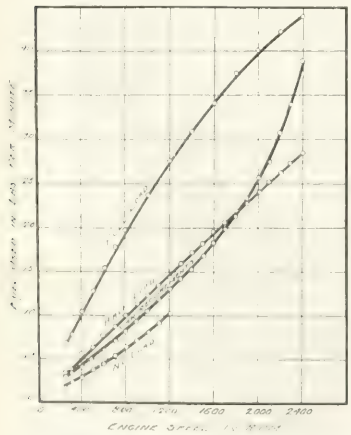


Fig. 4—Fuel consumption using 56 Be′ gasoline with mixture ratio of .0800 lbs. gasoline per lb. dry air

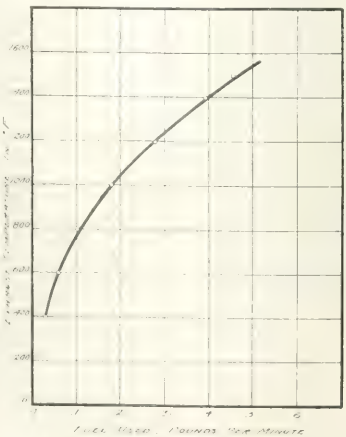


Fig. 5—Relation between exhaust gas temperature and fuel flow rate

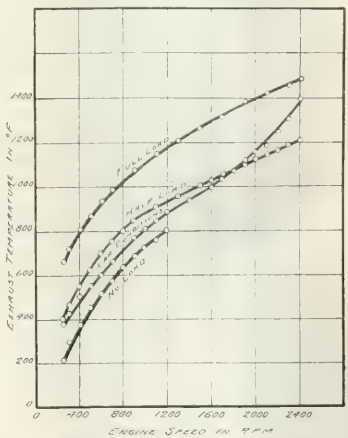


Fig. 6—Exhaust gas temperature at various conditions

The values of the rates of vaporization are reported at atmospheric pressure which would nearly conform to an engine operating at full load or accelerating rapidly. Under other conditions where the absolute pressure in the manifold is less, the vaporization would be higher. As an engine is continually accelerating or decelerating the manifold pressure is quite a variable, and as atmospheric pressure is approached as a limit this is the worst condition to be met. If the heated area is computed at atmospheric pressure any added vaporization the manifold may allow is a help, and in the type under discussion no overheating will develop.

If the three primary factors essential to determine the hot spot area are evaluated, the relation is simply expressed by the equation

$$A = \frac{F}{R}$$

Where

A is the hot spot area;
F, the fuel flow per unit of time;
R, the rate of vaporization per unit area.

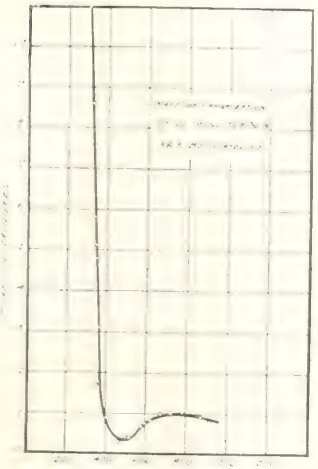


Fig. 7—Vaporization data of commercial gasoline

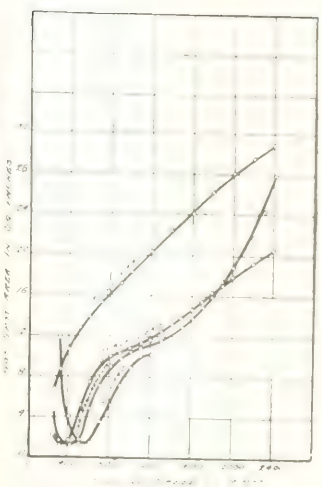


Fig. 8—Theoretical hot spot areas at atmospheric pressure

THE temperature of the exhaust gases being a variable and the rate of fuel vaporization depending on it, no definite area will suffice for all loads and speeds. For the power plant used, Fig. 8, shows the four points of operation previously explained. The hot spot area presupposes all the fuel vaporized by the hot spot and under actual exhaust temperatures. The curve for car operation is interesting, as the maximum area is not necessary for even prolonged idling in high gear. Of course, where low speed idling at no load is noted, the required area mounts rapidly.

In a practical example, where the manifold depression and the carbureter atomization are considered, foggy or even dry mixtures have been attained with a minimum area.

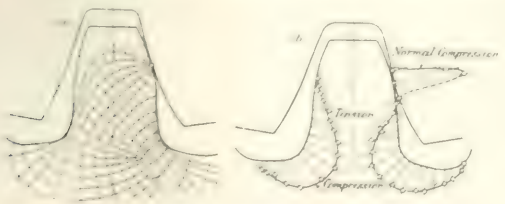
In any case it is not the low loads and the low speeds that cause trouble with hot spots, but more generally the acceleration after a period of idling. To be theoretically correct, the heated area should be changed with every variation of load or speed but for average operation this is folly. Even with poor carbureter atomization, 15 sq. in. of heated area should be amply sufficient for any condition that may arise during summer or winter operation.

When the art of carburetion is seriously considered as embracing the manifold system as well as the metering device, and these made to operate in harmony with the whole powerplant, each part so designed as to properly function, little apprehension of the heavier fuels looming in the future need be felt. When the fuels properly vaporized will travel 10 to 15 ft. in 10 deg. Fahr. air without condensing beyond the fog point it would seem sane to conceive that with suitable atomization for starting and correct application of heat satisfactory operation could be obtained throughout the year.

The data presented in this article is not final nor exceptionally conclusive, but it may prove of value in bringing to light some helpful points on hot spots and to show how badly research is needed to eliminate excessive experimental efforts.

Stress Distribution in Gear Teeth

PROF. E. G. COKER of England years ago developed a method of determining the distribution of stresses in power-transmitting members by means of celluloid models and polarized light, and he has since applied this method to the analysis of stresses in many common machine parts.



(a) Lines of principal stress in a tooth of a spur wheel. (b) Contour stress in the same tooth

In a paper which he read before the Institution of Mechanical Engineers at Paris recently he gave stress diagrams for spur gear teeth. A typical example of this kind is shown in the illustration herewith, in which the upper part of the diagram shows the lines of principal stress in a tooth, and the lower part the contour stresses with maximum values at the roots and at the surfaces in contact.

The stress distribution is obviously of a complicated character and it is apparent that the usual method of calculating the stresses in teeth by considering them as cantilevers can be only a very rough approximation. Of course the stress in the tooth varies as the line of contact shifts along the flank.

Will Truck and Motor Bus Design Change Radically in the Future?

British expert believes future changes will be minor in character. Two-wheel drive likely to continue in predominance. Lighter weight seems probable. Improved accessibility is desirable.

By Sir John E. Thornycroft*

IN addition to the limitations which may be imposed legally, resulting from taxation, limiting weight, speed, etc., the designer and builder may be limited by the impossibility of a particular fuel being available at economical prices. We are told that we only get supplies of American petrol in this country because we pay a higher price for it than they do in America. It seems doubtful if anyone really knows how long the supplies of petrol are going to meet the constantly increasing demands brought about by the ever-increasing number of motor vehicles. There can be no doubt that some form of petroleum spirit is by far the most convenient fuel. An average motor can be made to run reasonably well on kerosene by fitting a vaporizer, but it is necessarily less flexible and more trouble to drive.

In parts of the world where kerosene is materially cheaper than petrol, there are a fair number of vehicles using it, but it cannot be said there has been any general adoption, and there seems little doubt that, if petrol can be obtained at anything like a reasonable price, users will not put up with the extra trouble which a somewhat cheaper fuel entails. Where cheap alcohol is available, by increasing the compression of the motors they can be run on it quite well and, in the event of a world shortage of petroleum spirit, this must be looked upon as one of the best substitutes. Unfortunately, in this country the Excise Authorities have put great obstacles in the way of experimenting with alcohol, but there seems a prospect now of a specially prepared alcohol fuel, which has been produced in South Africa, being available here. Quite new methods of low temperature distillation of coal give promise of greater supplies of benzol which is, of course, an excellent substitute for petroleum spirit.

Theoretically, a very great gain in economy should be possible by running motors on producer gas made by burning anthracite or some similar fuel, and engineers are now experimenting and have shown that vehicles can be run with a modified form of the suction gas producer which is in very general service with small stationary power plants.

The inconvenience of handling solid fuel and the attendant trouble which must occur in looking after a fire seem, however, to make it improbable that gas producers will be used to any great extent in this country as long as there are supplies of petrol at the present prices, but, in parts of the world where petrol costs about twice or three times as much and is difficult to obtain, there would seem to be a probability of very considerable development, as in these undeveloped countries there are generally supplies of charcoal at a low price which forms perhaps the best possible fuel for a gas producer.

Having reviewed the present position, the writer will now consider in some detail the efforts that are being made by the designers of different types of vehicles to improve their efficiency.

Petrol Motor Vehicles

IT is common knowledge that an enormous number of alternative designs have been tried in recent years, but the one which has been generally adopted, as the result of practical experience, is that consisting of an internal combustion engine on the front of the vehicle placed over a steering axle, a disconnecting clutch and a change speed gear of the simplest possible form, namely a driving and driven shaft with gears of different ratios which can be slid in and out of mesh, the power being transmitted to the driving axle by a shaft operating a worm gear on the axle or by means of bevel drive. Chain gear is still employed in some cases but it is certain that it is being displaced by gear transmission.

There are, of course, a great many variations in the details of designs made on this general scheme, but it can be looked upon as the stereotyped design for a petrol vehicle or lorry to-day.

In considering the chances there are of any radical change one would ask, is it probable with increasing loads that builders will adopt a drive on all four wheels? Where vehicles are intended to run on made roads, in the writer's opinion, the complication of driving on more than one pair of wheels would always be a bar to the adoption of the system. For vehicles to run on un-made roads or across country, a 4-wheel drive has great advantages, but it is highly probable that, for these conditions, it will be more economical to use an ordinary lorry drawn by a special tractor.

If we assume that the vehicle will continue to be driven by one axle, what are the most likely features to be modified? Running costs are largely made up of fuel consumption and maintenance. There is no reason why a highly efficient motor and gearing should not exist with a minimum maintenance cost and with the best designs. It may be taken for granted that it does. But it is a very nice point for the designer so to proportion the parts of his mechanism that he does not make the size of the various parts of the mechanism so large, to reduce the stress and wear, that he unduly increases the weight of his machine and its consumption of fuel.

There are a great many lorries of foreign make, which

*Extract from paper read before the Institute of Transport Congress, England.

were purchased by the Government during the war, which are excellently but elaborately designed and which should have a long life, but which are not efficient from this cause. It is well known in the case of a petrol engine that there is still a considerable amount of energy, available in the fuel, wasted apart from the inevitable losses.

There have been innumerable schemes for improving the efficiency of the petrol engine but there has been no very great change since high-speed petrol motors were designed for cars and vehicles by De Dion-Bouton, and others.

There has, of course, been some improvement and, at the present day, the efficiency, as measured by ton miles per gallon of petrol, of different makes of vehicle varies very materially but, in view of the work which has already been done, it does not appear likely that we may look forward to any great improvement on the best of them in the near future. As regards transmission gears, every conceivable arrangement has been tried or patented but the simplest has survived. The epicyclic gear has, of course, had an enormous run when used as a single change of speed in the Ford, but has not been found satisfactory where more than one change is required, although it would appear in many ways to have advantages where constant changing is necessary.

The only alternative to the gear box transmissions, which is meeeting with any success for commercial vehicles, seems to be the Stevens' electric drive consisting of a continuous current generator driven direct from the motor and which, in turn, drives the axle by means of an electro motor coupled to it by a propeller shaft or other means. By a simple control the reverse and variations in torque are obtained, the speed of the vehicle being mainly varied by opening up or throttling the engine itself.

While the inevitable shock, which is often very small, of engaging the clutch and gear in the ordinary system is avoided and a very sweet drive obtained, the efficiency of the electric transmission is necessarily less than that of gear and a considerable additional weight is added to the vehicle. How far these are balanced by reduction in wear and tear is a matter for experience, but the designers of the system contend that there is an advantage on the side of the electric transmission.

Ease with which renewals and repairs can be effected is, of course, most important. It is found in practice that some designs which run quite well are most expensive to open up and repair. The repair question is looked at from a different point of view by the comparatively small owner to the users of large fleets as, in the case of large fleets, it is often customary to substitute complete new units, motor gear, transmission or axle. A design in which the unit can be removed with the minimum of labor is not necessarily one in which repairs can be easily effected to the units in position on the chassis. The ideal that designers should strive for is, no doubt, a combination of the best facilities for both alternatives of repair.

The leading British makers have not followed American designers in combining their engines and gear boxes. The arrangement has undoubted advantages in the first cost of manufacture and would seem, in many ways, theoretically right, but, so far, in practice it has not proved best for commercial vehicles. Many of the advantages of the combination of motor and gear box can be obtained by mounting the motor and a separate transmission gear on a common frame which can be fitted and removed as a whole from the chassis if desired, and, at the same time, admits of the separate removal or opening up of the gear box or engine in position if it is preferred to do so.

With regard to the motor itself, designers are continuously working to obtain greater economy, not only of fuel but of oil consumption. Probably every alternative valve position and gear has been tried as well as various types of sleeve-valve arrangement. The present record in this country is, however, held by what may be described as a well-designed normal type of motor with the inlet valve placed over the exhaust. In the hope of obtaining still better economy, on the Continent a number of engineers are working at engines with high compression and, in some cases, trying to use small motors of the pure Diesel type. If a small Diesel engine could be made with a considerable range of power and revolutions, it would, of course, be a great stride and not only most useful for motor vehicles but for all sorts of other purposes, but experience with motors of this type ranging over a number of years does not make it seem at all probable that we shall have motors of this type fitted to lorries at an early date.

The writer mentioned, at an early stage, the advantage which designers at the present day had of being able to employ greatly improved material, and it seems probable that we shall have the possibility of employing aluminum to a greater extent owing to the improvements in its alloys which are being made. A short time ago, it would have been looked upon as impossible to use cast aluminum road wheels, but they have been in service now with a number of vehicles with success for a considerable time. The extent to which its employment will increase will no doubt depend to a great extent on the price at which it will be produced in comparison with cast iron and steel. Coupled to some extent with the employment of aluminum for various parts of the lorry will be, it is thought, the use of pneumatic instead of solid rubber tires.

HERE is what an English expert thinks about motor truck and bus design. His views, while taken from the standpoint of British problems, are well worth the attention of American design and production men.

Several statements are made with which American engineers are likely to disagree.

The article is interesting as giving the ideas of an expert British observer about the future of commercial vehicle design.

The solid rubber tire not only enables increased speeds to be obtained but has enabled the structure of the vehicle to be made very much lighter than it would stand if it had to run without them and, if a pneumatic tire is employed, there is no doubt that there are parts of the vehicle at present made in steel which would hold up satisfactorily in a suitable aluminum alloy.

The relative advantages of solid versus pneumatic tires are difficult to decide. For passenger vehicles and lorries taking fairly heavy loads, with the present cost of pneumatic tires it seems very doubtful if they are worth while except in certain special cases. For the heavier loads, the pressures required in the tires are so great that the shocks to the road do not seem to be very much less.

It, therefore, might be argued that, from the point of view of damage to the road, there is little gain. From trials which have been made, it seems difficult to prove by measurement that the pneumatic tire greatly reduced the vertical motion of the vehicle by absorbing the bumps and inequalities in the road surface but there is no question that the sensation in a char-a-banc or lorry on pneumatic tires is very much easier and that, while there may not be a great difference in the actual motion, innumerable small jars and stresses which would be transmitted to the

vehicle are actually absorbed, although the vertical motion which is set up in the axle by passing over a bump does not die out so quickly as in the case of a solid-tired wheel.

Unless road authorities decide that much less damage is caused by pneumatic tires and obtain legislation to support them, it does not seem probable that there will be any greatly extended use for the heavier class of vehicles, failing a great reduction in their first cost and the lessening of some of the other disadvantages.

WHILE the designers of the chassis have been doing their best to save weight, with the exception of the London General Omnibus Co. and a few others, little has been done to improve the construction of the body work of passenger or goods vehicles. A great deal of this work has been left to the coach builder who, no longer having responsibility for the complete vehicle, seems to care very little what his part of it weighs. When goods are carried on a plain lorry platform, the weight is a small proportion of the load, but, in the case of a high-sided or box van, it becomes quite a large proportion.

The large carriers and railway companies are now finding it economical to make up their loads on special platforms or in containers which are handled by cranes or on wheel trolleys in the yards and depots and then placed completely laden on the chassis to be conveyed to another center. The weight of these containers is often a very large proportion of the load and to obtain really economical results with this system it is evident that considerable improvement must be made.

Mechanical handling devices are now being called for to a large extent, power tipping gears and cranes being the most frequent. With the petrol or electric vehicle, which is almost invariably driven by one man, devices of this sort are most valuable. With vehicles normally carrying two men, the handling of comparatively heavy loads is, of course, easier, provided both men help. Experience with these devices is hardly sufficient yet to say whether mechanical drive from the motor itself or the hydraulic system operated by a pump driven on the motor will prove best, but there seem to be indications that a hydraulic system is in favor, excepting for electric vehicles where an independent electric motor is obviously the most suitable. To keep the overall dimensions of a vehicle as small as possible is, of course, very important for traffic considerations and maneuvering in depots.

With a steam driven vehicle it is impossible to place the boiler below the carrying platform or body. Many of the earlier designers of internal combustion vehicles tried putting the motor as well as the gear below but, with somewhat unreliable motors, the practice was soon abandoned. Motors are now so reliable that it is less important to have such ready access, but it is still very desirable readily to be able to inspect them. There is no doubt that this is the reason for what may be looked upon as the present day standard design but, in the larger passenger vehicles and those for heavier loads, there is a tendency to give less space in the front of the vehicle to the motor and there is every probability of the arrangement in which the driver is placed alongside the motor instead of behind it, being further developed.

It will be gathered from the foregoing remarks that until the physicists and chemists discover some new source of energy or means of storing it, the writer does not think it probable that there will be any great change in the design of present-day road vehicles, and that engineers will have to content themselves with devoting their attention to improving details of design with a view to getting the best possible economy out of the fuel available and making the machines as simple as possible to maintain.

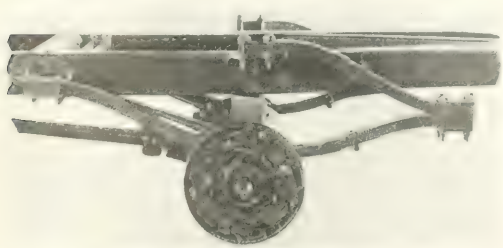
Unusual Spring Design in New Indiana Truck

THREE-QUARTER elliptic springs of unusual design are a feature of the new Indiana one-ton speed truck which will be known as the Highway Express. These springs are used in both front and rear. The construction is such that shackles and ground bolts are eliminated, thus making lubrication at these points unnecessary. The drive is through the springs and the driving strains are carried by a number of main plates instead of by one main plate as in the conventional construction.

The power plant is a four-cylinder Waukesha with $3^3/_4$-in. bore and $5^1/_4$-in. stroke. The carbureter is a Stromberg and ignition is by Bosch generator and distributor with Presto-Lite battery. Starting motor, motometer and electric horn are regular equipment. The clutch and gearset are mounted as a unit with the power plant and are of Brown-Lipe manufacture. The rear axle is a semi-floating type with spiral bevel drive. The pressed steel frame is 5 7/16 in. deep with $3^1/_4$-in. flanges. The wheelbase is 132 in. Disk steel wheels with 34 x 5 in. pneumatic tires are standard.

The capacity of the truck is 2000 lb. with a body allowance of 900 lb. The maximum speed is between 30 and 35 miles per hour. The engine speed at 33 miles per hour is 2000 r.p.m. The truck is said to have done 13.4 miles per gallon of gasoline on test.

The price is $1,425. The manufacturer is the Indiana Truck Corp.



Three-quarter elliptic springs used on new Indiana truck

Detailed Design Changes in Bethlehem Truck Models

THE use of a Wisconsin Parts Co. double reduction type axle, in place of the make formerly used, is the chief change to be noted in the new truck line just announced by the Bethlehem Motors Corporation. One-ton, 2-ton and 3-ton trucks comprise the Bethlehem line, the prices being $1,195, $1,595, and $2,195, respectively.

Electrical equipment is standard on all models. In addition to the axle change on the 2-ton job, two leaves have been added to the rear spring. The motors on all models are similar in construction, differing only in size. They are manufactured by the Bethlehem Motors Corp.

Automotive Industries
August 24, 1922

A New Method for Determining Engine Friction Losses

Method based on idea that friction couple varies with engine torque and consequently with mean effective pressure. Developed by G. Lumet, Laboratory Engineer of Automobile Club of France

WHILE the thermo-dynamic theory of the internal combustion engine is highly developed, the theory of the mechanical losses is in a rather embryonic state. This may be due to the multiplicity of the factors affecting the friction losses. A determination of these losses is, however, of considerable importance, as it furnishes a valuable criterion of the workmanship embodied in the engine.

In steam engine practice the friction losses are determined either by measuring the brake horsepower and the indicated horsepower at full load and taking the difference, or by measuring the indicated horsepower when running idle. The first named method is quite satisfactory as long as the indicator furnishes reliable cards, but the field of application of this method is limited by the limitations of the indicator. The second method is based on the assumption of equality of friction losses under full load and when idling, respectively, and this assumption is entirely unwarranted in the case of internal combustion engines. The application of this method is apt to give very deceptive results, and M. Witz, the well known French gas engine expert, who used this method, was led by it to ascribe to a certain engine a mechanical efficiency of 93.4 per cent at full load, whereas Prof. Riedler, whose competence in such matters he acknowledges, found a mechanical efficiency for an engine of practically the same size of only 83.1 per cent. The engines referred to were of 1500 hp. and such discrepancies as here mentioned are entirely too great to be passed by. In the first case the losses would have been 6.6 per cent and in the second case 16.9 per cent or nearly three times as great. The difference must have been largely due to errors inherent in the experimental methods employed.

A NEW method for determining friction losses has been proposed by G. Lumet, laboratory engineer of the Automobile Club of France, in a book entitled "General Investigations of the Influence on the Power of an Internal Combustion Engine and on Its Specific Fuel Consumption, of Different Modifications in Its Method of Operation." This method is based on the following idea: The friction couple varies with the engine couple or torque, and, consequently, with the mean effective pressure as determined from the indicator diagram, of which it is a linear function. By "mean effective pressure" is here meant the mean gaseous pressure in the cylinder throughout the four strokes of the cycle. The problem may be simplified by assuming that during the inlet and exhaust strokes the gas pressure within the cylinders is nil.

The research made by M. Lumet brought out the fact that it is absolutely necessary to take into consideration two other items of loss, the inertia forces and the so-called pumping losses. In measuring the friction losses the engine may be operated from an outside source of power in two different ways:

1—The cylinder being constantly in full communication with the atmosphere.

2—The cylinder drawing in, compressing, expanding and exhausting a charge of air.

Calculations based on the results of these tests were put in the following form:

In order to take account of the inertia forces, which may be expressed as a certain number of pounds per square inch of piston head area, the indicator diagram should be modified by adding the corresponding inertia forces algebraically at each point. That is, if the force of inertia is in the same direction as the gas pressure it should be added to the pressure indicated by the diagram, and if in the opposite direction it should be subtracted. If

$$p = p_g + p_i$$

is the instantaneous pressure thus obtained, the mean pressure of the modified diagram will be given by the expression

$$\frac{1}{V}\int_{r}^{l} p\, dv$$

taken successively for the four strokes of the cycle.

Let t_p be the resisting couple or torque corresponding to the pumping losses in test No. 2 and t_f the resisting torque due to the friction for any particular value of p. Under the conditions of test No. 1 we have

$$p = p_i;$$

that is, the mean pressure is due solely to the inertia, the gas pressure p_g being constantly nil. The resisting torque t_f' is due entirely to the friction.

Under the conditions of test No. 2 the pressure is p_i, but the couple due solely to the friction is not the resisting couple or torque t_f'' directly measured, but, rather, $t_f'' - t_p$. The equation of the straight line representing the friction in the coordinate system p, t_f is, therefore,

$$t_f = t_f' - \frac{t_f'' - t_p - t_f'}{p_i - p_i} + \frac{t_f'' - t_p - t_f'}{p_i - p_i}\, x \quad p = a + bp.$$

It is this equation which was verified experimentally by M. Lumet by measuring the values of t_f corresponding to different values of p for a large number of cases and by entirely different methods. This research showed that the expression

$$t_f = a + bp$$

represents the variation of the friction torque in a very satisfactory manner. In this equation t_f represents the total no-load torque, a and b are constants and p is the algebraic sum of the gas pressure and the inertia pressure averaged for the four strokes of the cycle.

Properties and Methods of Using Duralumin

This new aluminum alloy has about the same ultimate strength as structural steel, but weighs one-third as much. It can be heat-treated, rolled, stamped, cast, forged, welded and readily machined. Takes a durable polish and possesses physical characteristics which render it of potential value to the automotive industry.

DURALUMIN is a light alloy of aluminum whose striking properties were discovered in experiments and investigations carried on from 1903 to 1911 by A. Wilm, a German scientist. His work has since been supplemented by European and American scientists. Duralumin is the commercial name given to aluminum base alloys having a copper content up to approximately 4 per cent, and a magnesium content up to approximately 1 per cent. It also contains some manganese and is never found without impurities of iron and silicon.

Chemical and Physical Properties

The chemical composition of duralumin varies between the following limits which have been found to give the most satisfactory results:

Copper	3.5 to 4.5 per cent
Magnesium	0.2 to 0.75 per cent
Manganese	0.4 to 1.0 per cent
Aluminum	Balance (not less than 92 per cent)

The total impurities should not exceed 1 per cent.

The outstanding property of duralumin which makes it so very useful commercially is that it combines great strength with a very low specific gravity.

The following are some of its physical properties:

Specific gravity	2.8 to 2.85
Melting range, degrees Fahr.	1000 to 1200
Young's modulus, psi,* tempered	10,000,000
Compressive strength, psi, tempered	44,000
Shear strength, psi, tempered	30,000
Tensile strength, psi, tempered	50,000 to 60,000
Coef. of linear expansion	.0000126 F.
Per cent elongation in 2 in., tempered	16 to 20
Weight per cu. in. (assuming sp. gr. 2.80) lbs.	0.10101

The electrolytic metals negative to duralumin are copper, brass, bronze, iron and steel, and these metals should never be joined to duralumin where subject to moisture.

Another property which makes duralumin valuable commercially is that the metal will harden after heat treatment, but not until some time has elapsed. This permits working the metal into the desired shapes and flattening and straightening of the pieces where necessary, before hardening begins.

Due to the fact that duralumin is non-magnetic and since it resists corrosion of the atmosphere quite well, it is being used for compasses and similar instruments where this property would make its use beneficial. Duralumin is practically unaffected by the action of sea water, although under corresponding circumstances aluminum is quickly reduced to the white oxide. When buffed duralumin takes a very fine polish and is similar in this respect to silver, but, owing to its freedom to corrosion and the fact that it does not tarnish in the presence of sulphuretted hydrogen and similar gases, this surface lasts for a very considerable time before becoming dull.

Duralumin is less subject to corrosion after tempering than in the annealed, cast, or forged conditions.

As a result of welding and soldering the adjacent material is annealed. Without subsequent heat treating and with exposure to the salt spray test after the welding, it was noted that the adjacent plate was annealed along a parallel band, and that between the annealed and tempered material there appeared to be a band which was badly corroded. The welded joint did not corrode and the tempered material resisted the corrosion. Heat treating will correct the above difficulties and may follow directly after the welding.

Corrosion of duralumin can be deterred by the application of a thin coat of spar varnish which adds about 20 grams per square meter for both sides of the material.

A Good Conductor of Electricity

Duralumin is a good conductor of electricity, and in wet locations is subject to the injurious effects of electrolysis unless well grounded.

Paints containing metallic oxides, particularly those containing lead oxide and carbonate, such as white lead, red lead, etc., are liable to produce corrosive effects. Even the regular aircraft dope will give rise to slight surface corrosion if it contains chlorine compounds, such as tetra chlorethane, although this is not particularly serious due to the fact that there is only a small amount of chlorine present, hence progressive corrosion does not occur. It is best to use only bituminous varnish or some similar non-metallic coating.

The strength of duralumin depends not only upon its chemical composition but to a greater degree upon the heat treatment to which it is subjected. Tests show that when duralumin is quenched from temperatures up to 572 deg. Fahr. it is annealed and very much softened so that it can be cold worked. Quenching from higher temperatures up to about 970 deg. Fahr. results in an increase in the hardness. Beyond this temperature the hardness decreases rapidly, a dark gray coat of oxide is formed and the surface blisters. Fig. 1 shows the variation of tensile strength and elongation with temperature of heat treatment. It has been found that the tensile strength of duralumin varies almost directly as the hardness, and therefore the maximum hardness is

*The term psi is an abbreviation for pounds per square inch.

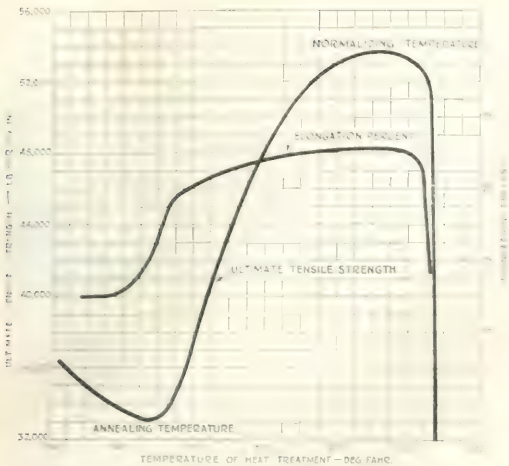


Fig. 1—Effect of heat treatment upon strength and elongation of duralumin

sought in order to obtain the strongest material.

A peculiar phenomenon exhibited by duralumin is the fact that immediately after quenching it is not very hard but the hardness increases with age for a period of about four days after which it is approximately constant.

Fig. 2 shows some gasoline tank ends which are approximately 36 in. in diameter. These tank ends have been spun on a lathe, and they show how easily the metal can be worked while in the softened condition. After aging they form an extremely strong and rigid member.

Tests have shown that when copper is present without magnesium or magnesium is present without copper the product is harder than pure aluminum, but that the maximum hardness is obtained when both are present. The hardening is analogous to that of steel which is due chiefly to the suppression of the cementite precipitation (pearlite). Similarly, the hardening of duralumin is due to the suppression of the precipitation of the eutectic $CuAl_2$ by sudden cooling, and the subsequent precipitation of that compound in highly dispersed form in the process of aging. It is the formation of this highly dispersed precipitate which causes the hardness. The function of the magnesium is not definitely known, but it is thought to be of secondary nature, aiding in the hardness caused by the copper. It may act in one or more of the following ways: (1) by removing the silicon by uniting with it to form Mg_2Si; (2) by hardening the aluminum matrix and thus affecting the dispersion of the Cu_2Al_3 precipitate; (3) by forming crystals of Mg_2Si which affect the formation of $CuAl_2$ crystals.

The following is taken from the Bulletin of the American Institute of Mining and Metallurgical Engineers:

"Duralumin after rolling shows a structure similar to that in Fig. 3, which is quite typical. Fig. 4 shows the same alloy at a higher magnification. Grains of aluminum (in which are dissolved Si, $CuAl_2$, and Mg_2Al) are surrounded by strings or islands of eutectic ($CuAl_2$—aluminum, FeAl—aluminum and possibly others), which are white in Fig. 3. Upon examination under a higher power, the eutectic is seen to consist of two constituents, one a brownish color, the other white. These two constituents are evident in Fig. 4, and have been identified as FeAl (brown) and $CuAl_2$ (white), respectively. Quite often the FeAl surrounds the $CuAl_2$, as is shown in the illustration.

Besides these two constituents, a third, of pronounced bluish color, is visible. This is readily distinguished under the microscope, not always so readily in a photograph: it is seen within an island of $CuAl_2$ in Fig. 5. It is believed that this is Mg_2Si; it occurs only in alloys containing magnesium.

"Samples, some of which had been treated at 932 deg. Fahr. quenched in water, and immediately etched, and some of which had been subsequently aged at 266 deg. Fahr., after identical treatment to develop maximum hardness, were carefully compared in their appearance after etching in the same solution (0.1 per cent NaOH) and for the same periods of time. No difference was observed in the structure nor in the general shades of the etched surfaces of the two groups of specimens."

Correct heat treatment is essential if the best properties of the metal are to be developed to their fullest extent. Unlike the corresponding treatments of steel the temperatures necessary are relatively low and easily controllable.

The best method of heating the material uniformly and satisfactorily is by means of a salt bath. This can be made up in a rectangular iron or steel trough, arranged in a brick setting, and partly filled with a mixture of potassium and sodium nitrates (equal proportions of each) over a covered heating furnace. It is found that the heat required to keep the bath at a constant temperature is greatly reduced if a sheet iron lid which is protected by a layer of asbestos is so arranged as to be capable of being lowered over the bath at such times as articles are not being put in and taken out of the furnace.

Accurate thermometers and pyrometers should be inserted in the salt mixture to insure its being heated to the correct temperatures.

The articles to be treated are left in the molten salts until they are uniformly heated to the proper temperature and are then withdrawn and quenched in water or oil.

It should be noted that no damage can occur to the material by leaving it in the bath for a longer period than is actually necessary, providing the temperature is kept constant. On the other hand, ample time should be allowed for the articles to heat through if the best results are to be obtained.

Annealing

Duralumin when treated in the normal manner becomes too hard to work satisfactorily in the cold state. Consequently, when any cold work is to be put on the



Fig. 2—Drum head spinnings made from duralumin



Fig.3



Fig.4

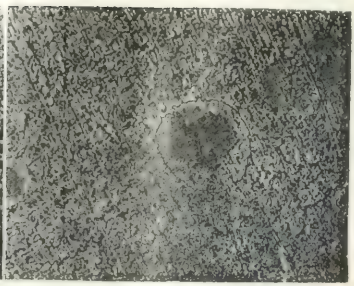


Fig.5

Figs. 3, 4 and 5—Micrographs showing physical structure of duralumin

material the latter must be annealed. Moreover, if considerable work must be done on it the material will, like brass, require annealing between successive operations. For such shapes as can be produced by a single operation of the dies annealing is not applied, but the material is heat treated or "normalized" (as described below), and the working follows while the material is still in the primary stages of the aging process.

For such pieces as cannot be produced in one single action, or with one single heating, the last heating should be the normalizing one. The product can be annealed many times without injury to the material. In any case the annealed product is finally subjected to normalizing in order to restore the original ductility and to slightly increase the other mechanical properties.

Normalizing or Tempering

Annealing is accomplished by immersion in the molten salts or in a suitable muffle furnace if the temperature can be regulated absolutely. The article to be annealed should be left in the bath for a period which can be roughly computed by the following rule: Take the least dimension of the article in inches, that is, the thickness in the case of plate, the diameter in the case of bar, etc. Calculate the square root of this dimension and multiply by 80, which will give the *minimum* number of minutes for which the article should be left in the bath. The temperature range should be from 662 to 716 deg. Fahr. At the end of the specified period the articles are taken out and quenched either in water or in a good quality oil or they can simply be air cooled. The working of the pieces should follow closely and should be completed within three hours due to the fact that the effect of the annealing goes fairly rapidly. The material at the end of three or four days after annealing returns to a semi-hard condition with an ultimate strength of about 42,000 lb. per sq. in.

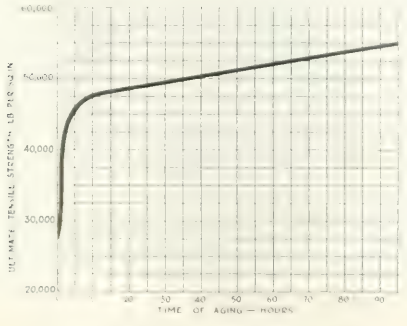


Fig. 6—Effect of aging upon tensile strength of duralumin

For final treatment the material should be uniformly heated to 842 or 932 deg. Fahr., and then quenched in water or a good quality oil. The time for which the material should be left in the bath for normalizing may be obtained by the following rule: Take the square root of the minimum dimension in inches and multiply this by 60, and the result will be the *minimum* number of minutes required.

As soon as the product is placed in the quenching bath it commences to harden and starts the aging process. This process results in the slow growth of the tensile strength, hardness and yield point, and the rapid growth of the per cent elongation. The aging starts at once and attains about one-half of its normal stable condition inside of the first half hour, progressively increasing therefrom for the next three hours, and slowly increasing thereafter for the next 96 hours. Very little increase is found after that time and 96 hours' duration after quenching is sufficient for tensile tests to be made of the material. A curve of the increase of tensile strength with aging is shown in Fig. 6.

Hardness Becomes Permanent

The peculiar behavior of duralumin in gradually hardening after heat treatment gave rise when the metal was first introduced to certain natural misgivings as to whether the material in the hardened condition would be permanent and stable, but a recent test on some of the material which had been exposed in the open for about eight years showed the same strength as was obtained within a week after treatment. These same specimens showed only a very faint discoloration due to the presence of ozide, although exposed in the open air alongside a dock where the atmosphere is naturally moist.

Bending or any similar work required should be completed within an hour after normalizing, but if it is delayed after this the cracking of the material may give trouble.

Rivets are always softened for use at the normalizing temperature and are rivetted up within one hour of the treatment.

This property of remaining soft immediately after the treatment and later hardening up makes duralumin unique among metals. Thin sections or plates often buckle or warp during heat treatment, but it is possible to straighten these by suitable dies or rolls while the metal is still soft. This is a particularly useful property in the case of members intended to take compressive loads, such as tubular struts. In the case of high tensile strength steel which, from the point of view of strength for a given weight, is often more economical than duralumin in tension, warping always occurs

in heat treatment. Hence, when used as struts, alloy steels are less reliable than duralumin, since in the hardened condition they can be made perfectly straight only with great difficulty.

If the metal is overheated to 1022 deg. Fahr. the strength falls off very rapidly, and the material becomes extremely hard and brittle. Even when treated between 968 and 1022 deg. Fahr. it is found that the metal is to a certain extent unreliable. For ordinary commercial purposes the most satisfactory results are obtained by fixing the temperature of treatment between the limits of 896 and 950 deg. Fahr. It is essential that an accurate pyrometer be used, and that the temperature of the bath be carefully controlled.

Since it is not practicable to raise and lower the temperature of the bath over a short period of time it is usual practice to either keep two baths running, one for annealing and the other for normalizing, or else to do all the annealing during the night and the normalizing during the day and in this way use the same bath for both.

It has been found that heat treating articles to 896 deg. Fahr., then quenching in water at room temperature, resulted in considerable buckling and twisting. The practice has therefore been modified so that articles are heat treated at about 915 deg. Fahr. and quenched in hot water, temperature about 194 deg. Fahr. This results in less warping.

Quenching

No difference is found in results from quenching in water or non-acid oil, but it is the practice to alter the quenching process to suit the ultimate handling of the pieces. If the pieces are to be formed or worked the quenching medium is kept at a temperature of about 212 deg. Fahr., or that of boiling water, since the aging is somewhat retarded in this way. This method affords an opportunity to form or shape the product before the maximum aging condition is reached. Mechanical working of the piece also hastens the aging process.

If the pieces are not to be worked after quenching the latter may be carried out at ordinary room or shop temperature. Aging may be extremely hastened by allowing the pieces to cool off in the quenching bath for two or three hours, either in hot or cold mediums.

Quenching in cold water leaves the metal softer immediately thereafter than does quenching in boiling water. Oil leaves the metal slightly harder than cold water, but softer than boiling water. Very little difference is noted after the first day's aging. The yield point, ultimate tensile strength, elongation and reduction of area are all practically the same after fully aging.

For parts which are to be worked immediately after heat treatment, where the working will take but a short time and where slight warping will be immaterial, cold water should be used as a quenching medium for by its use maximum softness can be obtained. For quenching of pieces that slight warping might injure, boiling water or oil should be used. Oil[8] is not as satisfactory as boiling water where the parts have been heated in the nitrate bath, since the nitrate must be removed by washing in water after the pieces are taken from the oil. However, oil is more desirable when heating is done in an electric furnace since the oil does not have to be heated for its successful use.

[8]Some of the qualities necessary in a satisfactory quenching oil are:
1. Suitable quenching speed.
2. Uniformity of quenching speed at various oil temperatures from room temperature to about 250 deg. Fahr.
3. High flash and fire points.
4. Stability of qualities after continued use or storage (freedom from change by distillation, oxidation, or other changes in presence of moisture, etc.)
5. Freedom from corrosive elements.
6. Freedom from objectionable odors.
7. Uniformity of supply (batches purchased at diverse times should have the same quenching speed and other qualities.)
8. Stability. Mineral oils are liable to deteriorate by oxidation; by polymerization of the lighter constituents. This may change the flash point which will change the quenching speed of the oil. Service tests combine these difficulties. Flash and fire points, viscosity, and specific heat, when new do not fully indicate the stability of the oil. An actual service test for a given period of time is at present the best standard in the selection

Heat Treatment for Forging, Stamping, Etc.

The material should be heated in a muffle oven to a temperature of between 716 and 788 deg. Fahr., and since it is essential that the temperature remain within these limits a pyrometer should be arranged to record the temperature.

It is sometimes found, however, that owing to the distribution of the stamps it is not always convenient to have a muffle that will serve all sizes of stamps. In these cases the stampers build up a Smith's hearth and heat the end of thee bar prior to forging, in which case it is impossible to have a pyrometer which will show the actual temperature. However, the stamper soon ascertains by experience the correct temperature. Trials may be made with paper, the approximate temperature being such that it will brown a piece of ordinary newspaper.

The forging and stamping work should be done as soon as the metal leaves the muffle. No definite rule can be given as to the time when the metal requires reheating, but it soon becomes evident when the metal becomes too cold as it will give a decided ring and will probably crack.

It is essential that a temperature of 788 deg. Fahr. should not be exceeded otherwise cracks will be caused.

The final heat treatment of drop forgings should always be carried out in the salt bath, and not in the muffle furnace as it is practically impossible to insure all parts of a muffle furnace being at a temperature such as recorded by the pyrometer.



Fig. 7—Rough duralumin forging. Fig. 8—Finished forging for Cadillac hood catch. Fig. 10—Airplane throttle control in which the bolt and wing nut are duralumin forgings and the spring and other parts are made from sheet rolled from the same alloy

Figs. 7 and 8 show an adaptation of duralumin to the automotive field. Fig. 7 shows a Cadillac hood clamp which has been drop forged. Fig. 8 shows the same clamp after grinding and buffing. No further finish need be given after a thorough buffing which leaves the piece perfectly smooth and with a mirror-like surface very similar to a bright silver plating. This surface resists corrosion and holds its finish for a long while without the application of any protecting coating. Since duralumin furnishes a very light, strong, easily finished material which does not corrode in the atmosphere, it seems logical that its use will become varied and wide in the automotive field.

Duralumin can be cast and is free from blow holes. Everything in the form of scrap duralumin can be melted and cast. It has been found that this material on cast-

ing has shown a slight loss in magnesium content. This loss seems to run pretty nearly the same and hence sufficient magnesium can be added in the form of aluminum magnesium alloy to assure a correct chemical composition. The molten metal is thoroughly skimmed just prior to casting. No flux or protective coating need be used. The casting temperature is about 1300 deg. Fahr. Cast iron molds are employed.

Welding and Soldering

Preliminary tests with soldered joints indicate that this process will not be generally employed due to the fact that local heating anneals the adjacent duralumin and leaves it subject to corrosion, as already noted. This annealed duralumin cannot be normalized, due to the fact that the heat treatment would melt the solder. Acetylene welded joints are possible, and are made with the use of a duralumin flux. The heat of the welding anneals the adjacent duralumin, but this can be renormalized since the heat treatment will not melt the weld.

Welded joints have shown an efficiency of about 70 per cent after heat treating the piece and dressing down the weld to the same gage as the surrounding plate.

Influence of Heat and Cold

Heat has an important influence on the strength of duralumin. According to the results obtained in tests by the Central Bureau for Scientific Investigation, Neubabelsberg, when heated the strength decreases 10 per cent for an increase in temperature of 212 deg. Fahr. and about 20 per cent for an increase of 300 deg. Fahr. The loss of strength increases with the increase of temperature. The elongation increases on first heating to a hardly appreciable extent, while between 300 and 392 deg. Fahr. it decreases. At 482 deg. Fahr. the elongation becomes the same as at room temperatures. Consequently, whenever duralumin is exposed to heat the possible decrease of strength should always be considered.

As opposed to the foregoing the influence of cooling upon the strength properties is less unfavorable. The Central Bureau for Scientific Investigation has made tests on this also. The strength and elongation increase somewhat with the decrease in temperature. The work represented by a blow in the impact tests is not decreased when the material is affected by cold so that one can safely assume that reasonable decreases in temperature have no unfavorable influence on duralumin.

Plate Rolling

The metal is most widely used in plate or in articles made from plate. Plate is produced directly from the ingot. After thorough preheating the ingot is passed through the plate rolls until the plate is reduced to the desired gage. If necessary the plate is trimmed and annealed between rollings. Table 1 shows how the tensile strength, hardness and yield point increase, while at the same time the ductility decreases with rolling.

TABLE 1

Tensile lb. per sq. in.	Yield Point, lb.per sq. in.	Brinell Test, 10 mm. ball, 500 kg. load	Elongation, per cent in 2 in.
30,000	20,000	50 to 60	20 to 15
35,000	25,000	60 to 70	15 to 5
40,000	30,000	70 to 80	5 to 2.5
45,000	35,000	80 to 90	2.5 to 2.0
50,000	40,000	90 to 100	2.0 to 1.5
55,000	45,000	100 to 110	1.5 to 1.0

Tempered plate can be punched, sheared, drilled or faced with no injury to the mechanical properties, but injury will result if it is flanged or bent to a 90 deg. angle without providing an easy radius. The latter is, at the minimum, twice the gage of the plate. Only slight difference is found in the mechanical properties of plate relative to the directions of tests, whether across or along the direction of rolling, or between the relative strength of punched and drilled holes. However, it is known that products, the parent plate material of which showed 18 per cent elongation, have only about 10 per cent elongation after they are finished. Such reduction is due to the working of the material, and is accompanied by an increased hardness. Tempered plate is generally buckled due to the aging.

Cold Rolling Tempered Plate

Cold rolling tempered plate will take most of the buckling out, but the elongation will be lowered. At the same time the tensile strength, hardness and yield point will increase.

Table 2 shows the approximate effects of cold rolling tempered plate.

TABLE 2

Tensile lb. per sq. in.	Yield Point, lb. per sq. in.	Brinell Test, 10 mm. ball, 500 kg. load	Elongation, per cent in 2 in.
60,000	35,000	110 to 120	15 to 12
65,000	50,000	120 to 130	12 to 5
70,000	60,000	130 to 140	5 to 2
75,000	70,000	140 to 160	2 to 1

The original ductility can be restored by again heat treating. This material, as well as that which has not been rerolled cold, should not be bent at a sharp angle. Both tempered and rerolled tempered material should be annealed before placing in forming dies which are to materially change the section or shape.

By passing tempered plate while cold through the rolls only once the elongation is found to decrease about 12 per cent in the case of the thin gages, but the buckling will be taken out of the plate and the gage reduced by about 0.001 in. No added heat treating will be necessary.

The rolled sections are produced from slitted plates. These strips are spooled and heat treated just prior to rolling. The treated strip is placed in the rolls while in the softened condition, and progresses from the elementary crimping set to the final finishing set in one operation. The strip and the developing section must be held laterally by roller guides. As the working is done while the aging is proceeding, internal stresses in the metal sometimes cause the finished pieces to be twisted, warped, or buckled, regularly or in waves. If this difficulty occurs in long regular waves the piece can be straightened by stretching, but the piece should not be stretched to more than 1.5 per cent of its original length.

Rolled Sections

It is more difficult to produce sections having flat sides, prescribed radii, and a well-defined contour in gages over 0.050 in. than in lighter gages. One stated requirement for rolled sections is that it must be possible to flatten out the section without developing cracks along the bend lines. It has been found possible to flatten out the rolled section having a gage of 0.079 in. and a radius of 0.175 in. inside of the section without cracking along the bend lines.

Whatever tolerances are applied to the rolled section should be applied to the parent plate for gage, to the strip for area, width and weight and to the finished section for height, width and slope of sides.

Rolled sections should not be bent at an angle up or down from the plane of the web, but the offset should be accomplished by means of an arc having not less than an 8-in. radius.

All pieces that are formed by dies should be inspected after production and after piercing, and pieces that show eccentric forming, eccentric piercing or that are cracked in any way should be discarded.

Wire, Rod, Rivets and Screws

Drawn wire of duralumin, tempered, shows a shear value ranging from 23,500 psi to 35,500 psi with an average of about 30,000 psi, and a tensile strength slightly higher than that of tempered plate. Rods are rolled or extruded and are used for forgings.

The drawn wire is used mostly for rivets, which are stamped in dies from annealed wire in coils. It is found that such rivets should not have flat heads due to cracking on the periphery of the head, but that button heads can be produced without suffering from this defect.

Preliminary investigation has shown that threads can be cut on the rod with ordinary hand dies, but better results are obtained by the use of the automatic screw machines in which the dies automatically recede from the rod on the return. Plenty of kerosene should be used as a lubricant in threading. It has also been found that paraffin forms a very good tool cooler in screwing or finishing machine parts of duralumin since it leaves an excellent surface.

The metal can be turned and machined at the same speed as brass, and it is found that it does not seize or drag the tool as do most other aluminum alloys.

Wood screws are rolled from the rod or produced in automatic machines. Tempered rod provides the cleanest threads.

Bars up to 2.5 in. are extruded. Over this size they are hammered. The latter are generally in the annealed state. Tubes of thin wall gage are drawn from the solid bar, and those of heavy gage, about 0.125 in., are extruded.

Strength Comparison

During a tensile test on duralumin it is often noticed that at loads of about 20,000 psi and over, a small extension takes place. When the metal was first used this gave rise to the belief that the yield point of the metal was abnormally low. Subsequent investigation has shown, however, that duralumin has several "false yield points." As the load is applied the material suddenly yields slightly at a low load, but instead of this yield continuing the metal remains elastic, and finally the true elastic limit and yield point occur in the neighborhood of a load of 32,000 psi. Often several such false yield points occur before the true yield point is reached. If the load is removed afterwards the yield at these lower values remains as a permanent set in the material; if the load is reapplied they do not occur again, the material obeying Hook's Law right up to the elastic limit.

A Stress Strain Curve Is Shown in Fig. 9

These false yields seem to be in the nature of molecular adjustments in the material under action of the load. This must, in practice, be looked upon as a useful property of the metal particularly when under the action of compressive load. If an ordinary material, such as steel, is tested in the form of a strut, large variations in the crippling loads are obtained unless the material is absolutely homogeneous, and axially loaded in all cases. In the case of duralumin struts much more uniform results are obtained, the reason being, perhaps, that the presence of these false yield points enables the material to adjust itself, to a certain extent, to the load placed on it.

Exactly similar effects probably occur when local stresses are high, as in the neighborhood of bolt holes, etc., the material adjusting itself to the load and at the same time retaining its elastic properties.

Thin plate is found to be stronger per unit than the heavier gages, and for this reason all test pieces from different sources should be similar. A comparison between the mechanical properties of the alloy in its different conditions is shown in Table 3.

TABLE 3

Condition Tested	Tensile lb. per sq. in	Yield Point, lb. per sq. in.	Brinell 10 mm. ball 500 kg.	Shore Test	Elongation, per cent in 2 in.
As rolled...	40-55,000	20-45,000	75 to 100	30-45	2 to 5
Tempered X	50-55,000	23-28,000	85 to 100	30-40	16 to 20
Tempered Y	55-60,000	25-30,000	85 to 105	30-40	18 to 20
Annealed ..	28-35,000	15-18,000	48 to 70	17-30	14 to 20
Temp. Roll Z	60-75,000	35-50,000	110 to 150	35-50	10 to 1

Condition X is for thicker gages, from about 2 mm. up to 0.25 in., and Y is for thin gages. Condition Z is

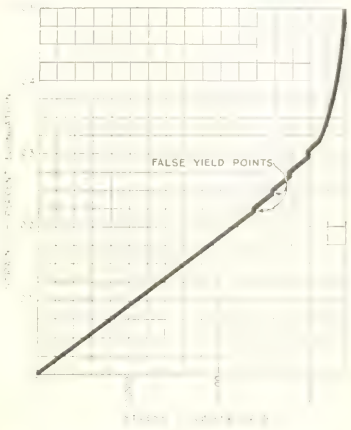


Fig. 9—Stress-strain diagram, showing false yield points

for the cold rolled material which has not had its original ductility restored by heat treating after the rerolling.

Tension Members and Riveted Joints

The full tensile strength of approximately 55,000 psi can be relied on with confidence, and duralumin can be used for any part in which a combination of strength and lightness is desired. It should be noted, however, that where small holes are drilled in thin material, a small reduction in strength of the material surrounding the holes occurs, this probably being due to the heat produced by the drill.

The bearing pressure allowed on the rivets should not exceed 70,000 psi; above this elongation of the hole occurs. An ultimate shear of 24,000 psi can be allowed with confidence on the rivets in single shear.

These figures are based on two-thirds the corresponding strengths obtained as a result of tests of riveted joints of different proportions. Since for efficiency it is essential that ultimate failure should as far as possible be by shear, with the very thin plates and members usually found in duralumin construction, it is preferable to use a large number of small rivets rather than a few of large diameter.

From the standpoint of strength for a given weight duralumin, except in certain special cases, gives much better results than high strength steel or wood when similar members in each material are actually tested in compression.

THIS is due to the fact that high strength steel usually depends for its strength upon heat treatment and this same heat treatment usually causes warping, which very greatly reduces the strength in compression. As has already been mentioned duralumin can be worked for an hour after final treatment and hence can be made perfectly straight after treatment. In the case of timber struts, although theoretically these should be lighter for a given strength, it is found in practice that, except in special cases, owing to the reliability of the material being less, one cannot adopt such refinements in reducing weight as is possible in the case of duralumin. Hence the final weight in the case of a timber strut for a given strength is usually much greater than in the case of one of duralumin.

The ultimate tensile strength of duralumin is between 50,000 and 60,000 psi, which is the same value specified for structural steel. Its specific gravity is about one-third that of steel. It is this combination of strength with light weight that gives duralumin its value as a structural material. Naturally it has found its chief use up to the present in the construction of aircraft.

Fig. 10 gives an idea of the variety of uses to which duralumin can be put. The device shown is a standard throttle and spark control for an airplane, which is made entirely of duralumin with the exception of the tops of the levers, which are of wood. The bolt and wing nut are drop forgings of duralumin. The springs, housing and levers are made up from sheet duralumin. The whole device is fully as serviceable, and weighs only one-third as much as the old type which was made up of sheet steel.

Duralumin was first used in the framework of dirigibles by the Germans, who soon were followed by the British. More recently it has been used in heavier-than-air craft, first, for struts and booms and now for the wings themselves. An example of this type of construction is the German airplane brought to this country a few months ago, which was constructed entirely of duralumin. Undoubtedly the use of duralumin is only in its infancy and when its manufacture has become better standardized it will displace other materials in quite varied uses.

A Bandit-Proof Truck Body

AN armored truck body has been developed for use by banks, chain store organizations, trust companies, and industrial concerns which find it necessary to transport large sums of money from one place to another.

The appearance is somewhat similar to the ordinary light delivery body. The entire interior is lined with a light tough bullet-proof steel, capable of resisting the largest revolver bullet at close range. All the windows, windshields and portholes are fitted with shatterless bullet-proof glass, and the windows and porthole shutters are fitted with geared window lifts to hold them in any position desired. No running boards, door handles or other unnecessary projections are afforded the thug who attempts to hold up the truck while in motion. A step is provided at the entrance door of course, but it automatically folds up when the door is closed. In place of the usual seat in the cab running its entire width, a single driver's seat is provided, which makes available a space for a locked door connecting the cab with the body.



An armored, bandit-proof truck body

The inside of the body is provided with folding cushion seats, dome lamps, ventilators in the roof, and an exhaust heater for use in cold weather. Several rifles and revolvers are supported on convenient racks, and are kept loaded for instant action. The six port holes provided, including one opening back of the cab, give ample range to reach any point, near or distant, on all sides of the truck. An extra emergency brake is fitted inside the body operating independently of the cab controls, so that the men in the body have control over the truck in case of accident to the driver.

The body is mounted on a standard Mack chassis equipped with rubber shock insulators. It is being built for the Mack Company by the Metropolitan Body Co.

Organization of Aerial Mails in Argentine

IN order to develop the aviation branch of the Argentine Army and to provide at the same time an improved air service from the capitol to the smaller commercial centers, the Director of Aeronautic Service has suggested the establishment of an aerial mail system by co-operation between the Ministry of War and the Director General of Post Offices & Telegraphs, the Department of Commerce is advised by Vice Consul Houlahan, Buenos Aires.

The plan meets with the approval of the Ministry of War and the Postal Administration, but the latter has stipulated that the administration of the service in peace times shall be under the exclusive jurisdiction of the Post Office Department, since that branch of the government would be responsible to the public under ordinary conditions. The suggested route from Buenos Aires includes the cities of Azul, Bahia Blanca, Patagones, San Antonio Oeste, Rawson, Comodoro Rivadavia, Rio Gallegos and Ushuaia.

A joint committee is now preparing a detailed plan, including the schedule of delivieries, time of flights, mail capacity for each trip, charges, etc.

Chauffeur Bribing Hinders Car Sales in Japan

U. S. Trade Commissioner says American manufacturers should agree on fixed selling price and then uniformly get behind Japanese dealers. Many cars are represented in name only. Dealers needed outside of Tokyo. Good roads campaign has been launched

By William I. Irvine*

CHIEF among the handicaps to the development of motor transportation is the lack of preparedness of the country.

The existing narrow, dirt roads suitable for motor traffic are few in number and comparable to the secondary roads in the United States. A national road policy has been launched which will cover a period of thirty years and involve the expenditure of 270,000,000 yen ($135,000,000) in the six principal cities alone. The building of new highways in the country districts will be slow and very costly for the reason that their construction means the purchasing of adjacent paddy fields, and the buying and condemning of thousands of houses in the cities.

High fuel costs are another detriment to the more general use of motor vehicles, for, because of the poor roads and traffic conditions, more fuel is required for an equal mileage than in the United States. Gasoline at presents sells for 62 cents a gallon at the distributing companies, but garages generally charge 67 to 80 cents and in the smaller cities it sells for 75 to 80 cents. About 40 per cent of the fuel consumed is produced in Japan and compares favorably with the imported product. Gasoline is sold at a regulated price by all companies and it is agreed that the price must always be about 50 cents. Most of the gasoline consumed in Japan is used by motor boat and stationary engines, so that increased sales to motor vehicle owners through lower prices is no argument to fuel men.

Development of the Market

Next to poor roads the greatest obstacle to the development of the motor industry in Japan is the chauffeur evil, which is present in its most virulent form and prevents cars being sold on their merits. Motor car salesmen assiduously court the chauffeurs, because practically every car is sold on the chauffeur's decision, which is in turn influenced by the largest commission offered by the dealer.

The fault of this system cannot be laid entirely on the dealers, but must be shared by the manufacturers, who, by not making a more determined effort to fix the resale prices of their vehicles, force the distributor to follow the line of least resistance in order to get the business.

Only one motor car manufacturer has insisted on the fixed selling price and despite all claims that this was impossible, his policy has been successful.

This is a question which American manufacturers should immediately agree on and then uniformly get behind their dealers, for left to themselves to break the evil, the dealers will be a long time doing it, if at all, during a couple of decades.

Many Makes Represented in Name Only

The limited number of responsible dealers in Japan is one of the greatest obstacles to the expansion of the use of motor vehicles. Many American manufacturers are represented in name only and not in face. There are at present barely more than a dozen responsible dealers—who represent hundreds of American and European cars. The result is that only those cars are pushed that offer the least sales resistance. With the exception of two dealers, they are all located in Tokyo—with a territory over 1600 miles in length to be covered.

There are very few branches and only one company has sub-agencies over the empire.

It is a certain conviction that more cars could be sold if the dealers would extend themselves instead of concentrating in Tokyo. It would be advisable for American manufacturers' representatives to place the agencies with a new motor selling company, backed by people in other lines of business, with a capable transportation man at the head of it. This would be far better than the present method of canvassing active motor car dealers and adding another car agency to the long list already on hand.

Business on a confirmed credit basis is generally satisfactory with Japanese dealers, as the banks are well able and willing to finance reasonable risks, relying more on the name and character of the firm than the nature of the business. It is an advantage from this phase to be connected with one of the old family firms of Japan whose activities and interests touch every ramification of the empire. European manufacturers appear to be in accord with manufacturers in the United States, by demanding cash against documents and usually on irrevocable credits.

Many manufacturers are represented by more commission houses who make no effort to push an agency beyond taking orders. Such manufacturers should immediately remove their agencies and seek for a more active dealer. Even the large family firms of Japan give the wrong impression of representation, for although they

*Trade Commissioner. Article released through courtesy of Automotive Division, Bureau of Foreign and Domestic Commerce.

are represented all over the empire, they rarely have a separate motor organization in all places and their local agents are merely order takers.

There is not an American or European car in Japan which sells for less than $950. Although dealers are reluctant to give their figures that make up the selling price of their cars, a hypothetical case, verified by two dealers, shows that a car selling for $1,300 in the United States, sells for about $2,500 in Japan. The asking price is generally $500 higher in order to make allowances for the chauffeur's commission and for the customary bargaining with the buyer. The high cost of bodies also affects the excessive price. Comparatively few cars are imported with bodies, each dealer having his own body building plant. All dealers charge excessively for bodies and still claim to be building at a loss. Many dealers agree that it would best to have a central body building plant and thus cut down the selling price of all cars as well as doing away with the unnecessary dealers' losses.

Education on the Utility of Cars Necessary

Passenger cars are still considered a luxury in Japan, and even motor trucks are considered as an unnecessary asset to a business. This can plainly be seen from the motor vehicle taxation in Tokyo, where passenger cars of over 20 hp. are taxed over $590 per year. (See Commerce Reports, May 15, 1922, page 402.) American manufacturers may assist their representatives in fighting these high taxes by an educational campaign on the utility value of the motor car.

The car owners in Japan are far more wealthy than the average car owner in the United States, and the ownership of a motor car is a sure sign of wealth. Thousands of Japanese with good incomes feel that they cannot afford to own a car and so they hire cars—with the result that over 40 per cent of the cars in Japan are owned by hire shops.

The Need of United Action

The present time is propitious for American manufacturers to unite their efforts and develop the Japanese automotive market. The number of dealers is few, owing to the collapse of many houses after the post-war boom had given out and it should be easy for American manufacturers to aid the dealers in organizing as an association and combine their efforts toward a reduction of taxes and assist the good roads movement. The most important step is the establishment of fixed prices on all American cars sold in Japan, thus doing away with the chauffeur evil and lowering the selling price and increasing sales.

Japan should also be divided into at least two sections with individual representatives in each one, and branch agencies all over the empire. The Japanese are nature loving people, and will suffer a great deal of inconvenience to visit the famous beauty spots of the islands and were roads suitable to motor traffic and motoring costs lowered, the market for motor cars from this source would satisfy the most ambitious exporter.

Mr. Irvine has furnished the Bureau with a revised and complete list of automotive importers and dealers in Japan, which may be secured from the Bureau of Foreign and Domestic Commerce or any of its district or co-operative offices by requesting Automotive Products —Importers and Dealers in Japan, FE 11003-B.

Hardly a Top Down



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This picture visualizes the trend toward permanent tops or closed cars which has been in evidence for the last several years. There are still numerous problems of design and production to be solved before the public demand for permanent protection can be adequately met at the proper price, but engineers and sales managers are both thinking along these lines

What Highway Transport Education Means to the Automotive Industry

Highway Education Board has made definite progress since its organization two years ago. Educational work in safety, traffic, transport, and highway economics has been forwarded. College course for transport engineers herein outlined and described.

By Roy Chapin *

TWENTY-FIVE years ago the symbol of messenger service was a boy running along the road carrying a letter. Times and the custom changed and the artist began to visualize the boy as riding a bicycle.

A few days ago the post office department of the government again broadened our concept by changing the machine pictured on the special delivery stamp from bicycle to motorcycle, and it is strikingly significant of the humdrum, everyday part which the modern agency of highway transport has come to play that the change created little or no attention.

Yet the same causes which brought about a revision of the special delivery stamp are to-day exerting a profound and far-reaching influence on the mental attitude of the nation toward transport and in no field is this disclosed in a more fascinating or in a more fundamental manner than in education.

True education seeks to tell us the meaning of those things which constitute the fabric of our daily life. At first we are content with surface impressions, but as we grow the task of the educator becomes one of searching out principles and of interpreting them to us.

Consequently, he who would best perform this duty must be constantly on the alert to discover new tendencies and movements, in order that those who are to be the citizens of the future may properly evaluate their influences and effects.

For the purposes of this article we are concerned only with that segment of progress which is highway transport, but in the advance which has been made in this field in the past ten years, we have an influence which is destined to play perhaps a larger part in the life of the nation than that occupied by any form of transport now perfected.

The development of the modern motor vehicle has brought with it a complete overturn in many of our traditional habits and customs and still we stand but at the threshold. No evolution of national import can be brought about without a concurrent change in social, legislative, physical and educational practice and the problems so brought out can only be met by a thorough and exhaustive probing into underlying facts.

Two years ago, realizing these truths as applied to the evolution of highway transport, the then United States Commissioner of Education, Dr. P. P. Claxton, called together a group of governmental, educational and industrial authorities to consider the whole problem and to see if a reasoned program could not be worked out which would acquaint the whole public with the situation as a few leaders then saw it.

As the Commissioner saw the problem it was one which called for a revision of our entire educational program, in order that education might continue to fulfill its purpose by interpreting this phase of our everyday life to all of us. How clear his vision was is most easily determined by a review of the events which have followed:

The preliminary conference in Washington lasted two days, at the close of which those present recommended that there should be set up in Washington a permanent committee having to do with highway and highway transport education and charged with the task of compiling and distributing relevant data.

In order that the committee might be inclusive of all of the principal sources of information material, representatives were named from the Bureau of Public Roads, Bureau of Education, and the War Department, representing the national government; from the American Association of State Highway Officials, representing the states; from the Society for the Promotion of Engineering Education, representing engineering education; and from the National Automobile Chamber of Commerce, and the Rubber Association, representing industry. Later, the Society of Automotive Engineers was invited to participate as representing the technical side of industry.

A Definite Program Formulated

The next step was the formulation of a definite program, which was accomplished under the direction of Prof. C. J. Tilden of Yale University, who was granted leave of absence from that institution for the purpose.

Since that time, the committee has met at stated intervals without interruption and with a gradually broadening program which has to-day made it one of the great forces in sound highway development in the United States, not from a present-day standpoint, perhaps, but in its ability to place the problems ahead clearly and dispassionately before the educators of the country.

The story that follows, then, is a chronology of events wherein we find the committee driving steadily ahead and clearing the path of the underbrush of misunderstanding that the way of those to follow may be made easier.

It is difficult at this time to tell definitely in just what field the work has been most farreaching. It is sufficient to say that there has been little lost motion and that all of the accomplishments are of moment, since each marks a

* President Hudson Motor Car Co., Chairman N. A. C. C. Highways Committee.

A COMMITTEE of educational experts is in charge of the program of the Highway Education Board. Extensive work has already been done along many lines, the details of which are outlined in this interesting article.

A meeting will be held in Washington, Oct. 26-28, to discuss further plans and future procedure. This big highway congress will be one of the most important ever held in the history of road building and road use.

definite advance on a course which has been but obscurely charted, if at all.

Suppose we consider first the most popular work of the committee, which has to do with safety and essays in highway transport.

The question of safety on the highways has been one of immediate concern to all. Little children were prone to stray on the roads and could not always be avoided by the most careful driver. The pedestrian has been wont to cross roads at will and the driver has not always stayed within his rights.

Here is a major problem in education which the committee realized must be met quickly and efficiently.

The National Automobile Chamber of Commerce, made up of the manufacturers of cars, set aside generous sums for the best essays by children in the grade schools on the subject of safety on the streets and roads, and awards for the best lessons in safety submitted by school teachers.

The first year's awards have been made, and so successful was the event that it will be renewed this year. Some 500,000 essays were submitted to the committee by school children in every community in the land, while teachers everywhere contributed lessons which the committee will later summarize and distribute for the information of teachers everywhere.

The result was that a tremendous impetus was given to safety discussion. Many great national publications gave liberally of their space, and educators, Government officials and others, of their time. New life was given the movement for playgrounds for children, and the effect can only be measured by the statement that, while traffic increases, the accidents per car show a decline.

Highway Transport Scholarship

The same success was obtained in the high school field through the essays on highway transport. H. S. Firestone, a member of the committee, contributed an annual scholarship worth $4,000 for the best essay on this subject, and the event has now progressed for three successive years, each competition showing an increasing merit and understanding of the problem, each reaching out into new fields and bringing the youth of the nation to a new understanding of the fundamental problems involved, through personal study and work.

Curiously, there has been a reaction which was entirely unexpected when this phase of the committee's work was undertaken. So interested have the elementary and high school officials become that they in turn have begun to study the effects of highway transport upon education itself. Much more is known to-day about the influence of highway development upon the average attendance of the child at school than was current a brief time past. The day of the little red schoolhouse is numbered. Consolidated schools are a forecast of the future, with motor buses to carry the children back and forth. Taxes will be cut down and better facilities afforded as highways become standardized, and the educator, recognizing this truth, is to-day an advocate of better roads.

Turning to the university field, the committee was confronted with a lack of definite outlines for instruction and with a lack of interest, due largely to the fact that no effort had been made to place the facts before the professor. Two steps were taken to meet this situation.

Wherever sufficient interest was indicated, regional conferences were held on the question of highway transport, with State and national highway officials taking a prominent part. Such meetings have been held at the universities of Pittsburgh, Michigan, Yale, Kentucky, Tennessee, Missouri and Maryland, and at the Texas Agricultural and Mechanical College. Others are now pending and a widespread interest has been generated. Some twenty institutions of more than average collegiate rank now have courses in highway engineering, which are to-day more numerous and more rationally planned than two years ago, through the co-operation of the several elements interested.

The other outstanding activity in this field has been the publication of a tentative topical outline on highway transport under the auspices of the committee by Prof. Lewis McIntyre of the University of Pittsburgh. Here all known sources of information are listed and complete lecture courses suggested for the consideration of the professor.

Outline to Be Revised

The book sprung into immediate popularity and the first edition was exhausted upon publication, educators everywhere asking for it. The work has gone into practically every civilized country, and while admittedly anything but final, has established a clear basis for future progress. It is to be revised this fall to contain many new facts which have been developed since its publication and frequent revisions will probably be necessary for a considerable time to come, so rapidly is new data being developed by the Bureau of Roads, research agencies of the colleges and others engaged in the task of searching out facts.

The success of the McIntyre outline at once brought the committee to an examination of the high school field. Here it was found that highway transport played a negligible part in instruction. Whether the course be civics, history, economics, geography, transportation or what not, the older forms of transportation were used as illustrations and highways neglected, again due simply to the rapid evolution of the latter.

So the committee has undertaken to meet this need by obtaining the services of Professor Buckner to undertake the same task in the high school field as McIntyre accomplished for the university—in other words, to translate this work into language and form suitable for consideration by high school teachers. This book, too, will be distributed.

Meanwhile, Miss Florence Fox, one of the specialists in the Bureau of Education, had become interested in this work, and as a result she has recently brought out one of the most interesting developments which has yet been seen in the whole field of highway transport education.

The story of the work is best told by a visit made by the writer to the Thompson school in Washington, where Miss Fox is demonstrating her ideas to fifth and sixth grade pupils.

It is a study in what is known as the project method of education. The pupil takes a given highway, and by tracing its course across the country learns in detail the history of the locality, the geography, and the different forms of production as well as the flora and fauna. Studying how the highway is built, he learns about civics and physical construction.

The results cannot adequately be described in the space

allotted here. It is enough to say that so interested do the boys and girls become that they take their questions home to the whole family, and days are spent in motor cars studying the highway at close range. It is an education for the parent as well as the child and a most excellent piece of work.

This object form of learning is so successful that the committee has decided that every similar opportunity should be given to university students who are studying the more fundamental courses. Accordingly, T. H. MacDonald, of the Bureau of Public Roads, has prepared a series of model exhibits which show in detail different phases of highway construction and maintenance, together with the most approved forms of culverts, underpasses, bridges, etc. Roadside treatment is handled incidentally, as are other phases, and the whole constitutes a vivid picture of highway work.

Simultaneously, Mr. Firestone has had ten exhibits prepared which show by material and pictures the process of raw rubber on its way from the plantation to its destination as the finished tire on the automobile. An elaborate textbook supplements this work, making the whole study of tremendous value.

The last link in the chain is now being worked out by the National Automobile Chamber of Commerce, under the direction of George M. Graham, who is charged with the task of getting together a similar study of the motor vehicle. This exhibit is as yet in the formative stage, but it will be one of the most complete of its type ever put together, and will represent a marked advance in work of this kind from the standpoint of the automotive industry.

These three exhibits linked up with charts, tables, textual data and films, will place an array of material at the command of the university professor which, it is anticipated, will give him a complete laboratory.

These are the outstanding accomplishments to date of the Highway and Highway Transport Education Committee or Highway Education Board, as it is to be known in the future.

They do not, however, cover the field. The contact with the National Research Council established through Dr. W. K. Hatt is one certain to bring large results as we turn more and more to laboratories for factual data. Highway transport films are in the making, which will seek to bring out the public interest in sound highway administration, finance and regulation. The vocational field and the training of those men already on the job is an important aspect which will form a large part of the committee's contribution in the coming year, and which has been passed over only temporarily while other problems were tackled.

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>
> "No evolution of national import can be brought about without a concurrent change in social, legislative, physical and educational practice and the problems so brought out can only be met by a thorough and exhaustive probing into underlying facts."

The committee should and probably will have a part in the deliberations of the International Road Congress in Seville, Spain, next year.

Meanwhile, preparations are being made for the second national conference on the educational aspects of highway transport at Washington, October 26-28 of this year. At this time, it is expected that the seed sown at the meeting two years ago will spring full-flowered into existence.

It is early yet to discuss details, but a committee of educational experts is in charge of the program, and it is anticipated that the event will be by all odds the most determinative ever held in the history of road building and road use. Problems of finance are looming large. So are questions of use and administration.

The meeting of many minds presents an opportunity not for immediate solution, but for progress, and it is to that the efforts of the committee are dedicated.

Automotive Sales in Foreign Lands Increasing

IN spite of the general business depression and the lack of good roads in the Chihuahua district, the 650 passenger automobiles in use at the end of June, 1922, represent an increase of 100 per cent over the preceding year. Consul J. B. Stewart states that this notable increase is due to settled political conditions in all parts of the state and to the establishment by an American firm of the first automobile sales agency using American methods, by means of which prospective purchasers are enabled to obtain their cars without making a special trip to the United States. The sales of low-priced light motors have greatly outnumbered those of all others, but there has been a decided tendency during the past six months toward the heavier and higher-priced cars.

THE comparatively large number of motor vehicles in use in the Republic of Panama and the Canal Zone is due principally to the activities connected with the Panama Canal, and also the extensive use of motor vehicles for hire in Panama City and Colon and the adjacent sections of the Canal Zone, says Consul Orr, Panama, in a report to the Department of Commerce.

MOTOR transportation of all kinds in Egypt, particularly with regard to taxicabs and commercial vehicles, received a considerable impetus during 1921. There are over 1600 passenger cars, of which 234 are taxis and 120 trucks in Alexandria, while in Cairo there are about 2200 passenger cars, of which 308 are taxis and 110 motor trucks. Motorcycles in these two cities number about 350 and 900, respectively.

THE motor car market in Shanghai is showing signs of recovery, according to dispatches from Trade Commissioner Hoyt. The representative of one of the largest automotive manufacturers in the United States has reported that late sales have been better than any time in the past eight months, which is particularly encouraging as business has been dull in all lines. The greatest demand he reports is for medium-priced passenger cars.

Who Are the Potential Truck Buyers?

A thorough analysis of the field of truck buyers and of methods of distribution form an essential basis for any truck marketing policy. Buyers consist of retailers, commercial haulers, and industrial concerns. Wide variation in distribution practice.

By Harry Tipper

COMMERCIAL vehicles are used for business purposes and the methods of buying vary greatly according to the character of the problem and the necessities of the business. If there were available thorough information regarding the number, sizes and uses of commercial vehicles in various industries, it would be possible to determine the general methods of distribution and selling of most value for these purposes. Such figures are not available in sufficient detail to serve the purpose, and in discussing this problem it is necessary to consider two points:

1. Probable buyers of commercial vehicles and their present methods of buying.
2. Present methods of distribution and their application to the buying requirements.

From these it should be possible to suggest the probable lines of most valuable development for the future extension of the commercial vehicle business. Buyers of trucks comprise all kinds of businesses, and the number of such vehicles required to meet their requirements runs all the way from one to several hundred for an individual establishment. A considerable part of the market for commercial vehicles is being supplied by the production of speed wagons in the passenger car factories, built along the lines of the passenger car with limited loads and rapid acceleration. These must be considered as commercial vehicles, however, subject to the same requirements of buying and sale as other commercial vehicles now in use. Probable buyers of commercial vehicles classify themselves as follows:

1. Retailers.

There are somewhat over a million retail stores of all kinds in this country and their relative value may be stated as follows:

Approximately one-third of the retailers are without sufficient working capital—provide no profit beyond a living for the owner, and have small delivery requirements.

Approximately one-third are sound but small, do a fair business but return a net income too small to be taxable.

This market represents the one wagon market for commerical vehicles except in the large cities, where approximately 50-60 per cent of this class do not use delivery equipment. Approximately 30-33 per cent of the retail establishments represent the possible customers for one vehicle or more, and approximately 10 per cent of the entire field have large delivery requirements demanding a fleet of five or more commercial vehicles of all kinds. These establishments range all the way from dry goods stores, florists, jewelers, and other package stores to coal, mill supplies, builders' supplies, and contractors' supplies, with their varying requirements as to size, speed and character of vehicle required.

2. Commercial haulage concerns.

A large number of these concerns are local express, storage warehouse, moving, cartage, etc., concerns. The number of large concerns in this field is comparatively small; only two or three thousand probably in the whole country, although the actual number of concerns engaged in express, storage, moving and cartage, runs ten to fifteen times that number. In this case the purpose of the equipment demands heavier vehicles capable of taking large loads and withstanding many severe conditions of service. Even if the moving concern in a comparatively small town needs only two or three vehicles, it requires them of sufficient size to answer the usual custom of a load size of household goods or packages. Small vehicles of limited capacity, such as speed wagons of one ton and under, have their place in this field. They are valuable, however, only in the delivery of local express packages where there are a number of small dumps. They do not serve the purpose in the larger haulage from warehouse to railroad and from warehouse to warehouse which is required for a large part of the movement of their product by commercial haulage concerns in the trading area of any city or town.

THE other phase of commercial haulage takes into account inter-city haulage, or haulage from one manufacturing or trading area to another. The statistics in relation to the amount of business done along these lines are very fragmentary and it is not possible to determine the number of jobs required. However, the type of vehicle demanded for this purpose is obvioulv the type permitting a maximum load carrying capacity, with a good rate of speed, taking in from $2^1/_2$ to 5 or 7-ton jobs, and demanding the possession of a number of vehicles in order that the haulage may pay.

There is one very important difference between the requirement of the retailer for delivery purposes and the requirement of the haulage company. To the retailer the delivery is a subsidiary part of his business, and his principal interest is to provide frequent and reliable delivery service, so that the will be able to give his customers proper attention in this respect. The haulage in itself is not a problem of his, and he is not interested either in types of vehicles or problems of delivery except as they affect his competitive situation as a retailer. The commercial haulage company, however, makes its money out

of its haulage equipment. Its whole problem is one of haulage and the entire approach to the question is a different one.

THE third section of importance in the market to be considered is that section occupied by various lines of industry in connection with the road haulage problems attached to these industrial concerns. In the lumber or oil—certain portions of the metal trades fields—in shipping industry, and in various other lines of endeavor, the industry requirements themselves include road haulage problems which must be solved in the best possible manner and more and more require the use of commercial vehicles in order to aid in their solution.

The problems in these various industries are entirely different and, in some cases in the same industry, they are entirely different. The problem of providing trucks for use in the oil fields is an entirely different one from the problem of providing suitable vehicles for the delivery of oil from the local distributing station to the retailer. Similarly, in the lumber field the problem of hauling lumber to the mill cannot be answered in the same terms as the problem of hauling lumber from the dealer's place to the building site or other point of construction. For this reason we have divided the industrial problem from the retailing problem, although in some cases the buyers are represented by the same organizations. In the oil business, for instance, the same company may be engaged in the production and refining and distribution of oil and also concerned with all the problems of haulage connected with the business. These problems themselves, however, are different and are usually in the hands of different men, so that they must be attacked as though they were separate marking elements.

The methods of distribution at present employed in the truck field in the marketing of trucks, take in the following elements:

1. Truck sales from the manufacturer to the buyer.
2. Sales through factory branches.
3. Sales through exclusive truck dealers.
4. Sales through retailers of automotive equipment who are not exclusively concerned with trucks themselves.

It is obvious that the value of these different methods of distribution depends upon the relative importance of the various markets and the accustomed methods of buying in these markets. This part of the subject cannot be treated without extending the article beyond the requirements of the present discussion, and it will be taken up in a future article dealing with this part of the subject.

IT is obvious, however, that no one method of distribution will serve the purpose and that some two or three methods must be combined in order to reach the various markets involved in the use of commercial vehicles and do this effectively in the consideration of their buying habits.

Sales Possibilities in Brazil Increasing Steadily

INCREASING sales of automobiles in Brazil are being reported by the customs authorities, according to a report just made on the automobile industry in that country to the U. S. Bureau of Foreign and Domestic Commerce. The American-made automobile is well thought of.

Despite a very unfavorable exchange rate and general financial depression, the automobile market opened up at the beginning of this year in a much better postion than 1920 and has continued to improve. The unusual slump which the Brazilian automobile market experienced during 1921 was brought on by a combination of circumstances, the chief of which were the exceptionally low value of the milreis and the general commercial depression. With the general reduction in prices of American cars and a corresponding improvement in Brazilian exchange and business conditions, the market to-day in Brazil for American automobiles is steadily improving.

Increasing automobile and truck sales in Brazil at the present time indicate that the market is on the high road to recovery. Representatives of American truck manufacturers who have recently investigated this market in Brazil express themselves as being highly pleased with the prospects for increased business.

Generally speaking, the American automobile and truck are given preference over European makes, as witnessed by enormous increases in American sales. This preference will not continue to exist unless the same kind of thought and energy is put into our sales methods and serve after sales have been effected. The American manufacturer is warned that when the sale is consummated he must not let his interest wane in the future of his product.

Light, medium-priced touring cars, roadsters and sedans are preferred for the most part. The lighter type of truck is also more popular. While the cheaper makes of cars are preferred, there is a tendency among the richer Brazilians to buy very expensive cars for quite the same reasons which prompt Americans to purchase them when they can be afforded.

Judging from the experiences of some American automobile manufacturers during past years in Brazil, and especially in 1921, it would seem that it is a mistake to place an automobile representation with a firm—whether American or foreign—which is doing general importing. It should not and does not necessarily work out detrimentally to a manufacturer, but in all too many instances this is the case.

Regardless of the popularity of a given make of automobile in the United States, and notwithstanding its excellence in design, workmanship and endurance and dozens of other good qualities, if turned over to poor representatives not so well equipped, will suffer greatly from this severe competition.

The Brazilian is a great taxi rider. Fares are lower despite the fact that gasoline in Brazil is much higher. Cars rent there at approximately $2 an hour.

ONE obstacle in the greater distribution of American cars in Brazil is the stringent credit arrangements forced upon the dealers and jobbers in Brazil. "While shipping cars out on consignment is not to be advocated, it does seem that it would be more advantageous to both the automobile manufacturers and dealers to allow from 60 to 90 days credit, allowing time for a turnover and making it possible for dealers to have a few cars in stock. This is one of the outstanding advantages which a large American corporation with branch offices in Brazil has over similar manufacturers with only local representatives or dealers.

Efforts have been made from time to time to promote an automobile show in Rio de Janeiro or Sao Paulo, but always without success. The approaching Brazilian Centennial will offer an excellent opportunity for American automobile manufacturers to display their cars in the American Industrial Exhibits Building, it is suggested. Several American companies have already arranged for exhibits.

AUTOMOTIVE INDUSTRIES & AUTOMOBILE
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Oaks and Acorns

PRODUCTION progress in the automotive industry probably will be largely a matter of details and refinements in the future. Major changes of vast import have been made during the last decade. Such large individual changes are not so likely to occur in the future.

A careful study and readjustment of numerous details of production, however, will continue to take place. The accumulation of efficiency arising from the innumerable minor improvements may result in a production system as superior to the present system as the present is to the past. But the change will come through a consideration of details rather than through major readjustments.

An outsider going into almost any up-to-date, normally efficient automotive plant will see many odds and ends of the production system that apparently could be altered to advantage. The production manager himself is usually aware of these, but he has been involved, of necessity, in larger improvements and has not yet come to a detailed study of these smaller elements.

Automotive production costs will continue to be lowered for many years to come. Production managers are finding it more and more worth while to take care of these small items. They are finding that these small factors, when added together, constitute waste or saving possibilities which mount into many thousands of dollars. The production manager of the future who is too big for these small things will be behind rather than in front of the procession.

Promotion as an Incentive

THE average worker desires to make financial progress from time to time. Since habit and inertia play a large part in human action, however, he would rather make that progress in the organization with which he is already employed. He will not change his place of employment unless he believes he can do better elsewhere.

Thus the factory which makes it possible for its workers to advance from time to time is likely to keep its experienced workers and thus increase its working efficiency. Incentive of this kind can be applied in several ways. The Franklin factory, for example, has recently installed a promotion system whereby old employees automatically move up to fill any vacancy and new employees from the outside start at the bottom of the ladder. All of the jobs in the factory have been classified for this purpose and charts are being posted so that the employees may see what their next step in advance will be.

It is assumed that in working out this system the test of merit as well as that of seniority will be applied.

Viewed broadly, the policy of promotion from within is a sound one, as it does give real incentive to the men already on the job. This applies both in office and shop, perhaps more in the former than in the latter. The objection has been made, of course, that such a policy tends toward inbreeding and ingrowing ideas; that fresh ideas and points of view coming with new men to the organization from time to time are highly beneficial. While there is something in this, it is to be recognized that ingrowing ideas are rather a matter of men than of environment.

Quantity and Quality

THERE is nothing inherent in quantity production methods that renders maximum quality impossible to attain. Efficient methods need have nothing in common with low quality. This is not always recognized in discussions about the relative merits of American and European cars. High production and lower quality are too commonly thought to go together, simply because some of America's cheap cars are not comparable in quality to the hand made—and high priced—European jobs.

Care in inspection and precision in operation will turn out in quantity a product equal in quality with any made in smaller lots. In fact, the repetition of

the same precision operation many times over tends toward greater rather than less accuracy and quality.

Quality varies with precision of manufacture and care of inspection, but has no inherent relation to the quantity produced. This is a fact that American exporters will do well to impress upon foreign dealers and prospective foreign buyers.

Railroads Plus Trucks

THE development of motor transport will come because, and insofar as, it fills an economic need. It has certain obvious limitations. It will not replace all other forms of transportation. In some cases it may replace, but in more cases it will assist and extend existing transport mediums.

The forward-looking men in the railroad and electric railway field recognize this fact clearly, as do most of those interested in the promotion of highway transport.

Elisha Lee, vice-president of the Pennsylvania Railroad, for example, expressed his opinion of highway transport recently like this:

"Personally, I do not subscribe to these views. The importance and value of commercial motor transport to the country as a whole will not lie in menacing or injuring the railroads, but in the extent to which it is capable of aiding them to greater usefulness by assisting in the improvement of their indispensable public service and in the solution of their problems of operation and earnings."

This is the sort of thinking which will enable the public to get maximum transportation efficiency and economy regardless of the medium. The problem is one which is most likely to be solved through constructive co-operation.

"The Greatest Show on Earth"

IT sometimes seems as though the automobile industry chooses its least accurate and most highly superlative writers to prepare the statements about individual products for public consumption. Careful consideration of the automobile advertising in nearly any popular magazine indicates that nearly every car on the market is the finest, runs the most smoothly, operates most economically, is the most powerful.

The affect upon the casual reader of such an array of superlatives is not likely to be specially favorable. It is evident that "somebody lied." They can't all be the best.

Along the same line is the practice, both within the industry and from the industry to the public, of slightly perverting the statements of prominent individuals or institutions for publicity purposes. One parts maker almost lost an important customer recently by using for publicity purposes statements made privately about the product by the customer. Another automotive company is accused by a scientific institution of attributing to that institution statements which it never made in the form used.

Comparatively speaking, the automobile industry is young. It has the advantages of youth—and some of the faults. Conservatism in youth is often more impressive than over-enthusiasm. Automotive advertising and publicity will increase in effectiveness as it increases in accuracy and decreases in superlatives.

Answering Foreign Inquiries

CAR and truck manufacturers can materially increase their foreign sales by having greater consideration of the "other fellow" in their foreign correspondence. Friendliness is always the basis of better business, and courtesy and service are the basis of business friendliness.

In handling foreign inquiries the American manufacturer should go more than half way in trying to accommodate his prospective customer. This can be done without incurring any financial expense. If the letter writer puts himself in the place of the foreign buyer, he will write a far different letter than when he simply considers foreign correspondence in the same category as domestic.

Many things that are clear and obvious to a domestic inquirer are entirely unknown to the foreigner. It should be remembered that in many cases the foreign inquirer has no more knowledge of you than you have of him. The fact that you know all about yourself is no sign that he knows the same things.

Misunderstandings always arise more readily through correspondence than through personal contact. They can readily be avoided, however, by a little intelligent effort. Foreign correspondence can easily be made a real builder of sales.

Air Mail Proves Reliability

WE are getting so used to saying that America is far behind in the development of civil aviation, that we frequently fail to give proper attention to the achievements which have been made. The figures recently published concerning the past twelve months of aerial mail service give a striking record of accomplishment.

The entire automotive industry has been conscious of the presence of this service, but its real scope and accomplishments are scarcely recognized. The figures given are for the fiscal year ending July 1, 1922.

The planes in mail service covered 1,750,000 miles and carried 49,000,000 letters. This mail totaled 1,224,500 pounds.

92.5 per cent of the trips scheduled were actually completed and 94 per cent of the scheduled mileage was actually flown. This is a record for reliability to which any commercial transportation medium might point with pride.

The air mail service is of interest to the automotive industry, chiefly as an experimental route of civil aviation. Its record for the past year indicates the regularity and safety with which a service of this kind can be operated in the United States, given proper organization and careful supervision. It is unfortunate that the cost figures available for operating this service are such as to be of little use for commercial comparison, because certain important factors of commercial operating costs are omitted.

Rest of Year Holds Out Good Prospects

Effects of Railroad Strike Alone Would Prove Retarding Factor

NEW YORK, Aug. 17.—The inconsistency of the Government's coal priority ruling classing the automotive industry as non-essential, on the one hand, and of a public demand for motor transportation which is speeding up motor truck production, on the other, is causing a feeling of indignation among automotive manufacturers which may reach the stage of formal protest against the priority order if the threatened coal shortage becomes actual through a continuance of the railroad strike.

No Curtailment Yet

So far no curtailment of automobile, truck or parts production has been necessary, as day to day receipts of coal in the Detroit district, heart of the industry, have maintained the situation just about where it was two weeks ago. But with rapidly gaining demands for trucks and in some cases for passenger cars to do the work of partially crippled railroad lines again emphasizing the utilitarian character of the industry, its leaders naturally are chafing under the non-essential label.

With the electric power company in Detroit making no discrimination against the automotive industry or any other class of users and with coal in small quantities but steadily reaching the district, production is showing no more than a seasonal decline from the record-making figures of May, June and July.

Agricultural Sections Buying

Reports from various sections of the country show a logical mid-summer stagnation of passenger car sales in the larger industrial and mercantile cities, but buying is gaining in the agricultural sections. Indications are strong that unless a continuance of the railroad difficulty adversely affects general business conditions the country's automobile makers and merchants will have a fall and early winter business vigorously holding its own on a basis of seasonal comparison, with the huge sales of the spring and summer.

The price reduction flurry apparently is all over. With one or two exceptions lowered prices were confined to the big production field. One or two makers have slightly increased their prices. Generally, indications confirm the earlier forecast that manufacturers whose quantity production justified lower prices without sacrificing fair profits have set their lists for the remainder of the year

(*Continued on page* 397)

Business in Brief

Although the end of the strikes seem near, uncertainty as to when the skies will definitely clear has been such as to have an effect upon current trade and industry. Coal priorities may hit some of the industries like iron and steel and there promises to be a car shortage when the crop movement enlarges this fall. A quick pickup, therefore, is not expected.

This is borne out by the slowing up of collections and spotty crop conditions, this being noticeable in cotton in Texas, the lower Mississippi valley and Georgia. Corn has suffered somewhat in the Northwest and the middle Ohio valley because of the lack of rain.

In wholesale trade the immediate future is producing mainly small orders, but purchases for next spring show confidence that is cheering. In the East shoes are holding up, but in the West business is slower. Uncertain raw cotton prices have slowed staple cotton goods buying, but activity among New York jobbers has helped the situation. Woolen mills are selling well for spring delivery.

Hot weather hit retail trade and the strikes have left thousands without employment, which slowed buying.

Fuel shortage continues to hamper industry and there promises to be further reductions in the number of iron furnaces in blast and of the capacity of steel works. Prices of scrap material, pig iron and finished steel continue to advance. The increase of coal production is noticeable, with available coal reported to be easing in price in the West. Coke is $3 under the peak price of 1920.

If anything, the stock market is stronger, caused by promise of the strike settlement, bonds continuing steady. Money, too, remains easy, with bank clearings at forty-two cities showing a gain of 4.8 per cent over last week and of 14 per cent over the same week a year ago. The aggregate was $6,381,631,000.

Car loadings for the last five weeks showed 4,151,434 cars loaded on the railroads as against 4,212,171 cars in the preceding five weeks. A year ago the wheat movement was heavy, but despite this the present August movement was 9.6 per cent better.

Public Given Chance, Buys Timken Stock

Shares Sold Number 400,000—Offering Heavily Over-Subscribed

NEW YORK, Aug. 23—Decision on the part of the members of the Timken family, sole owners of the Timken Roller Bearing Co., to give the public an opportunity to buy into its ownership, was followed by immediate action on the part of investors, who responded to the offer by heavily oversubscribing the stock offering of 400,000 shares, which represent one-third of the holdings of the family and which are valued at $12,000,000, according to the statement issued to-day by Hornblower & Weeks, head of the banking syndicate which made the offering.

No Change in Policy

Application will be made to list the new shares on the New York Stock Exchange.

The stock readjustment now under way provides for 1,200,000 shares of common stock, including 400,000 now offered to the public. The authorized capitalization is 1 250,000 shares.

A statement made by H. H. Timken, president of the company, in connection with the stock issue shows net profits of the company, after taxes and depreciation charges, as follows:

	After Taxes
1915	$4,671,710
1916	6,184,786
1917	2,453,177
1918	1,821,933
1919	4,778,115
1920	2,449,147
1921	2,275,549
Average	$3,519,201
6 mos. 1922	4.095,630

Company's Balance Sheet

The Timken balance sheet as of June 30, last, shows current assets of $10,308,493; permanent assets, including land, plant, etc., $9,953,654, minus an allowance of $3,670,593 for depreciation, amortization, etc.; other assets, including additional real estate, investments, accrued interest, etc., $2,013,353; prepaid insurance, miscellanous supplies, etc., $111,618, making total assets of $18,716,156. Liabilities include $1 291,267 in current liabilities and $2,350,000 in reserves. Under nominal assets the company lists declared capital at $6,000,000 and surplus at $9,074,889.

Net profits available for dividends (after taxes and depreciation) are estimated by the company at $6,000,000 for 1922.

It is the policy of the company to start dividends on the new stock on a basis of $3 per share.

There will be no additional members of the board of directors and no change is planned in policy or management, it is stated.

Maxwell May Obtain Title to Chalmers

Proposed Plan Must Be Ratified by 90 Per Cent of Latter's Bondholders

DETROIT, Aug. 21—President W. R. Wilson of the Maxwell Motor Corp. and Chalmers Motor Co. said to-day that a basis had been arrived at between the bondholders committee of the Chalmers company and representatives of the Maxwell company for an exchange of bonds outstanding of the Chalmers company for class A and B stock of the Maxwell corporation. If the plan is ratified by 90 per cent of the Chalmers bondholders, it will become effective and Maxwell will take title to the Chalmers company.

Wilson declined to give any details of the plan at this time, as he said it would be withdrawn if the consent of the required number of bondholders was not obtained. It is expected that action will be taken this week.

With the consent obtained, steps would be taken at once toward refunding the Chalmers organization and placing it in a satisfactory financial position.

An outline of the production possibilities of the Chalmers company has been drafted through to next July, and with the financing plan effective, producing would be started upon the scale outlined. This is considerably larger than production now, which has been held to a point which Wilson determined was consistent with its financial position.

Much larger production, he said, was warranted by the demand for the car, but it was financially unable to extend its operations. The material inventory at the plant has been practically worked off, Wilson said, and purchases are being made to meet manufacturing requirements until the future operation of the plant has been determined. The reduced prices announced this month has brought a large increase in business which the company has been unable to meet because of its financial condition.

Metropolitan Districts Will Provide Most Business for Rest of Year

By W. R. Wilson

President of Maxwell Motor Corp. and Chalmers Motor Co.

Detroit, Aug. 21.

Indications are that there will be a continuance of steady business in the automotive industry throughout the balance of the year unless there are unfortunate complications due to the coal and railroad strikes. Without tieups in material or coal supplies, the industry should go ahead manufacturing at close to capacity throughout the year.

Most of the business in the fall and winter months will come from the Metropolitan districts, I am convinced, with a betterment in the general farm market, but not a real buying movement from this source this year. The banks will get the larger part of anything the farmer may realize on his crops this year and will be inclined to frown upon automotive purchases at this time. Until the banks have been provided for, the farmer will not come into the automotive market extensively but there will be more activity in farming districts this year than for some time.

In the event that the railroads are unable to move immediately the crops that the farmer has been blessed with this year, I believe the holding over of them will increase their value and give the farmer a higher price when they are moved. The holding of them will not give the farmer money to come into the market this fall but in my opinion he would not be a large buyer this year anyhow.

Traffic conditions to date, while causing delays in getting material into the factories, have not had the effect of slowing down production. We do not anticipate much trouble from this source as we know the railroads are desirous of holding the good will of the industry because of the large amount of profitable business that it affords them. It is necessary that the traffic departments of the factories work harder than in ordinary times, but they will find the railroads ready to cooperate in every way they can.

We find that the railroads are doing effective work in making coal deliveries, not in quantities as large as we would like to get but nevertheless in quantities sufficient to meet requirements. It is necessary for the railroads first to have sufficient fuel for their own requirements, but they are making every effort to get to the industry the coal it has contracted for.

Freight cars for shipping automobiles are somewhat scarcer than formerly but we are getting enough for our requirements and the boat service is effective in moving large numbers of cars in the lakes district.

Cass G. Selden Elected Joseph N. Smith Co. Head

DETROIT, Aug. 21—Changes in the officers and board of directors of the Joseph N. Smith Co., manufacturer of body hardware, have resulted in the election of Cass G. Selden as president and general manager; A. R. MacCorquodale, vice-president; Robert Dittenhaver, secretary and treasurer, and H. P. Fry, assistant secretary and treasurer. The directors include the three first named officers and J. W. Watling, George Rumford, C. B. Chamberlain and Edward Claxton.

Dittenhaver had been connected with the General Motors for 15 years in a financial capacity, having been secretary and treasurer of the Scripps-Booth division until it was discontinued. No changes in the manufacturing policy will be made, Dittenhaver said, except that the company will aim at the standardization of its products and will concentrate in the future upon the manufacture of automobile body hardware.

The financial condition of the company was declared to be excellent, and business during the first six months of the present fiscal year shows a large increase over the same period a year ago.

H. P. Williams has been appointed sales manager of the company, one of a series of promotions in his 13 years of uninterrupted service with the company, during which he has been identified with practically all departments.

PLANS RIM FACTORY

ATLANTA, Aug. 21—The American Wheel & Rim Co., organized here a few days ago with $650,000 capital, is planning the establishment of a factory before the end of the year for the manufacture of automobile wheels and rims. A new type rim recently invented by James W. Cordell, who is one of the organizers of the company, will be the principal product. R. H. Lukenbill of Atlanta is associated with Cordell in the enterprise.

Richard F. Kelsey Dies; Old "Automobile" Editor

NEW YORK, Aug. 21—Death has claimed Richard F. Kelsey, for many years a prominent figure in bicycle racing circles and at one time editor of the *Automobile*, now AUTOMOTIVE INDUSTRIES. Kelsey died at his home in Montclair, N. J., following a stroke of apoplexy. He was 61 years old and leaves a widow and married daughter.

Since 1903 he had been chairman of the racing board of the National Cycling Association, which took over the control of racing from the old League of American Wheelmen. At the time of his death he was connected with *Motorcycling and Bicycling* of Chicago. Originally he came from Buffalo, where he was the first president of the Buffalo Ramblers Cycling Club, one of the most powerful organizations of wheeling days.

TIRE STOCKHOLDERS ACT

AKRON, Aug. 21—Stockholders of the Liberty Tire Corp. of Carey, Ohio, have applied to the Federal Court of Toledo to have the company adjudged bankrupt. The proceedings follow receivership action at Carey, in which A. H. Schwartz was named receiver a few days ago.

Strike Settlement Heartens Milwaukee

End of Rail Trouble Awaited—Production Moves Forward at Increasing Rate

MILWAUKEE, Aug. 21—More men were employed in the automotive industries as a whole in Milwaukee county at the middle of August than at any time in two years past, according to authenticated figures. There have been some declines in the number employed in certain lines, while others have increased which has worked to more than offset any losses. According to indications at present, new men will be taken on right along to handle business developing.

Virtual settlement of the coal strike has heartened the industries here, which are dependent largely upon fuel mined in Ohio and Pennsylvania and brought from Lake Erie ports to Milwaukee, which also is the main distributing center for the entire northwest. The railroad strike has been a collateral trouble, the solution of which alone will bring about a feeling of ease in the minds of all manufacturers here. The two strikes have been about the only serious check to the forward march which business is making, automotive and otherwise.

Trucks Make Gains

Passenger car production in this territory is going forward on an increasing scale. Makers of engines, frames, transmissions, steering gears, axles, etc., are finding it difficult to keep pace with shipping directions. The same is true of manufacturers of automotive equipment, both for car manufacturers and the jobbing trade.

The truck industry is making steady gains, due largely to the remarkable stimulation which the motorbus is experiencing in this and other parts of the United States because of the railroad strike and resentment against wartime fares charged by street railway lines and the increasing demand for more flexible and rapid urban and interurban transit. Freight trucks are making some gains but business is not yet on a satisfactory basis.

Tractor and trailer builders report a slowly improving condition of demand, with prospects for fall trade in tractors the brightest since the spring of 1920. Trailers are forging ahead under the stimulus of a demand for larger freight carrying capacity from existing or new truck equipment by utilization of a maximum of power gainable through the trailer.

Closed Car Demand Heavy

While reports of retail trade following the formal announcements of 1923 models and new prices are conflicting, on the whole dealer trade has undergone a very respectable stimulation in the past week especially. As a rule those who have not felt this betterment in demand are dealers representing cars that have not been reduced.

A good many people who did not buy passenger cars last spring during the big rush find eminent satisfaction in new models and prices and are beginning to place orders. Trade, however, probably will not get into a real swing until dealers are better able to place cars into the

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USE RADIO-TELEPHONY TO INCLUDE TWO CARS

RACINE, WIS., Aug. 21—Incident to the various spectacular activities in exploiting the new "F-50" motor, the Mitchell Motors Co., Inc., has successfully experimented along a new line, namely, the application of radio-telephony to mobile motor cars. Starting with a single car, one of the "White Streaks" now running in various parts of the country, which was equipped with a three-tube amplifier, which gave street corner concerts and provided other forms of entertainment, the idea met with such instantaneous response that it has been developed to embrace a pair of cars.

C. P. Robinson, during the war an expert radio operator, conceived the idea of inter-car wireless communication. By adding a microphone to each radio outfit he was able to build up individual sending stations, each able to transmit messages over distances ranging from one to two miles. The apparatus is rugged enough to withstand the hazards of all ordinary road travel and the occupants of the two cars are able to carry on an uninterrupted conversation within the distance limit.

Rufus S. Cole Heads Stephens in New York

NEW YORK, Aug. 21—The formation of the Stephens New York Motor Co. marks a change in representation of the Stephens in the Metropolitan district. An entirely new company has been formed and new quarters opened at 1853 Broadway, of which Rufus S. Cole is president.

In taking up this agency Cole retires from the exporting house, the Robertson-Cole Co., with which he was identified for six years. Previous to that time he was oriental sales manager for the Hupmobile. His long experience in the exporting business caused President Peek of the Stephens to ask him to take over the foreign representation of this car in addition to the Metropolitan territory.

J. Fred Hunter will continue to represent the Stephens factory in this territory as district manager. A. J. Higgins, former Metropolitan distributor for the Stephens, has become a sub-agent for Maxwell.

Barley Will Market New Car in 30 Days

Light Six Not to Be Called Roamer—New Company Succeeds Old

KALAMAZOO, MICH., Aug. 21—confirming the announcement of two weeks ago to the Kalamazoo Exchange Club of a new light six to be made by the Roamer organization, but which will not be known by the name "Roamer," President A. C. Barley states that the new models will be on the market in 30 days. At the outset the line will consist of a five-passenger phaeton, a five-passenger sedan and a five-passenger touring sedan. Later a coupe model probably will be added.

The car will be equipped with a new type of Continental Red Seal engine. The wheelbase is to be 115 inches. Prices will be set when the first shipments are made, or about Sept. 20.

Develop New Taxicab

Barley also announces the development of a new taxicab. It will be regular production in the future.

Roamer models will be continued as in the past. New closed models will be on the streets in the near future. They will carry the new 12-XD Continental engines. Duesenberg engines will be used in certain specified types of Roamers.

Barley reports that orders for the new Light Six and Roamers are coming in rapidly, and that the production for next season for the local plants should be well in excess of 2000 cars, all models included.

Announce Bond Issue

In connection with the manufacture of the new car, announcement is made of an issue of $300,000 first mortgage real estate gold bonds, paying 7½ per cent interest and maturing in three to ten years. Olmsted & Mulhall of Kalamazoo and Corrigan, Hilliker & Corrigan of Grand Rapids participated in underwriting the issue. The Grand Rapids Trust Co. is trustee. This issue is guaranteed by the Roamer Motor Car Co., which has just been incorporated as successor to the Barley Motor Car Co. The capital stock consists of $500,000 7 per cent preferred stock and 100,000 shares of no par value common stock.

Stock in Treasury

All the $500,000 preferred stock and 500,000 shares of common are in the treasury and will be available for further financing, should the business expand to such a point that it will need additional capital.

The bond issue provides for the retirement of an issue outstanding on the plant of the Kalamazoo Realty Co. and originally placed on the plant by the States Motor Car Co., which formerly owned the property.

Organize Company to Attract Fokker

Business Men of Milwaukee Incorporate American Airway Transport Co.

MILWAUKEE, Aug. 21—As the next formal step in the campaign of Milwaukee manufacturers and other business men to induce A. H. G. Fokker, the Dutch aircraft designer and builder to locate his proposed new American works here, the American Airway Transport Co. of Milwaukee has been incorporated in Wisconsin with a capital stock of $100,000.

This represents a fund raised by voluntary subscription by 200 business men to make a complete survey of the country, both with respect to manufacturing facilities and commercial transit possibilities. The establishment of the new American Fokker industry is to be accompanied by the organization of a great system of passenger and express transportation by air which will support the industry.

The incorporators of the Airway company are Clarence R. Falk, vice-president of the Falk Corp.; T. C. Hatton chief engineer, Milwaukee Sewerage Commission; E. M. McMahon and Fritz Cremer, personal representative of Fokker in this country.

Offices have been opened in the Metropolitan Block, jointly with the new American office of the Netherlands Aircraft Manufacturing Co.-Fokker of Amsterdam, and are in charge of Cremer. F. W. Walker is director of the survey, which will take about six months' time.

On the basis of results the proposed investment of approximately $5,000,000 is dependent. Business men throughout Wisconsin and in some of the largest cities of the country are becoming interested in the enterprise.

Appeals Court Affirms Sentence Given Pandolfo

CHICAGO, Aug. 22—The United States Circuit Court of Appeals has affirmed the sentence in the penitentiary and a fine of $4,000 imposed on Samuel C. Pandolfo, formerly head of the Pan Motor Co. of St. Cloud, Minn., who was convicted on a charge of using the mails to defraud.

The sale of stock through the mails was the basis of the prosecution, it being charged that Pandolfo had represented that the company had assets of $2,000 000 and that tractors actually were being built and sold. More than $1,000,000 was alleged to have been realized by stock sales.

FARM EQUIPMENT PROGRAM

CHICAGO, Aug. 20—Preliminary announcement of the program of the convention of the National Association of Farm Equipment Manufacturers, which is to be held at the Congress Hotel, Oct. 18, 19 and 20, states that the discussion will include such subjects as "Present and Future of the Implement Industry," "Transportation Situation from the Shipper's Viewpoint," "The National Institute of Progressive Farming" and "Depreciation."

FRANKLIN PLAN GIVES EMPLOYEES ADVANTAGE

SYRACUSE, N. Y., Aug. 21—Under a new system put into effect in the factory of the H. H. Franklin Manufacturing Co., promotion practically is guaranteed to every man in the shop. The plan, which is now operative in the machine shops and the wood shop, provide that vacancies, as they occur, shall be filled not by new men but through advancement of old employees.

All operations have been classified and charted according to the skill required. Charts have been placed in all departments where the new classification is now effective, so that the men can see for themselves just where they stand in the scale of advancement and just what the next step forward is.

Other things being equal, the priority of service rule will continue, the man with the greater length of service receiving recognition ahead of the man who has not been employed so long.

Federal Policy Opposed by Aeronautical Chamber

NEW YORK, Aug. 21—At a special meeting of the Aeronautical Chamber of Commerce a resolution was passed protesting against the policy of the government in placing orders for the manufacture of aeronautical equipment and supplies in shops owned and operated by the government. The chamber also was disturbed over the report that the federal authorities are contemplating the purchase abroad of equipment in quantity.

It is contended that this policy does not encourage the development of the civilian aircraft industry of the United States, and that it is not in keeping with "the clearly defined wish of Congress as expressed and emphasized by that body at the time appropriations for the procurement of aircraft were made."

The chamber has decided to increase the number of governors from eleven to fifteen and has re-elected all of the old board.

JEFFERSON RECEIVERSHIP

JEFFERSON, WIS., Aug. 21—Upon petition of creditors, the Jefferson Rubber Co., manufacturing tires, tubes and other rubber goods, has been placed in the hands of a receiver. A. C. Ehlman has been named receiver. It is stated in the petition that of $75,000 in assets, not more than 50 per cent is collectible.

Chicago "L" to Use Buses in Its System

Forty May Be Required When Service Is Developed—Will Be Feeders

CHICAGO, Aug. 21—Plans for the operation of buses to supplement its electric railway service are announced by the Chicago Elevated lines. This step involves a recognition by the management of the elevated lines of the utility and convenience of the bus for passenger transportation, so capably demonstrated during the recent strike on the street and elevated railway lines, and indicates a determination to take advantage of the bus as a feeder for the electric lines.

Three bus lines are proposed for the inauguration of the service and to begin with 14 buses will be operated on these routes. The bus routes begin at the end of three elevated lines and extend from one to two and a half miles through well populated districts.

Bus Lines Integral with "L"

The bus lines will be an integral part of the elevated service available to the passengers without extra fare. Transfers will be issued from buses to electric trains or from trains to buses.

It is estimated that probably 40 buses will be required when the service is fully developed. The company expects to use buses seating about 25 passengers, lighted and heated by electricity. Formal application has been made to the Illinois Commerce Commission and to the city authorities for permission and license to operate the buses.

Winther Plant Will Build Rail Coach for Russell Co.

KENOSHA, WIS., Aug. 21—A. M. Russell, formerly of the Packard and Locomobile, has organized the Russell Co. to manufacture automotive railway equipment. The new concern has made a contract with the Winther Motors Co., Kenosha, for production. It is said to have approximately $1,000 000 worth of orders in hand and prospects of several times that amount of business.

The Russell gas-motor coach is now undergoing exhaustive experiments under practical working conditions on a number of leading steam railway systems notably the Pennsylvania, New York, New Haven & Hartford and others. The first coach was built at the Winther plant several months ago and other demonstration models have since been constructed. The Maryland & Pennsylvania has purchased one of the cars for service between Baltimore and Belair. It will be delivered about Oct. 1.

It has been emphasized to the people of Kenosha that the Russell company is not seeking a bonus nor will it attempt to market stock locally, since the industry has been well-financed by eastern capital on its showing.

Star Distributors Take Year's Output

Plant at Lansing Will Make Start on Manufacturing Next Month

DETROIT, Aug. 18—Contracts signed with distributors this week will take practically the entire output of Star cars by the Durant factory, Lansing, for the entire year of 1923, according to a statement issued by factory officials following a two days sales session. The Lansing plant will manufacture Stars for the entire territory between the Alleghanies and the Rockies. Its capacity is 400 cars daily.

A start on the manufacture of the Star will be made at the Lansing plant on Sept. 15, but it is not expected to get into capacity operation much before the first of the year. Two assembly tracks are now completed, and there remains only the installation of minor machinery. Delays in material and parts shipments will hold back operations temporarily, officials said, but this situation will be overcome rapidly.

Carroll Downes, president and general manager of the Star corporation, addressed the meeting of dealers. No statement on the proposed method of distribution of the product was forthcoming from the meeting, it being said that Downes would make a statement on this within a short time. It is reported here that the plans involve the financing of the cars until sold by the dealer. Most of the middle western territory was reported represented at the meeting, though there remains some territory yet to be assigned.

Willys-Overland Plant Producing 800 Daily

TOLEDO, Aug. 22—Despite the strikes and coal shortage, the Willys-Overland plant here has kept operating up to its high point of nearly 800 cars a day with 14 000 men employed.

The quota of production for the present quarter of the year is 47,000 cars which is the largest ever set for a third quarter.

The company recently wrote off $1,079-675 on account of its investment in the Curtiss Aeroplane & Motors Corp. and reduced its more than $12,000,000 investment in the Moline Plow Co., to $1 on its books.

The non-convertible block of preferred stock has been temporarily listed in certificate form by the New York Stock Exchange. The authorized amount is $10,-000,000, of which there is outstanding more than $8,870,000.

FRANK B. SMITH DIES

MILFORD, CONN., Aug. 21—Frank Burr Smith, works manager of the Bullard Machine Tool Co., died last Wednesday following an acute attack of appendicitis. He was in his fiftieth year and leaves a widow. Smith entered the employ of the Bullard company in 1890 as a machinist apprentice, remaining for four years when he went west. In 1911 he returned to the Bullard company, at one time, representing it in a sales capacity in Chicago, Cleveland and Philadelphia. He became works manager in 1920. Smith was prominently active in the mechanical development of Bullard products and was the holder of several automotive and mining patents.

Oakland Is Preparing For Biggest September

PONTIAC, MICH., Aug. 21—With a temporary lull during August while shifts are made in manufacturing arrangements at the plant here, the Oakland Motor Car Co. is preparing to make September the biggest production and sales month of the year. The only difficulty confronting the factory is means of getting material into the shops, due to the railway tie-up. The plant has not thus far been handicapped by lack of fuel, and expects no shut-down on that score.

The company is building an addition to its mill room at Plant Six, which will permit of enlarged operations there. Body making is done at this plant.

Packard Plans Capacity Output Through Winter

DETROIT, Aug. 22—Since the inception of quantity shipments on the single six model in May, this year, the Packard Motor Car Co. reports that earnings have increased to a point where they now are at an annual rate of about $6,000,000. This is reported equivalent, after all disbursements, to about $2.85 a share on the 1,188,510 shares of $10 par common stock outstanding, or about three times the annual 10 per cent dividend requirement. The cash balance is now about $16,000,000, an increase of $7,000,000 since Jan. 1.

Capacity operation is planned through the winter. Present production is reported to be approximately 2100 vehicles monthly, including single six, twin six and truck models. This production will be increased, the factory having capacity for 3000 monthly. No interference is expected from strike conditions, the company having a coal surplus ample for several months' requirements. The company is prepared to use trucks to bring in supplies of material if necessary.

EARL BALANCE SHEET

JACKSON, MICH., Aug. 21—Total assets of $5,984,153, including current assets of $1,557,759 against current liabilities of $793,396 are reported in the balance sheet of Earl Motors as of April 30. The total deficit is $1,439,419. There is a proposed issue of $2,775,000 5 year 6 per cent debentures and $2,285,000 7 per cent preference stock to be applied to a settlement of creditors' claims under the plan of reorganization.

Hudson, Essex Plan New September Mark

Gain of 20 Per Cent in Sales Is Expected for Last Half of Year

DETROIT, Aug. 21—Sales of Hudson and Essex cars for the last six months of 1922 are expected to run from 20 to 25 per cent heavier than in the first six months. Reports received at the factory from dealers in all parts of the country indicate ready demand for cars, in some sections the dealers being considerably behind on deliveries. Closed car sales are reported increasing.

Shipments of Hudson-Essex for the first fifteen days of August were higher than for any similar number of days in the company's history. The demand for cars has resulted in the factory increasing its tentative schedules for the later months of the year three separate times. Orders now on hand assure capacity operation for several weeks. No let up in production due to the coal or rail strikes is expected.

Total August business will show an increase over the July total which was the largest the company has had. August, 1921, business will be exceeded by 200 per cent, and the largest previous August by 40 per cent. September business will set a new September record.

Cities Largest Buyers

Increased business is reported from Portland, Ore., Providence, Dallas, Shreveport, Miami, Tampa and Lincoln, Neb. States in which business is reported running larger now than at any time this year are Oklahoma, Tennessee, the Carolinas, Georgia, Florida, Mississippi, Louisiana, Texas, Utah, Oregon, Montana, Kansas, Nebraska, Ohio, Iowa, Illinois, Indiana, New York, Connecticut, Rhode Island and Massachusetts. Most other states are ordering in about the same volume as in May, June and July.

Rural business is reported to be good, but most of the buying continues to come from the larger cities.

Hupp Sales in 7 Months Show 210 Per Cent Gain

DETROIT, Aug. 22—Reports for the first seven months of 1922 show that Hupp Motor Car Corp. sales were 210 per cent of those for the 1921 period, with July deliveries showing an increase of 87 per cent over the same month last year. August business so far is 114 per cent greater than a year ago.

April, May and June were the best months in the company's history, and for the first three months of 1922 net profits before federal taxes were $383,656, equivalent after paying preferred dividends to about 75 cents a share on 519,210 shares of $10 par common stock outstanding. It is expected that the June quarter will show about $2.25 a share.

Bright Future Seen by Merger Officials

Recent Visit to Associated Motors Plants Forecasts Quantity Production

CHICAGO, Aug. 19—Quantity production at the National Motor Car plant at Indianapolis, the Traffic Truck plant at St. Louis and the Kentucky Wagon Manufacturing plant at Louisville, where the Dixie Flyer automobile is made, was forecast by the visit just made to these plants by a group of officials of the Associated Motor Industries who have returned to Chicago.

Will I. Ohmer, chairman of the board, and Louis Ruthenburg, president, of Associated Motors, with technical assistants, spent a week at these plants outlining their part in the production plan of the merger and making the preliminary arrangements for them to produce their quotas.

"We are more than pleased with the progress that has been made," Ohmer said. "All the plants we visited were in splendid condition and arrangements necessary to fit them into the co-ordination plan of the merger were well under way. An assembling unit of Associated Motors is to be operated in connection with each of these three plants and we gave some time to preliminary planning of these buildings."

Other plants in the merger probably will be visited by the officials within the next week or 10 days.

Petition Against Kentucky Wagon

LOUISVILLE, Ky., Aug. 21—An intervening petition in a bankruptcy suit against the Kentucky Wagon Manufacturing Co., has been filed by W. T. Godfrey, attorney for the Kentucky Title Savings Bank & Trust Co.

Other creditors recently stated they were willing to drop the bankruptcy suit and accept terms of a merger into the $80,000,000 Associated Motors Industries, of which the wagon plant is a part.

Godfrey said that the petition means that the company will be thrown into bankruptcy and the merger prevented unless the bank's claim for $45,000 is met. The bank refused to agree to the merger, which, Godfrey said, would have meant the acceptance of second mortgage bonds.

MONITOR PLANT SOLD

COLUMBUS, Aug. 21—The plant of the Monitor Motor Car Co., which has been in the hands of E. W. Pavey as receiver for more than a year, has been sold to the Clark Grave Vault Co., which will soon occupy it.

LUG COMPANIES ENJOINED

PHILADELPHIA, Aug. 21—United States District Court, Northern District of Ohio, Eastern Division, Anthony Gorosa and the Hudson Motor Specialties Co. of Philadelphia has secured a perpetual injunction against the Simmons Manufacturing Co., Lake Erie Accessories Co., the M. & M. Co., and the American Signal Co., restraining them from manufacturing or selling lugs for power plant support for motor vehicles embodying the inventions held by the complainants or from using the term "Crank Case Repair Arm."

Westinghouse Automotive Division Is at Capacity

SPRINGFIELD, MASS., Aug. 22—The Westinghouse Electric & Manufacturing Co. is running its automotive equipment department here at top capacity, 2500 being employed in that division. Work on starting and lighting and ignition apparatus is being rushed for the fall trade. Equipment is being made for 67 different makes of cars. The new type D-A ignition device has passed all tests and will be put into regular production soon.

The present rate of production at the plant will probably be maintained through September.

Aeromarine Satisfied With Month's Report

NEW YORK, Aug. 22—The first month's operations of the flying boat service between Cleveland and Detroit—from July 17 to Aug. 17—have produced results satisfactory to the Aeromarine Airways, Inc. In all 624 passengers were carried between Cleveland and Detroit and 150 on other flights. Of these 49 per cent were women and children.

There were sixteen charter flights made by the flying boats which took in Toledo, Erie., Pa., Put-in-Bay, Ponchartrain Hotel on Lake St. Clair and the Old Club on St. Clair Flats. The flying boats crossed the lake 114 times.

Freight also was carried, one of the shipments being a Ford roadster in knock down form, the first time in commercial aviation, it is claimed, that an automobile has been thus transported.

GOOD BOSCH JULY

SPRINGFIELD, MASS., Aug. 22—July billings were larger than June's for the American Bosch Magneto Co. and branch house business was the second largest in its history. Current earnings were running at the rate of $6 a share on the stock, and the company reports even better prospects for next year.

NOT TO TAKE DUTY PLANT

ELGIN, ILL., Aug. 22—The American Steam Truck Co. of Chicago has notified the Elgin Association of Commerce that negotiations for the proposed purchase of the Duty Motor Co. of Elgin have been cancelled. In the event that the offer of the American company is not renewed, the stockholders of the Duty company will consider other propositions for utilizing the plant here.

Miller Tire Resumes Paying of Dividends

Declares 2 Per Cent on Preferred Stock and One to Apply on Accumulations

AKRON, Aug. 21—What is considered one of the most optimistic statements issued by any rubber company in the United States since the days of unprecedented prosperity, which existed just before the precipitate slump of 1920 in the automotive industry, is issued by the Miller Rubber Co. of Akron.

The company not only resumes payment of dividends on preferred stock, after having passed six quarterly preferred stock dividends, but has declared special dividends to apply upon the accumulated dividends due preferred stockholders. A regular quarterly 2 per cent dividend on preferred stock is resumed, payable Sept. 15 to stock of record Aug. 25. In addition the company has declared a dividend of 1 per cent to apply upon the 12 per cent due preferred stockholders in accumulated dividends.

Greater Dollar Volume

In spite of the series of heavy price cuts on tires by all companies, which have greatly reduced gross revenues from sales this year over last year, the Miller company shows a 28 per cent increase in sales in dollars for the first six months of this year, as compared to the corresponding period last year. This means that Miller production and sales in units were approximately 100 per cent greater than last year, for tire companies are receiving from 35 to 50 per cent less for their tires than a year ago.

The Miller company for the first half of 1922 makes an unusually good showing as to profit, reporting net profits, after deduction of interest and depreciation and all charges except Federal Income Tax, of $1,026,317.

The company's financial ability to resume preferred dividends and to start the payment of accumulated preferred dividends, is regarded as unusually significant as Miller is the first large company in the Akron tire district to resume dividend payments.

7,500 Tires Daily.

The Miller company now is producing more than 7,500 tires a day—far above the old peak reached in 1920. The company recently has put out two new lines of tires. One is the fabric "Rellim" tire in 30 x 3 and 30 x 3½ sizes. The other is a new Wedge tread cord tire in all sizes.

Miller officials although optimistic regarding the future say they will not venture any prediction due to the extremely low tire prices. The company is in an unusually sound financial condition and has extended its ramifications to such an extent that additional factory space and facilities may soon be necessary in order to increase production commensurate with current demand for tires.

Men of the Industry and What They Are Doing

Williams Goes Abroad

O. H. Williams, export manager of the Hudson Motor Car Co., sailed for Europe this week on a trip which will take him through the British Isles, the Scandinavian countries and other countries on the continent. The trip is in connection with Hudson exports, which are reported by the factory to be steadily increasing.

Grant Advances Parker

D. K. Parker, former assistant purchasing agent of the Grant Motor Car Corp., has been promoted to the position of purchasing agent, left vacant by the resignation of G. C. Starkweather, who has joined the Buffalo Pressed Steel Co., as assistant to the president, R. J. McKenzie.

Davis Becomes Durant Official

James A. Davis, for three years manager of the Advertisers' and Investors' Protective Bureau of the Chicago Association of Commerce, has resigned to join the various Durant automobile interests as a vice-president. His work will be in connection with the financing and marketing undertakings, with special reference to the co-ordination of the activities of the related corporations. His headquarters will be in New York, but he will spend a good deal of his time in Chicago and in the West. As a member of the State "blue sky" commission he has been a special investigator of "blue sky" law violations for the Secretary of State of Illinois.

Rowley Gives Up Sales Work

W. C. Rowley vice-president in charge of sales of the Federal Motor Truck Co., has resigned, but will remain as a director of the company. He has been sales director for the past five years. F. F. L. Pierce, sales manager, is now in charge of the sales department.

B. F. Wright Resigns

B. F. Wright has resigned as chief engineer of the Republic Motor Truck Co., Inc. He was formerly with the Federal Motor Truck Co. in a similar capacity.

Haynes Advances Radoye

Gilbert U. Radoye, who for the last three and one-half years has been director of advertising and sales promotion for the Haynes Automobile Co., has been appointed director of sales and advertising for that company. He will continue to direct the advertising and sales promotion divisions, in addition to his new duties. Before becoming associated with the Haynes company, Radoye held important positions in the sales and advertising departments of other automobile manufacturing concerns. He is a member of the advertising committee of the National Automobile Chamber of Commerce.

White Calls O'Mara to Factory

Martin A. O'Mara, for the past two years manager of the Kansas City branch of The White Co., has been made a vice-president of the company and a member of the sales committee, with headquarters at the general offices in Cleveland. O'Mara entered the employ of the company about six years ago as a salesman in the St. Louis office, going to Kansas City as a salesman in 1917, where his efficient work led to his promotion as manager of the Kansas City territory in the early part of 1920. As a member of the sales committee at the general offices, O'Mara will have supervision of White truck sales in the territory covered by the following branches: Kansas City, Tulsa, St. Louis, Memphis, New Orleans, Dallas, El Paso and Houston.

Oakland Promotes Whitfield

Morris Whitfield, for several years in the employ of the Oakland Motor Car Co. as an accountant at the Oakland plant, has been elected assistant treasurer of the company, under Thomas Mayer, comptroller.

Osterheld Goes with Own Company

Clark Osterheld, assistant general superintendent of the Stoughton (Wis.) Wagon Co., in charge of the motor truck department, has resigned to become president of the Stoughton Manufacturing Corp., recently organized to manufacture electric water heaters and other electrical devices designed and patented by him. When the wagon concern engaged in the manufacture of trucks several years ago, Osterheld took an important part in the work of designing and placing in production the Stoughton freight car.

Gould Joins Malleable Iron

A. R. Gould, a director and general manager of the St. Louis (Mo.) Malleable Casting Co., has resigned, effective Sept. 1, to join the Malleable Iron Range Co., Beaver Dam, Wis., as vice-president in charge of production. He is one of the best known men in the light malleable casting field, in which he has specialized for twenty years. It is understood that the Beaver Dam concern is planning to invade the automotive and power farming equipment field and that Gould will have special duties in this relation.

Campbell Returns to Firestone

Homer C. Campbell, chief administrator of the city of Akron since Feb. 1 of this year, has resigned, effective Sept. 1 to join the Firestone Tire & Rubber Co., with whom he was affiliated before being named city manager. He will become assistant treasurer of the company, in charge of foreign and domestic credits and will serve as chairman of the operating committee of the Coventry Land & Improvement Co., controlled by Firestone and providing homes for Firestone employees.

Campbell's successor will be M. P. Tucker, until last February chief construction engineer for the Firestone company and former district construction engineer here for the Pennsylvania railroad. Tucker was named waterworks superintendent by Campbell on Feb. 15 and was elevated to the city's service directorship on July 1.

L. E. Porter Advanced

L. E. Porter has been appointed assistant general manager of S. F. Bowser & Co., Fort Wayne, Ind. Porter for the past three years has been director of publicity. Roscoe L. Heaton, formerly assistant to the president, succeeds him as advertising manager.

Owen Engineer with Lacey

Richard L. Owen, formerly identified with the Brown & Sharpe Manufacturing Co. as engineer, with Remington Arms & Ammunition Co. as tool engineer, and associated with the Cadillac Motor Car Co., is now interested with Arthur H. Lacey, consulting engineer, Oakland, Cal., in charge of tool engineering. The Lacey organization has been enlarged so that, in addition to automobile and internal combustion engineering, it is actively engaged in production and tool engineering.

Hopkins Joins Rackliff

Benton Hopkins, formerly advertising manager of Denby Motor Truck Co., Detroit, and previous to that associated in an advertising capacity with other automotive manufacturers, has joined the H. L. Rackliff Co., automotive marketing counselors of Cleveland and New York. Hopkins will be associated with the Rackliff organization as advertising counselor.

Wood and Rueckert Appointed

The Cowan Truck Co., manufacturer of industrial trucks and tractors, Holyoke, Mass., has appointed Frederic Rueckert sales manager and Keith A. Wood head of the material handling division, organized to promote efficiency in the handling of manufactured products. This service will be at the disposal of customers.

Electric Convention to Convene in Maine

Subjects Relating to Starting, Lighting and Ignition to Be Discussed

NEW YORK, Aug. 22—The annual summer meeting of the Automotive Electric Association to be held at Old Orchard Beach, Me., Aug. 29 to Sept. 1 will consider three dominant subjects relating to starting, lighting and ignition.

A greater use of standards by manufacturers of these products is to be urged, many of the makers being back of the movement. One manufacturer of electric equipment reports that of 67 customers, only three use accepted standards, the case referred to being that of flange sizes for attaching starting motors to the crankcase. There is a demand to standardize output of generators and to arrive at perhaps four or five output classifications or standards. President A. D. T. Libby of the association is eager to have all rational standardization that reduces costs of parts or maintenance pushed.

Will Discuss Service

Service will come in for lengthy consideration, the service managers of the member companies having a special program. The education of dealer organizations in service is one of the objectives aimed at. Earl Turner has charge of this division of the work.

The association has done good work for many years in adjusting patent problems among its members and this work will be furthered at Old Orchard.

The storage battery division under chairman R. J. Nightingale will hold two sessions.

Joseph Bijur is chairman of the standardization committee and Victor S. Beam of the legal and patent committee.

Creditors Ask That Metz Be Adjudged Bankrupt

BOSTON, Aug. 19—The Metz Co., of Waltham, Mass., maker of the Metz Master Six, was petitioned into bankruptcy here yesterday by three creditors. A hearing will be granted on the petition next week. Two of the creditors brought the proceedings as a result of judgments received against the company last June, and a third has an assigned claim.

The petitioners were the Johns-Manville Co., $442.19, judgment recorded June 16; The Culver-Stearns Manufacturing Co., Worcester, $67.57, judgment recovered the same date as that of The Johns-Manville company, and Jacob I. Hanflig, Chelsea, on a claim assigned to him by the M. I. Hubbard Spring Co. for $108.52 on Aug. 2.

REO TO RETURN TO OLD TIME

DETROIT, Aug. 22—The Reo Motor Car Co. will resume operations on a full five and a half day week after being on a five day operation throughout the summer. It had been the company's plan to work the short week through the warm weather period, but sales have increased to such a point that it is necessary to get largely increased production. The speed wagon business, which has been steady all year, has been augmented by large increases in passenger car business following the reduction of prices and the presentation of new models.

PERSONAL NOTES

Service Appoints Gillam

G. L. Gillam, formerly associated with the International Harvester Co. in the sales department of the truck division, has been appointed sales manager for the Service Motor Truck Co. Rolfe C. Spinning has severed connections with the company as advertising manager and has accepted a position with the Service Corp. of Troy, N. Y. His place is being filled by W. E. Murphy.

Leidy with "Michigan Alumnus"

Paul Leidy, formerly secretary-treasurer of the Michigan Drop Forge Co. at Pontiac, has been made business manager of the *Michigan Alumnus*, weekly publication of alumni of the University of Michigan. He is pursuing a law course at the university.

O'Rourke Heads Suburban Gas

J. Slocum O'Rourke, formerly with the Oakland Motor Car Co., is now president of the Suburban Gas Co., with headquarters in Detroit, manufacturing a gasoline heating and lighting apparatus for suburban homes.

Powe Gives A. E. A. Full Time

W. R. Powe has discontinued his connections with all other organizations and will hereafter give full time as general traffic manager of the Automotive Equipment Association of Chicago.

Receivership Is Ended of Watson Products Co.

SYRACUSE, Aug. 22—Federal Judge Ray has signed an order authorizing the re-organization of the Watson Products Co. of Canastota and ending the receivership which has been in effect about two years.

The Watson Truck Co. is the name of the new concern. Indebtedness of the old company will be met by giving first preferred stock in the new concern to all creditors with claims of more than $1,000. The creditors accepted the stock proposition.

The report of Kirk B. Delano, receiver, will be formally received by the court Sept. 21. The company, with an indebtedness of $550,000, has been manufacturing motor trucks under the receivership, and business is reported to have shown a decided improvement of late.

Gliders Open Epoch in Aerial Studies

German Student Makes Flight in Wiesbaden in Wind of 17 to 20 m.p.h.

NEW YORK, Aug. 22—The gliding in a motorless monoplane for 2 hours and 10 minutes by Hentzen, a student of the Hanover Institute of Technology, on Aug. 18 near Wiesbaden, Germany, has opened a new epoch in the study of aerial flight, as such gliding pioneers as Otto Lilienthal in 1896 in Germany, Percy S. Pilcher in England in 1897, Octave Chanute in America in 1897 and the Wright brothers in 1901 never glided over a few hundred feet and remained in the air a matter of seconds, with the exception of the Wrights.

Hentzen made his flight in a wind of 17 to 20 m.p.h., and started from a cliff at Mount Wasserkoppe on the Rhone watershed near Wiesbaden. At the start he rose to a height of 100 meters, where he hovered for some minutes and then rose another 100 meters, and at a height of approximately 800 feet hovered back and forth for nearly two hours. When the wind fell to 12 m.p.h., he descended in a long glide and landed very closely to the point from which he had started.

Monoplane Design

Details of the Hentzen glider or sailplane are lacking, but it is a monoplane design with the fuselage located between the two wings which are movable so that by a series of levers Hentzen was able to ascend or descend. The fuselage and wings are wood construction covered with fabric. The total span approximates 35 feet and the area is 140 sq. ft.

A fellow student of Hentzen's, named Martens, flying the same glider, remained aloft 1 hour and 6 minutes.

In the French glider tests held at Clermont-Ferrand over a period of two weeks, the duration flight was 49 minutes and 59 seconds, total time in air on different occasions, made by a Farman biplane. The take-offs in the French trials were made from an altitude approximately one-third the height of Wasserkoppe, the German take-off point.

The gliders used by the Germans, Hentzen and Martens, were constructed through funds raised by fellow students.

Early Study of Subject

The art of gliding played a very important part in the evolution of the airplane. As long ago as 1862 students were studying the subject, and at that time Otto Lilienthal began his first studies which continued until 1896, when he was killed in a 50 foot fall when his glider took a nose plunge. Lilienthal's greatest discovery from his gliding experiments was that the curved surface of the wing was superior to the flat surface; in fact, the curved wing was an essential to flight. He made upward

(*Continued on next page*)

Gliders Open Epoch in Aerial Studies

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(*Continued from preceding page*)

of 2000 glides, some of his gliders weighing 50 pounds and having 100 sq. ft. of sustaining surface. His first glider of this size was built in 1891.

Lilienthal relied on moving his body with reference to the wings for balance and control, and it was in experimenting along this line that he met his end. He gave much time to the study of flight and tabulated the amount of resistance offered the flight of a bird. It was from his observation of bird flight that he discovered the curved wing. Most of his glides were made with a monoplane, but in 1895, the year before his death, he developed a biplane glider.

Pilcher Follows Lilienthal

After his death, Pilcher, the Englishman, took up his work and built gliders with 300 sq. ft. of sustaining surface and weighing 55 pounds. Pilcher hoped with a very small engine, perhaps 4 hp. or a little more, to accomplish mechanical flight, but in 1899 he died as a result of a 30 foot fall in his latest glider, the Hawk. He used a tail plane on his gliders.

In America Octave Chanute, who had visited Lilienthal, started gliding experiments in 1896 with a Lilienthal type of glider. These experiments were carried out on the sand hills along the east shore of Lake Michigan, 30 miles from Chicago. He made glides of 8 to 12 seconds, making 200 to 300 in all. He used a steering tail and had one glider with five planes, one above the other. Chanute started his work when 60 years of age.

The Wright brothers were great students of Lilienthal, and from 1896 to 1902 were engaged in glider tests, mostly conducted at Kitty Hawk, N. C., where they went to work where winds were 17 to 20 m.p.h., a speed well suited for such work. The Wright brothers made hundreds of glides. They used a biplane design, and in a wind of 25 m.p.h. remained in the air 10 minutes and one second. The glider had an area of 308 sq. ft.

Langley Not a Glider

Samuel Pierpoint Langley, according to Charles M. Manly, who was a fellow-worker with Prof. Langley, did not attempt any gliding experiments, but confined all his efforts to mechanical flight, and the engine developed by Manly for the plane generated 50 hp. and weighed only 120 pounds, or 2 1/5 pounds per horsepower. The plane weighed 730 pounds and had 1040 sq. ft. of sustaining surface. Langley was well acquainted with Chanute and closely followed his gliding experiments, recognizing the value of such in the evolution of mechanical flight.

In discussing the results of the German flight, Manly said to-day:

A great deal can be learned from gliding tests such as the recent German ones. The perfection of airplane lines and minute studies of economies of power are certain to follow. While gliding experiments are only a means to an end, gliding tests will do a great deal to reduce aviation costs and indicate possibilities for the development of commercial aviation. All accomplishments in matters of this kind flow from thoughts of wide diversity of mental attitude. Experimental research in gliding, under very wide ranges of thought, will result in much improvement. The greater study of air currents is one great essential of aviation and gliding contests will greatly stimulate such.

Manly looks for much of the development to come from students and others not tied hand and foot by traditions, but who venture into unknown fields.

Curtiss Completes Glider

NEW YORK, Aug. 23—Coincident with the publication of the sensational results in the German trials, Glenn H. Curtiss, chairman of the executive committee of the Curtiss Aeroplane & Motor Corp., announces the completion of a glider by his company which will be given its first public tests on Great South Bay shortly after Labor Day.

Curtiss personally will fly the glider in the tests.

This biplane flying boat glider is constructed of wood, duralumin and silk. Its dimensions are: Weight (empty), 150 lbs.; loaded (one man), 310 lbs.; span, 28 ft.; chord, 60 in.; gap, 54 in.; length over all, 22 ft. 11 in.; wing area, 267.5 sq. ft.; hull, 13 ft. 2¼ in. long; beam, 30 in. The hull is made of duralumin and the glider is said to be capable of a speed of 20 m.p.h.

Curtiss is of the opinion that better results may be had in flying over water instead of land, and most of his experiments have been conducted in this manner.

New Process Gear Sale Postponed Until Sept. 6.

SYRACUSE, Aug. 22—W. C. Durant is expected to purchase the New Process Gear Co. of this city at the receivers' sale Sept. 6. The date for the sale was set originally as Aug. 23, but George R. Lunn, special master, announced that an adjournment had been decided upon.

It is understood that this was agreed to after a conference preceding the proposed sale when prospective bidders asked for time to complete negotiations to finance the purchase. The upset price is fixed at $1,900,000.

Plant Valued at $3,500,000

The New Process plant, a subsidiary of the Willys Corp., has been making gears for the Durant and Star cars for some time, and is valued at approximately $3,500,000.

Representatives of a number of automobile companies were on hand for the sale, and some deposited the required $50 000 certified checks to make them eligible for bidding.

Ford to Hold Tests in South America

Prepares for Tractor Demonstrations—Big Future in Industrial Field

NEW YORK, Aug. 22—The industrial use of motor tractors will be promoted in the foreign field by the Ford Motor Co. through the staging of industrial demonstrations such as have been held recently in various cities of the United States. According to information received here, demonstrations of this character are now scheduled to be held in Buenos Aires, Argentina; Montevideo, Uruguay, and Sao Paulo, Brazil, where the Ford company maintains factory branches, and in addition at Rio de Janeiro, Brazil, in connection with the company's exhibition at the Brazilian centennial.

The first of these foreign demonstrations will be held at Buenos Aires early in September and, in preparation for it, shipments of rubber-treaded tractor wheels and three-ton trailers have been made to the Argentine by Sherman & Sheppard of New York who control these products for Latin-American sales. The possibilities of industrial sales for motor tractors were said to be large, as the result of a recent meeting of Fordson agents in Buenos Aires. The local Ford manager there stated that a considerable part of their future tractor trade undoubtedly would be for such purposes. Similar expressions have come from the other South American cities.

Builds Locomotive

The Sao Paulo branch announced during July that it had completed the construction of a Fordson tractor locomotive that will be used for light haul work on the railroads in that district. This machine was rebuilt for rail uses in Brazil. It will be of particular value, it was stated, on sugar plantations because of the fact that it will not endanger fire from flying sparks as is the case with a steam locomotive.

Ford Boilers to Burn Oil During Shortage of Coal

DETROIT, Aug. 23—The Ford Motor Co. has equipped its boiler plant at the Highland Park factory with oil burning apparatus which will enable it to continue operations in full for the duration of the coal shortage. The change was made after an experiment with coke screenings which proved impractical.

Twelve million gallons of oil have been ordered and will be brought in largely over the D. T. & I. The company believes sufficient oil can be obtained to carry it through the coal crisis but it is not the intention to change to oil fuel permanently. The oil will be supplied to the boilers from a reservoir 3,000 feet from the engine room.

Bodies and Chassis Changed in Mitchell

Increased Price of $100 on Two Models Includes Additional Equipment

RACINE, WIS., Aug. 23—Mitchell cars with revised bodies and refined chassis are now in production. While there are changes in almost every part of the car, making the car a really new job, yet the fundamental design and construction is practically identical with the previous model. The car has been improved both mechanically and in looks, and in step with this advance in class is a slight increase in price in some body models.

Here are the new and old prices:

	Old Price	New Price
3-pass. roadster	$1,490	$1,590
5-pass. phaeton	1,490	1,590
4-pass. sport model	1,690	1,690
4-pass. coupe	2,050	2,050
5-pass. sedan	2,275	2,275
7-pass. phaeton	1,690	Not announced
7-pass. sedan	new	Not announced

A news item in the Aug. 17 issue of AUTOMOTIVE INDUSTRIES to the effect that Mitchell prices had been increased an average of $160 was perhaps misleading. As a matter of fact, the increased prices included more than that value in addition equipment which had been previously quoted separately. The new prices given here include wood wheels and without de luxe equipment. The net change, therefore, in prices is an increase of $100 on two models.

Bodies Redesigned

The bodies have been entirely redesigned, and the sharp lines have been replaced by curved lines. The same F-50 engine is used, but the tappet guide blocks are made in pairs now, instead of blocks of six. This has been done to relieve the stress on the cylinder block and in the guides themselves. The method of making the rear axle shaft and hub is new. A billet of steel 4 x 11 in. is used in forging out the entire axle and hub. The rear hub caps have been greatly increased in size.

The Mitchell line is now confined to two wheelbases, 120 and 127. The 7-passenger phaeton and 7-passenger sedan are mounted on the longer chassis, and prices on these models have not yet been announced. All other bodies are on the short wheelbase.

GASOLINE CONSUMPTION

WASHINGTON, Aug. 22—Reflecting the increased use of automobiles as the result of greater production during the spring and summer months, statistics compiled by the Bureau of Mines show that the domestic consumption of gasoline for the first six months of this year increased 16 per cent.

The production of gasoline for June amounted to 525,940,600 gallons, an increase of 12,000,000 over May and 51,000,000 gallons over April. Domestic consumption for May represents an increase of 41 per cent in consumption as compared with the same month a year ago, while a similar comparison for June shows a 14 per cent increase, a more nearly normal figure. Stocks for June were 10 per cent in excess of last June.

Imports of gasoline for June amounted to 3,986,655 gallons; exports were 52,730,998 gallons; and shipments to insular possessions were 1,872,776 gallons.

The output of lubricating oil for June was 80,138,257 gallons, which indicates a daily average increased production of 95,000 gallons. The seasonal demand for lubricants reduced stocks to a figure of 226,903,812 gallons on hand July 1, a decrease during the month of 39,000,000 gallons.

$2,760 Speedway Roadster Is Added to Stutz Models

INDIANAPOLIS, Aug. 23—An addition to the Stutz line has been made in the shape of the Speedway roadster, a sport model, which will list at $2,760.

Equipment is the feature of the newcomer, one of the new things being a circular trunk which fits into a specially designed well in the rear deck of the car. The trunk holds two large suitcases. In addition to headlamps and spotlight, the roadster is provided with two small cowl lights and a parking lamp mounted on the left rear fender.

Two extra wheels, fitted with cord tires provided with moleskin covers carrying the Stutz crest, are furnished. Other conveniences are the heavy double bar bumper, plate glass side windshields, adjustable cowl ventilator, automatic windshield cleaner, rear view mirror and individual scuff and step plates.

Few Dwellings Available For New Flint Employees

FLINT, MICH., Aug. 23—A review of the housing situation at Flint is causing some apprehension among factory executives and city officials, in view of the increased operations of existing factories and the pending opening of several new plants.

An investigation of manufacturing conditions shows that Buick is adding to its employees at the rate of 100 a day; Mason Motor Truck Co. and the Martin-Parry Corp. are about to open plants; Chevrolet declares that its force will be increased by about 3000 by next spring, and Durant building plans call for the completion of the Flint factory by spring.

There is no unemployment in the city now, and it is reported that all of the new help required will have to come from outside the city. There are fewer than 100 available dwellings reported, and many real estate agents report a waiting list of persons seeking homes in certain sections.

Builders and real estate men estimate that between 4000 and 5000 homes will have to be built within two years.

Navy Tests Packard Engine for Aircraft

Built to Government Specifications—Allison Reduction and Reverse Gear Used

WASHINGTON, Aug. 23—The Bureau of Aeronautics of the Navy Department announces the completion of a 300 hour endurance test of the Packard six cylinder engine, which has been built to meet the needs of the rigid airship ZR-1 which the bureau has undertaken to construct.

In this test the engine was mounted on a test stand under a shed, open at both ends. It turned a calibrated pitch club and was run at power corresponding to the cruising requirements of 250 b.h.p. at 1400 r.p.m. at normal cruising altitude of 6000 ft. At the end of the 110th hour the engine was given a wide open throttle run and developed 350 b.h.p. at 1555 r.p.m. In order to check any power loss, the engine was again opened up at the 300th hour and developed 365 b.h.p. at 1577 r.p.m., thereby showing a slight gain in power.

The fuel consumption for the entire 300 hours was .436 lbs. per b.h.p.

Description of Engine

The engine was built to the specifications of the bureau by Packard, while the reduction and reverse gear was made by the Allison Engineering Co. The motor is known as the Packard model 1-A six cylinder water-cooled engine, with 6⅝ in. bore and 7½ in. stroke, with a rating of 300 h.p. at 1400 r.p.m.

The Allison gear is a combined clutch and reduction gear. The clutch is of the multiple disc type and the reduction gear planetary with spur gears. The gear reduction permits of a propeller speed of 550 r.p.m. when the engine is turning 1400 r.p.m. The gear is fitted with its own lubrication system. Propeller efficiency at low engine speeds being required, the reduction gear was adopted, and the clutch is necessary in order to warm up the engine in the hangar without turning the propeller. The gear is fitted with a brake which is used to hold the propeller when the clutch is disengaged.

The ZR-1 is to be powered with six engines of 300 h.p. each, and it was necessary to design engines which would meet the needs of this airship. Not finding anything in the market to meet their needs, the Navy Department engineers on the board drafted specifications which have been met by Packard and Allison.

REDUCTIONS IN PATERSON

DETROIT, Aug. 18—W. A. Paterson Co., manufacturer of the Paterson car, has reduced prices on all its models as follows:

	Old Price	New Price
5-passenger	$1,550	$1,390
7-passenger	1,585	1,425
Coupe	2,595	2,395
Sedan	2,595	2,395

No Slump Apparent in Chicago Decline

Falling Off of Sales Slight—Dealers Feel Failure to Obtain Deliveries

CHICAGO, Aug. 21—It is the general opinion of close observers of retail automobile sales in and around Chicago that whatever effect the recent price reductions of a number of lines had was to slow up sales and that in the slowing the lines reduced suffered as much or more than other lines. Sales have fallen off so slightly, however, that it is doubtful whether any of the decline should be attributed to the price reductions. Certainly a seasonal decline of some degree was due after the unusual selling of June and July, and all things considered the decline in sales has been less than was expected and by no means great enough to be called a slump.

Some of the more popular medium priced cars are selling as well as at any time this season. The Chicago agency for a well established make selling under $1,000 is just as far behind with deliveries as at any time this summer and is now booking orders for delivery in 60 days. This company has lost many sales this summer because of this situation. A popular car in the high price class which was announced this summer is now being sold in Chicago for delivery in December at the earliest.

Catching Up with Deliveries

Some of the agencies for popular cars are catching up with deliveries and the ability of buyers to get fairly prompt delivery on the established lines has caused the cars not so well established to suffer some loss of sales.

The record of time sales compiled by the Central Automobile Finance Association shows that sales thus far in August have been about on the same level as July. For the first two weeks of July the time sales numbered 1973 and in the first two weeks of August the number was 1892.

Sales of closed cars have been running unusually heavy. A dealer with a large number of orders on hand for delivery as soon as possible finds that the orders for open cars exceed those for closed cars by only 20 per cent. Another dealer in a position to make deliveries within two or three weeks is making 80 per cent of his sales on the closed models.

Medium-priced cars are leading the field in sales right now with low priced cars running a close second.

IMPROVEMENT IN TEXAS

DALLAS, Aug. 21—There appeared to be some improvement in the automotive business in Texas during July and the first half of August. Dallas retailers reported increased sales of cars and trucks while accessory men said their business was holding its own. The general tire trade was some better but competition was keener, due to many merchants in other lines handling tires.

Tractor sales showed some increase and sales of trailers were picking up.

The outlook is regarded as promising better conditions in the trade. The cotton crop is now beginning to reach the market and the grain is moving. Automobile dealers stated they expect September and October to be among the best months of the year.

Good Outlook for Fall, Philadelphia Reports

PHILADELPHIA, Aug. 19—Reports for the past week reaching the Philadelphia Automobile Trade Association headquarters show that sales of new cars are fair. A few dealers claim to be considerably ahead of last year's figures.

Thus far this month sales of accessories and parts have been unusually good, notwithstanding the fact that a very large number of cars have been withdrawn from the immediate territory through the absence of their owners at resorts or on prolonged tours.

Some distributors of accessories state that July business was far ahead of the corresponding month a year ago, and that it looks as if August sales might be in the same class. A good start has been made, and the outlook for fall trade is regarded as particularly promising. Customers who have been holding back for some time will be compelled to make purchases in a month or so, if they wish to run their cars.

Business in the trailer field is quiet. The tractor trade, which took a small spurt following the recent Fordson show here, is again dull, and the truck business, which for a few weeks gave promise because of some large sales of units for fleets, appears to have subsided.

Portland Establishes High Record in July

PORTLAND, ORE., Aug. 16—July this year proved the greatest month in the history of Oregon in the number of new cars for which licenses were taken out.

It exceeded by almost 100 per cent any previous month of 1922. Despite the unusual record for July the present year thus far is still considerably behind the sales record for the first seven months of 1920, although many laps ahead of the corresponding period of 1921.

Two factors enter into the record made by July. These are a reduction of 50 per cent for July 1 in the license fee for the year, new cars being taxed only for the last half of the year and the fact that during July the state motor bureau began arresting dealers for what it asserted was improper use of dealer licenses. As a result many of the dealers gave up their dealer licenses and began licensing their new cars immediately upon arrival, passing the cost of the license on to the purchaser. Several hundred cars were thus licensed in July which were not sold until August.

Program Made Ready for Steel Meeting

Two Societies Will Hold Exposition and Convention in Detroit, Oct. 2-7

DETROIT, Aug. 21—The fourth international steel exposition and convention of the American Society for Steel Treating the American Drop Forging Institute will be held in the General Motors building here Oct. 2-7.

The annual banquet of the two organizations will be held jointly in the ball room at the Statler, with C. F. Kettering, president of the Dayton Engineering Laboratories Co. and a member of the American Society for Steel Treating since its organization, serving as toastmaster. President Burton of the University of Michigan will be one of the speakers as will the Governor of Michigan and some chief executives of the largest steel companies in the country.

Among the plants to be visited by the delegates are the following: Ford Motor Co.'s Highland Park plant; Ford Motor Co.'s River Rouge plant, Cadillac Motor Car Co., Central Forge & Gear Co., Lincoln Motor Car Co., Detroit Steel Products Co., Detroit Twist Drill Co. and Hudson Motor Car Co.

Papers to Be Presented

Several papers of interest to the automotive industry will be read, among them being: "Carburizing and Decarburizing in Case Hardening," H. B. Knowlton; "Case Hardening," A. H. d'Arcambal; "Irregularities in Case Hardened Work Caused by Improperly Made Steel," E. W. Ehn; "Some Features of Industrial Heat Treating Electrically," C. L. Ipsen; "Heat Treating of Automobile Springs," A. E. Fuller; "The Uses and Abuses of Tool Steels from the Standpoint of the Producer and Consumer," W. P. Woodside; "Effects of Structure upon Machining of Tool Steel," J. V. Emmons; and "Heat Treatment and Properties of Duralumin," H. C. Kneer.

Buffalo Is Satisfied with Business of Year

BUFFALO, Aug. 19—Buffalo's automobile dealers are well satisfied with the business done so far this year, and are correspondingly pleased with the fall trade outlook.

July's business ran ahead for June, which had showed some falling off compared with May, when sales were slightly less in volume than in April, the banner month of the year.

Some of Buffalo's retailers in medium priced field complain of being unable to get deliveries from their factories on certain models, and say the volume of their sales during July would have been considerably greater if their factories had been able to supply their demands.

Year Closes in Peru With All Stocks Sold

Next Big Impetus Comes with Summer Season Opening in December

LIMA, PERU, July 31 (*By Mail*)—The celebration of the national holidays of Peruvian independence the last days of July marks the close of the automobile year in Peru. Business in automotive lines prior to these holidays is always very brisk, because the public likes to ride in new and newly equipped automobiles at this time.

The close of the automobile year in Peru finds the merchants practically sold out of all cars that they had in stock, so that they have a clean slate with which to begin the new automobile year.

Motor Buses Increase

The next big impetus, after the national holidays, that comes to the automobile business in Peru, is the opening of the summer season in December. There is not a great deal of difference between winter and summer in Peru, but as there is more sunshine and more pleasant weather in summer, sales of motor cars and motor car equipment always pick up in December with the beginning of the South American summer.

During the last year motor buses have increased from 1 to 60, and a continued equally rapid growth is only prevented by lack of well paved streets and good roads. Most of the buses are built on the Ford truck chassis, but there are two Renault, two Chevrolet, two Graham Brothers and three Benz. The latter are double deckers, the first German automotive success in Peru since the close of the great war.

Good Roads Support Urged

American manufacturers who are interested in the sale of automotive products in Peru should urge their agents to inaugurate, push and support good roads movements. In 1917 the National Association of Manufacturers of New York issued a pamphlet giving the number of automobiles in the different countries and the potential capacity. Peru was put down with 500 automobiles and a capacity of 3000. The 1922 book of Facts and Figures of the National Automobile Chamber of Commerce gives the present number of automobiles and trucks in Peru as 3900. The limit set five years ago has been reached and passed. A like rapid growth in the future will not be possible unless there is an inaugurated and feverish activity in road building. Why is it that Americans and Peruvians are so slow to realize this?

Exchange has hovered above $4 for Lima in New York, and about 9 per cent premium for Lima on London. A year ago exchange on London was more or less the same as now, but exchange on New York was $3.27. The improvement in New York exchange has greatly heartened the trade in Peru, and the tendency is toward further improvement.

An increase in the price of Peru's principal exports, as for example, a rise in the price of cotton, copper, sugar, wool, would greatly improve automotive prospects. A marked movement in any of these products should be a signal to the American manufacturer to push harder for business in Peru.

The automotive business in Peru has got its second wind. If concerted action is taken along certain lines—road improvement and elimination of certain trade abuses—there is no reason why the business cannot continue to grow in the future as it has done in the past.

Rest of Year Holds Out Good Prospects

(*Continued from page* 386)

and that the rest of the builders will rely on new models or public acceptance of current models for their sales appeal from now until the 1923 shows.

New models for 1923 are making their appearance every week. The list already is quite formidable and will continue to grow until the closed car shows of September and October, when most makers will have finished their alterations in chassis and body design until the advent of the mid-winter shows. As in the past, a good many of the 1923 cars now offered to the public will stand without change for a twelve months' period. The growing recognition of the closed car as the year round car is giving impetus to the making up of a long list of fall shows which will foster this movement.

It seems certain now that the automotive industry will go through to the end of the year making substantial profits for its widely scattered stockholders, giving employment to its workers on virtually a 100 per cent basis and providing business for many industries which but for the patronage of the motor vehicle makers would have put in a disastrously slim year.

ENCOURAGEMENT FROM WEST

DETROT, Aug. 21—Reports on conditions brought in by executives of prominent automobile companies who have been traveling through the west are encouraging. Corn, they say, is in good condition and promises a profitable crop. When the corn money comes in the farmers will be in a better financial condition than they have been for some time and this will help in the sale of cars. Conditions, too, are improving in Utah, where the copper smelter works were closed for some time. Now they are in operation again, giving employment to a large number of men.

Receiver Is Named for Supreme Motors

Seen as Part of Movement Leading Up to Possible Automotive Merger

CLEVELAND, Aug. 24—N. A. Wolcott of Warren, Ohio, has been appointed receiver of the Supreme Motors Corp. of Warren by Federal Judge D. C. Westenhaver of this city. The appointment was made on the application of the Trumbull Manufacturing Co., Park Hardware Co. and Aetna Foundry Co., Warren, concerns which sold materials to the corporation.

It is said that this step was anticipated by both creditors and stockholders and really is a step taken to determine the status of the company and check its assets and liabilities. It follows rumors of a possible merger with several parts making concerns and a prominent automobile manufacturer. It is believed the action was started to make this merger possible.

A receiver had been appointed previous to the action in Cleveland by the common pleas court of Trumbull County, in which the plant is located. This is said by the petitions in the Federal Court to have been an act of bankruptcy. Assets of the plant are placed at $300,000 in real estate, buildings and machinery and $250,000 in personal property. Liabilities are not given.

The Supreme Motors Co. has been in operation for about three years and is incorporated for $5,000,000.

Strike Settlement Heartens Milwaukee

(*Continued from page* 388)

hands of purchasers at the time of closing the deal. Quantity deliveries of new cars as yet are slow, which is true particularly of closed types.

At the same time the demand for closed cars is relatively much heavier than at any time in the history of the business. It is a matter of much favorable comment among buyers that manufacturers have succeeded in bringing the cost of closed types closer to the price of open cars.

As might be expected, dealers in cars that have not been reduced in price encounter constantly the expression of a conviction on the part of their prospects that they will be able to buy more cheaply later.

RECEIVER FOR SHAPER MAKERS

MILWAUKEE, Aug. 21.—The Milwaukee Shaper Co. has been placed in the hands of a receiver on petition to the circuit court by the Allis-Chalmers Manufacturing Co. and other creditors. Julius J. Goetz has been appointed. The company was one of the largest manufacturers of shapers and similar metal-working tools in the Middle West.

Spanish Duty Same to U. S. and France

Readjusted Tariff Clauses Give America Most Favored Nation Treatment

WASHINGTON, Aug. 22—Motorcycles, automobiles, motor trucks, chassis and detached parts, and rubber products, including tires, made in the United States are included in products which are given the benefit of reductions in Spanish tariff duties. These reductions are similar to those recently granted to France as a result of the Franco-Spanish treaty and give assurance that American products will continue to enjoy most-favored-nation treatment from Spain.

The concessions and duties granted by Spain to Switzerland by the treaty of May 16, 1922, which in practice already had been extended to similar American products, are likewise confirmed by the present order of the Minister of Finance of Spain.

Owing to conflicting interpretations on the part of the Spanish customs officials as to the application of the concessions granted to France to similar products of other countries, a definite ruling from the Spanish Minister of Finance was informally requested by Commercial Attache Cunningham, working in co-operation with the American Embassy. The concessions in duties granted to France by the terms of the Franco-Spanish treaty and extended to the United States amount to reductions of 20 to 25 per cent from the second column which has heretotore been the minimum scale of import duties into Spain.

Reductions Listed

Among the principal lines of goods affected by these reductions, which are of interest also to American exporters, are the following, together with an indication in each case of the approximate amount of reduction from the second column:

	2nd Tariff ad valorem	French Rate ad valorem
Motorcycles	25%	20%
Automobiles	25% to 30%	15% to 25%
Motor trucks	20%	15%
Chassis and detached parts	25%	15%
	Pesetas Per Kilo	Pesetas Per Kilo
Rubber manufactures including tires but not toys or waterproof fabrics	2.40 to 8	2 to 7

The tariff listed as the second is that which previously applied to American products. The rate now will be similar to that of the French.

CORRECTION

Through an error in the report of the filing of the Weiss suit against the Goodyear Tire & Rubber Co., which appeared in AUTOMOTIVE INDUSTRIES in the issue of Aug. 10, it was stated "the suit claims the company's profits, if $20,000,000 a year, will mean a bonus of $5,000,000 in addition to the $250,000 to the Kennedy company." The article also states that the profits were $240,000,000 in 1919.

The $5,000,000 bonus figure, it is pointed out, obviously should be $500,000 and the $240,000,000 profit item for 1919 should be (and was so stated in the plaintiff's petition) $24,000,000.

FINANCIAL NOTES

Spicer Manufacturing Corp. reports net profits of $498,968 for the quarter ended June 30, 1922. After expenses and interest charges are deducted this is equivalent after preferred dividends to $1.40 a share earned on common. Sales amounted to $2,889,221, cost of sales $2,194,321 and administrative selling and general expenses, $124,411. Preferred dividends amounting to $60,000, leaving a surplus of $438,968.

Hayes Wheel Co. reports net earnings of $130,381 for July, as compared with $125,242 in July last year. For the seven months the total was $640,712, compared with $309,395 to the close of July a year ago. Current assets as of July 31 were $3,764,609 and current liabilities $1,139,081. The usual quarterly dividend of 50 cents a share payable Sept. 15 to holders of record Aug. 31 has been declared.

Moreland Motor Truck Co., Burbank, Cal., is offering a new issue of $1,000,000 additional stock, equally divided between common and 7 per cent cumulative participating stock, both of $10 par value, which will about double the company's capitalization. The Moreland company has eight direct factory branches in California and one in Washington. It employs 400 persons.

B. F. Goodrich Co. will call for redemption on Oct. 1 all of the five year 7 per cent convertible gold notes now outstanding at 103 per cent which were issued under the trust indenture dated April 1, 1920, made with the Bankers Trust Co. of New York. After Oct. 1 interest on these notes will cease.

Stewart-Warner Speedometer Corp. has called for redemption Sept. 1 at par and a premium of 4 per cent and accrued interest all of the outstanding five year 8 per cent convertible bonds, which total $1,667,000.

Wisconsin Top Manufacturing Co. of Racine, Wis., has increased its capital stock to $600,000, consisting of 5,000 shares of common and 1,000 of preferred with a par value of $100 each.

Van H. Cartmell, Former Tire President, Is Dead

SPRINGFIELD, OHIO, Aug. 23—After an illness of two years from heart trouble, Van H. Cartmell, aged 72, former president of the Kelly-Springfield Tire Co., died to-day at the home of his son, Robert Cartmell. Cartmell became identified with the company in 1894 as general sales agent at Boston. In 1903 he was elected president and in 1920 retired from the company. Cartmell is survived by his widow and three sons, Van H. Cartmell, Jr., of New York City, Carl Cartmell of Buffalo and Robert Cartmell of Springfield.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Last week call loans covered a range of 3 per cent to 4 per cent, as compared with 3½ per cent to 5 per cent in the previous week. The situation remained comparatively quiet for fixed date maturities, although considerable business was transacted in the shorter maturities. The quotations were 3½ per cent for 30 days, 3¾ per cent to 4 per cent for 60 days, 4 per cent for 90 days, as compared with 4 per cent to 4¼ per cent for all three maturities in the previous week. Four and five months' maturities continued at 4 per cent, and six months at 4¼ per cent to 4½ per cent. No very large individual transactions were noted. The prime commercial rate remained unchanged at 3¾ per cent to 4 per cent.

On Aug. 14 the Kansas City Reserve Bank reduced its rediscount rate from 5 per cent to 4½ per cent on all classes of paper, and on Aug. 15 the Minneapolis institution announced a similar reduction. With the exception of the 4 per cent rate now maintained by the Boston, New York and San Francisco banks, the Federal Reserve Banks have a 4½ per cent rate.

The increased failures in the South and West last week overbalanced the decrease noted in the East and Pacific sections, and thus a total of 415 failures was recorded as compared with 402 in the previous week and 357 for the corresponding week a year ago. Of this number insolvencies involving liabilities of $5,000 or more amounted to 235 or 56.6 per cent of the total, as compared with 248 or 61.7 per cent in the previous week, and 188 or 52.3 per cent for the corresponding week in 1921.

During the month of July, wholesale and retail costs of food and other commodities took a turn upward, according to the Bureau of Labor index; retail prices averaging a 1 per cent increase and wholesale a gain of 3½ per cent, as compared with June prices. As compared with July, 1921, the general price level advanced about 10 per cent, the largest increase being that of 36½ per cent for the cost of fuel and lighting.

After June's record figure for the current year, bank clearings for July at 111 cities, amounting to $30,674,990,000, showed a decrease of a little more than 7 per cent. This total is, however, an increase of 16 per cent over that for July, 1921.

NEW OLDSMOBILE BODY

LANSING, MICH., Aug. 22—Production has started on a new Oldsmobile body which will be mounted on the standard, four-cylinder chassis. The body is a brougham and will sell at $1,425, f.o.b. Lansing. The body is designed to seat five passengers, the entrance being to the front compartment and by means of a tilting front seat to the rear compartment.

INDUSTRIAL NOTES

Seaman Body Corp. of Milwaukee, in which Charles W. Nash holds an important interest, has let all contracts for the erection of extensions which will increase the capacity about 100 per cent by Nov. 15 or Dec. 1. The present plant was erected a little over two years ago, when the old W. S. Seaman Co. of Milwaukee formed a community of interest with the Nash interests, the outgrowth of which was the Seaman Body Corp. The extension will consist of an ell-shaped four-story building, 100 x 423 and 325 x 100 ft., of concrete and brick and will cost about $400,000 fully equipped. Harold H. Seaman is secretary of the company.

Wico Electric Co., Springfield, Mass., manufacturer of motorcycle batteries and magnetos for stationary engines, has received bids for a new building to be started Sept. 1 and completed by the beginning of 1923. It will be a one-story structure, 400 x 90 feet and the first of five units. The company is now doing a business exceeding that of the peak of production in the wartime period, and purposes to double its employment force upon occupation of the new building. It is stated that contracts now in hand or in negotiation are sufficient to run the plant through 1923.

Kissel Motor Car Co. of Hartford, Wis., has started construction work involving $100,000 on a large power plant and boiler house which will supplant its present heat and power generating system. Three 300-hp. Sterling boilers will be installed, together with additional dynamos, generators, and other equipment. The Kissel plant also is undergoing general improvement and enlargement, the present construction including new dry kilns and lumber curing facilities for the wood-working and body shops, wherein all Kissel passenger car and motor truck bodies are built.

Western Reserve Cotton Mills Co. of Georgia, manufacturer of automobile tire fabric, advises that the new machinery to be installed in the Millen, Ga., plant represents an investment of about $75,000, and will almost double capacity of the plant. Tire demand has increased so rapidly of late that officials of the company state they are unable to keep up with demand though the mills are operating day and night.

Fernald Manufacturing Co., Inc., has taken over the business of the Clear-O-Scope Co., Angola, Ind., thus adding to the Fernald line the Clear-O-Scope windshield cleaner, which is largely sold in the original over-the-top type. In addition to this model the Fernald company has taken over the newly perfected Clear-O-Scope standard models, which will shortly be put on the market.

LaCrosse Motors Equipment Co. has been established in LaCrosse, Wis., to specialize in the manufacture of a new design of piston ring, known as the LaCrosse Triple Seal. The men interested are Jerome H. Chopiska, J. V. Nigro and Frank Chopiska, formerly with Chopa Piston Ring Co., Auburn, Ind.

Wilson Foundry and Machine Co., is building an addition to the transformer house at its plant in Pontiac. It will be 40 feet square, of fire-proof construction.

Lancaster Tire & Rubber Co., Columbus, has installed machinery and made factory extensions which has brought the output of the plant to 1200 tires daily.

ELECTRIC SHOW IN OCTOBER

NEW YORK, Aug. 22—The annual electrical and industrial exposition will be held at the Grand Central Palace, Oct. 7 to 14. As in former years electric trucks and passenger cars with their accessories will form an important department of the show. Incidental to the expositions a parade of electric trucks will be held on Oct. 10. The purpose of the parade is not so much to show the different styles of electric vehicles as to demonstrate what the electric is doing for the solution of traffic problems.

Selden Features Name of All Truck Branches

ROCHESTER, N. Y., Aug. 22—The building and facilities of the Hartnett-Stewart Motor Co., Chicago, have been taken over by the Selden Truck Corp. and will be operated as a direct factory branch. The branch will be known as the Selden Sales & Service Co., with James W. Stewart as branch manager.

The Hartnett-Stewart Co. has represented the Selden Truck Corp. in Chicago since the first of the year. The Selden Sales & Service Co. will be a combination of the Atlas Truck Corp. and the Selden Truck Corp. branches. J. Ira Hartnett will remain as Selden sales manager and Randall H. Crouse will be the Atlas sales manager.

At Philadelphia, the Atlas Truck Corp. branch has been united with the Selden branch to operate as the Selden Sales & Service Co. handling both Atlas and Selden trucks. George H. Covert will remain as branch manager in charge of Selden sales. H. A. Woodruff will continue in charge of Atlas sales.

At York, Pa., another branch operated as the Selden-Atlas Sales & Service Co. has been opened with H. M. Heiges as manager.

Nine branches are now in operation.

Massachusetts Limits Total Truck Weights

BOSTON, Aug. 18—A Massachusetts law effective next month places at the discretion of local officials the use of trucks on the public highways where the weight of vehicle and load exceeds 10,000 pounds.

Out of all the 50 bills introduced, the legislature passed but five. The truck law was a compromise. After the big fight on motor truck fees and a tax of one cent on gasoline ended in the defeat of these measures, the Department of Public Works centered its efforts on a bill to lower the weight limit, which now allows 28,000 pounds.

A bill was under consideration to cut this down to 20,000 pounds. As the department urged a lower limit on the ground that heavy trucks were destroying the roads, especially in the spring, the compromise was granted to allow holding up heavy traffic, if necessary, at that time. The law stipulates that local officials shall determine when the trucks of 10,000 pounds or more shall be kept off the roads.

Another law declares that no tail light shall be used on any motor vehicle until approved by the motor vehicle registrar.

METAL MARKETS

Recent price advances by the leading interests in the steel market, while expressive of the higher production costs forced upon the steel industry by the coal strike and other adverse factors, were not made for the purpose of attracting new business. Ordinarily an announcement of higher prices brings out a certain amount of new business, many buyers assuming that the tendency of the market is in an upward direction, and so they prefer covering their requirements at the first advance to waiting whether others will follow or not. In the present condition of the industry, however, producers are not figuring on any fresh demand developing over the next few months. They have enough orders on their books to keep their plants in operation at the curtailed rate of production which scarcity of fuel and, in a few instances, efficient mill labor have brought about.

The higher prices recently announced by the leading interest's sheet mill subsidiary are therefore, different in purpose. In the first place, they serve as an incentive to consumers who have placed orders at $2 to $5 a ton lower figures than the new levels to accept shipments of this material and not to ask for deferment of deliveries. Then again these advances, although the resulting prices are strictly nominal in character, serve to give producers a more advantageous position when there comes a revival of demand and a new market is being made.

In some quarters it was even said that price advances by many of the producers might be looked upon as a convenient means of keeping buyers away. That, however, is a palpably faulty conclusion. The mills are naturally anxious to fill the orders which they have on their books, and until coal becomes more plentiful, they will have to strain all their resources to fulfill the obligations to which they are committed. If there were, however, any consumers ready to talk November or December shipments, many mills would be only too glad to listen. The trouble is that consumers' operating schedules have been so upset that many of them are far more perturbed about securing postponement of steel shipments than about their requirements eight or ten weeks hence. The future of the industry is wrapped up in the coal and transportation situation.

Pig Iron.—It is a large question whether the output of pig iron is shrinking more rapidly than the demand. High prices are being quoted, but many automotive foundries enjoy special consideration as old customers. The market generally rules 50 per cent higher than it did a year ago.

Steel.—Producers state that quite a few automotive consumers have asked postponement of steel shipments because of their inability to obtain fuel for maintenance of their operating schedules and, in some instances, because steel urgently needed is not coming forward which makes shipment of other steel parts a waste of effort. The price for sheet bars is up in the air. Nominally $35 is still quoted but expectations are for a $37 to $39 market. Forging bars, cold-finished bars and cold-rolled strip steel are firm without much automotive demand.

Aluminum.—Passage of the new tariff law by the Senate has caused somewhat greater activity in the aluminum market. Some business has been done in sheets as well as in ingots. The heavy stocks of the latter operate against what might otherwise be a sharply advancing market.

Copper.—The market is quiet and steady.

Calendar

SHOWS

Aug. 26-Sept. 1—Toronto, Ont., National Automobile Show held in conjunction with the Canadian National Exhibition.

Sept. 4-9—Indianapolis, Automobile and Accessory Show in conjunction with the Indiana State Fair, Auto Show Building, under the auspices of the Indianapolis Automobile Trade Association, J. B. Orman, manager.

Sept. 23-30—New York, Closed Car Show, Grand Central Palace.

Oct. 7-14—New York, Electrical and Industrial Exposition, Grand Central Palace.

Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8-13—Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Sept. 1922 — Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Associação Automobilista Brazileria.

Sept. 15-20—The Hague, Automobile Show.

September — Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.

Oct. 4-15 — Paris, Automobile Show, Grand Palais.

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

CONVENTIONS

August 28-Sept. 2 — Detroit National Safety Congress.

Sept. 18-23, 1922 — Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

Sept. 13, 14, 15—Buffalo, Lafayette Hotel, Annual credit meeting, Motor and Accessory Manufacturers Ass'n.

Oct. 2-7—Detroit, Fourth International Steel Exposition and Convention of the American Society for Steel Treating and the American Drop Forging Institute, General Motors Building.

Oct. 18-20—Chicago, National Association of Farm Equipment Manufacturers, Congress Hotel.

Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

RACES

Sept. 16—Kansas City Speedway, 300 mi. International Speed Race.

Australian Market Waits Development

WASHINGTON, Aug. 21—A revival of the automobile business in Australia has been reported to the automotive division of the Department of Commerce by the American Consul at Melbourne. Import figures to that country show that during the past twelve months the imports have fallen to pre-war numbers. The automotive industry in Australia, insofar as the domestic production is concerned, is still confined to body building and the assembling of cars from imported and locally manufactured parts.

Body building is encouraged by high tariffs on imported bodies and a regulation prohibiting the entry of more than one automobile body to every three chassis and one truck body to every five chassis. As a result of this prohibition approximately 95 per cent of the cars imported arrive without bodies.

Motor Vehicle Use in Infancy

The potential market for automotive products is very large as the use of motor vehicles is yet in its infancy, the horse still being the principal means of conveyance, outside the principal cities. Automobiles are being used, however, in place of railroads and bus lines are being developed as a means of transportation between new districts and the cities, where ordinarily a railway would serve their transportation needs. The indications are, however, that because of the first cost in favor of the bus transportation the development of automotive transports in progressing fast.

It is estimated that the replacement market averages about 2,000 cars per year. Although Australia ranks fourth among the countries of the world in the number of cars per capita with one person in sixty-four owning an automobile, the registration amounts to only 78,517. Within the past three months the imports of passenger cars from the United States and Canada has totaled over 1000 per month.

The principal demand during 1922 and 1923 will be for medium priced cars, accessories and all classes of material for body building and fitting, the report states.

Maxwell Is Using Canal in New York Shipment

DETROIT, Aug. 23—Shipment of 40 automobiles from the Maxwell plant by an all water route through the New York State barge canal and thence down the Hudson to the Colt Stewart Co., New York City, will be made the subject of considerable publicity by the State of New York in its campaign to show the practicability of the barge canal for all water shipments to the seaboard from Great Lakes cities.

The publicity attending the shipment is not supported by factory officials because of the strong feeling which Detroit shares with other Great Lakes cities for the development of the St. Lawrence River project which would open the lake to sea-going vessels. The State of New York, however, has seized the opportunity to back its opposition to the St. Lawrence project by making the shipment the subject of favorable barge canal propaganda.

The activity of state officials has been somewhat upset by the sinking of the tug which was drawing the barges while enroute through the canal, fortunately, however, without damage to the barge upon which was carried the automobile shipment. The trip was resumed with the arrival of another tug and the automobiles will in due course of time reach New York.

Belgian Grand Prix Won by De Tornaco

BRUSSELS, Aug. 14 (*By Mail*)—De Tornaco, on an Imperia-Abadal, won the 183 cu. in. class in the Belgian Grand Prix road race, by covering 372.8 miles in 6 hrs. 44 min. 38 sec., thus averaging 55.2 m.p.h. Lagache, on a French Chenard-Walcker, was the second man home in 7 hrs. 17 min. 16 sec. In the 122 cu. in. class the only car to finish out of four starters was a four cylinder Bignan, driven by Gros, who averaged 47.8 m.p.h.

As a race the Belgian Grand Prix was disappointing. The rules, which limited the number of cylinders to four, the number of valves to two per cylinder in the 122 cu. in. class, and called for four seater bodies in the 183 cu. in. class, were responsible for the small number of entries.

The team of Metallurgique cars, in the 183 cu. in. class, went out early with broken connecting rods. Derny's Imperia-Abadal had cardan joint trouble; Dauveigne broke a valve cotter on his Chenard-Walcker and for three-quarters of the distance only the winner and Lagache on Chenard-Walcker were in the race. The latter finished on three cylinders, owing to a broken valve.

Moline Companies Active

MOLINE, ILL., Aug. 23—Survey of industrial conditions in the Moline manufacturing field this week indicated a steady revival of business and the prospect of continued increases. Deere & Co. is headed toward a full-time full-force production schedule; Moline Plow Co. expects marked increase within two months; the reorganization of the Stephens Motor Co. is expected to be "turn in the tide" for that company.

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Why Henry Ford Wants Muscle Shoals

Natural resources combined with tremendous water-power development make possible industrial development of striking magnitude. The South is eager to have Ford secure the Muscle Shoals project.

By James Dalton

WHY does Henry Ford want Muscle Shoals and why does the South want Henry Ford?

What and where is Muscle Shoals?

What magic is there in the Tennessee River at that point?

What are the natural resources within this district?

Why do the aluminum and fertilizer trusts object to the development of these resources by Ford?

These are some of the questions which have been agitating the minds of millions of persons in the United States ever since Ford made his now celebrated offer to the War Department to take over the property which had been half developed when the armistice put an end to the expenditure of fabulous sums of money for the production of munitions and other materials of war.

From a casual reading of the millions of words of testimony taken before committees of Congress and from a perusal of the other literature on the subject, it would appear that Ford's main object is to manufacture fertilizer more cheaply than the present makers.

In order to answer some of these questions intelligently the editor of AUTOMOTIVE INDUSTRIES visited Muscle Shoals and gleaned the facts available there. Information was not difficult to gather for the subject is one of burning interest to everyone from cab driver to bank president.

Nor is the interest in Muscle Shoals confined to the "tri-cities" of Sheffield, Florence and Tuscumbia,

THIS is the best article Automotive Industries has had the pleasure of publishing in many months.

It goes to the heart of the Muscle Shoals discussion and tells the automotive industry why one of its leading representatives wants the opportunity to develop this big project.

The story reads like a romance of industry. If you read the first two pages, you will need no urging to go on.

Like many other industrial romances, this one has an intensely practical application.

which surround them. It is general throughout the South, and with good reason. Northerners have no conception of what development of resources now going to waste will mean to the South.

Let it be taken as a text that if Ford gets the property now controlled by the Government the biggest industrial city in the South and one of the biggest in the United States will spring up within ten years in a country now sparsely populated. Ford has said that he will spend $50,000,000 for manufacturing plants at Muscle Shoals.

This bald statement may sound like an unwarranted exaggeration, but it is not. Sooner or later there will be unfolded on the banks of the picturesque river, winding through northern Alabama only a few miles from the border of Mississippi, one of the most astounding industrial romances history ever recorded. If the Ford offer is accepted, the story will be written in the comparatively near future, but if it is declined the writing may be deferred for years. Only inconceivable governmental stupidity and selfishness can prevent it permanently.

Missionaries have been preaching the development of the entire Tennessee River and Muscle Shoals in particular for many years—"missionaries" is the correct term for their message has become a gospel with them. Their words fell on deaf ears, however, until the necessities of war stripped some of the politics away from natural resources and the War Department began its gigantic development which was destined not to be finished in time to be of great service in helping defeat the Teutonic allies.

PRIMARILY, the Tennessee River at Muscle Shoals is rich in water power. This is its chief claim to fame. While it has no plunging cataract, Muscle Shoals is known justly enough as "the Niagara of the South." Engineers declared there is nothing in the United States save Niagara Falls which can be compared to it as a source of hydro-electric power.

Muscle Shoals is that section of the Tennessee River about midway between Nashville and Chattanooga, with a total fall of 130 ft. in thirty miles of rapids. The force latent in these rapids, when it is fully developed, will produce from 900,000 to 1,000,000 hp. The significance of this statement is found in the fact that the total of hydro-electric power now developed in this country is estimated at only 8,000,000 hp. In other words, Muscle Shoals can develop one-eighth as much water power as there is now in use.

It probably will be agreed unanimously that it is an economic crime to have all this power going to waste.

But water power alone would not take Henry Ford down into Alabama. Other sections of the country have tremendous supplies of undeveloped water power. Nor would the opportunity to make synthetic nitrate take him there.

BUT no one has found elsewhere in this country, up to this time, an unlimited supply of cheap power with practically all the raw materials needed for the construction of automobiles and farm implements almost literally in the backyard. In this lies the answer to the opposition of various interests to acceptance by Congress of the Ford offer.

Here are some of the things of which Ford could get unlimited supplies within a radius of 125 miles of Muscle Shoals:

Bituminous coal from which is obtained beehive and by-product coke.

Iron ore which will produce high grade pig iron particularly adapted for automobile and machinery castings, within 25 miles.

Bauxite, which is rich in the alumina from which aluminum is made, within a stone's throw of Sheffield.

Limestone for foundry fluxing purposes.

Cement rock.

Forests which will provide maple, hickory, elm, walnut, beach, oak, poplar, cedar, chestnut and pine.

Cotton suitable for tires and fabric.

Kaolin, a very pure white clay which is a hydrous silicate of aluminum.

Chert, a mineral closely allied to flint.

What more could a man in the business of manufacturing motor vehicles and farm machinery ask?

Nor should it be assumed that Muscle Shoals is in a remote and inaccessible district.



The Wilson Dam

The Tennessee River, open all the year, affords water connections with the Ohio and Mississippi rivers. It connects with the Ohio at Paducah, Ky., and thence by the Ohio and Mississippi with Memphis, Vicksburg, New Orleans and the Gulf of Mexico, all the way down stream. Cargoes can be floated up-stream on the Ohio to Evansville, Louisville, Cincinnati and Pittsburgh or along the Mississippi to St. Louis and farther upstream.

Ford could easily send barges up the Ohio to connect with his D. T. & I. road. He also could get a substantial freight differential by floating his products to the Mississippi and loading them on the west bank.

Three railroads center at Sheffield on the south bank of the river in the heart of the Muscle Shoals district. They are the Southern, the Louisville & Nashville and the Northern Alabama. The Illinois Central has announced that it will enter the territory when industrial developments warrant it in doing so.

Is it strange that Ford is eager to gain access to this wonderland? Is it to be wondered that Alabama and the entire South want him for an adopted citizen?

The common or garden variety of imagination gets tied up in bow knots trying to picture what would happen if Congress should permit Ford to bring his tremendous wealth and undeniable industrial genius to bear upon these limitless natural resources.

The people of Sheffield and Tuscumbia see visions of another Detroit. The citizens of Florence, just across the river, are not quite so enthusiastic—on the surface—but they are just as much interested.

When the Government undertook its gigantic development they had a taste of what intense industrial activity might mean to them, but the cup of joy was snatched from their lips when work was suspended. They thought perhaps their dreams were coming true, but now they have no illusions about what the Government will do with the power it will be possible to develop with the Wilson dam, for the completion of which Congress has appropriated $7,500,000 available Oct. 1.

These people of the tri-cities are more or less blasé. They know what it means to have from 20,000 to 30,000 strangers within their midst. They had that many when operations at Muscle Shoals were at their height. But that is not enough.

These visionaries, if visionaries you can call them, can close their eyes and see both banks of the Tennessee for miles and miles lined with great industrial plants. They know what these plants will bring in their wake in the way of population and civic expansion. It unquestionably is true that many of these people will benefit tremendously financially, but their interest is not all selfish. If it is selfish it is no more reprehensible than that of the citizens of other cities who are striving to build up their home towns.

Even the possibility of this tremendous expansion has brought about a real estate boom. It is significant, however, that it was a substantial Detroit real estate dealer, familiar with the life history of Henry Ford, who led the way. It was he who spent approximately $100,000 in the purchase of farm land along the main road from Sheffield to Muscle Shoals. This land never had brought more than $100 an acre and he paid $250 for it. He has cut it up into plots and is holding them to reap a golden harvest when Ford comes.

Compared with him the native real estate men are pikers. As a matter of fact they are Samaritans, for the Chamber of Commerce has decreed that the time shall never come when artisans and mechanics will not be able to buy for $750 a 5-acre plot, within easy distance of their work, on which they can build a cottage or a bungalow and still have land enough left to provide a pleasant lawn, fruit trees and a small farm.

These men of Alabama are not conscienceless profiteers. They do not propose to squeeze the last nickel out of the multitude which industrial development will bring as neighbors. They will be content to profit almost incidentally and leave the rest to their descendants. They are no paragons of virtue, but they have a little milk of human kindness in their breasts and they don't propose to throttle by selfishness a potential stream of riches. Then, too, they have vision and that is something given to comparatively few practical people. But back of that is the fact that they are Southerners, proud of their heritage and convinced that the South some day will be as great industrially as the North, or East or Middle West. To this end they are willing to sacrifice some of their own profits.

The country has been pretty well informed about the Wilson dam, control of which after it is completed by the Government, is one of the essential features of the Ford offer. It is 4300 ft. long, its base is 160 ft. wide and its total height is 120 ft. When completed it will be the largest single piece of monolithic concrete construction in the world. The locks, which will be built for navigation purposes, will have a lift of 45 ft.

When this dam is completed, without any further power development such as would be undertaken by Ford, it could supply 600,000 hp., adequate to operate the two gigantic nitrate plants built by the Government with enough left over to supply the present needs of all the territory within a radius of 200 miles. It is estimated that this would release for other uses about 6,500,000 tons of coal annually.

THE report of the Muscle Shoals committee of the American Farm Bureau Federation says that in dealing with the whole proposition of manufacturing nitrates either for military or agricultural purpose consideration should be given to the "remarkable list of advantages" at Muscle Shoals.

They include practically inexhaustible quarries of purest lime rock only 28 miles away; coke produced in the coal fields of Tennessee; the greatest deposits of raw phosphate rock in America; coal beds of immense proportions which almost surround Muscle Shoals, all within easy hauling distance. Great quantities of coal are needed to burn the lime rock.

The report adds that "Muscle Shoals is nearly in the heart of the great fertilizer using section of our nation and is also situated agriculturally somewhat near the center of the whole country."

It is asserted that agriculture is the biggest user of nitrogen and therefore "is primarily concerned in its production at a price which will permit of its use." The committee also points out the possibilities of producing in great quantities other chemicals used in agriculture as by-products.

The committee recommended that the power and nitrate plants be operated under the direction of a governmentally owned corporation.

THE steam power plant at Muscle Shoals produces nearly as much electrical energy as any other steam plant ever built. It contains one steam turbine unit with electrical generators which generates 60,000 kilowatts or 80,000 hp. It is the mate of the turbine in the New York Central's Grand Central power house. There is room in addition for another turbine of half the size.

A detailed description of the nitrate plants already built is hardly worth while, for the salient facts about them are pretty well known. Ford has agreed to use one or both of them for the manufacture of fertilizer which would be sold at a profit of 8 per cent. In case of war they would be turned over to the Government for the manufacture of nitrate. It is probable that as factories they have scarcely entered into his considerations and it is certain that they are really incidental to his main plans.

Nitrate plant No. 2, in which the cyanamid process was used, has been in successful operation, and the War Department now has a reserve of some 1500 tons of nitrate made there. Plant No. 2, in which the Haber or synthetic process was employed, never was operated successfully. Ford professes to have a process of his own for the manufacture of nitrate and it is certain that with cheap power and easily accessible raw materials he can sell fertilizer more cheaply than the present makers. That is one of the reasons for the determined opposition to his plan offered by the "fertilizer trust," which has powerful friends in Congress.

PROBABLY only Henry Ford himself, his son and his closest advisers know exactly what he proposes to do with Muscle Shoals if his offer is accepted. It is probable, also, that the leading citizens of the "tri-cities" who have attended him on his two visits to Muscle Shoals and who have followed most closely the course of his negotiations, have a clearer conception than almost anyone of the magnitude of his conception. There is considerable evidence scattered here and there, to back up their contentions, but it never has been assembled into a concrete whole. Here is an outline of his plans as told, with substantial unanimity, by a dozen of the most prominent men of Sheffield and Florence:

Ford proposes to bring out sooner or later a new car of a type entirely different from the one now being operated by the millions. In some respects it will be more conventional in design and in others it will be a radical departure from accepted practice. One of its most notable characteristics will be its lightness.

To attain the lightness which Ford has in mind, and which his engineers have demonstrated in his laboratories is practical, light alloy steels and aluminum will be used most liberally. All the materials he will need can be obtained in unlimited quantities in the Muscle Shoals district.

It is the belief in Florence and Sheffield that the new car will be made on the banks of the Tennessee River in a gigantic new plant, which will at least duplicate in size the one at Highland Park. When the new plant is thrown open and the new car is in quantity production, as only Ford understands quantity production, manufacture of the present line will be abandoned.

The huge Highland Park plant will not be abandoned, but as much of it as necessary will be used to make parts for the Fords now on the road. There will be a great surplus of space which can be devoted to expansion of the truck and tractor business and to other purposes which Ford may have in mind. This space obviously will increase from year to year as the present Ford cars wear out, but it is felt that Ford always will be able to find some use for it.

THE people around Muscle Shoals believe that Ford will manufacture there practically all the materials and parts which will go into the new car. One of the plans they attribute to him, or rather to Edsel, who is said to have proposed it first, is the construction of one of the biggest cotton mills in the world in which tires will be manufactured and fabric made for tops and such other purposes as he can use it for. All the cotton needed can be purchased within a few miles of Sheffield.

It is asserted, also, that Ford will not by any means confine his southern activities to motor cars. There is talk of expansion of his tractor industry and a new motor cultivator which will sell at a price low enough to bring it within the reach of even the poorest farmer. For this work he will build electric furnaces and the most modern steel-making devices.

Muscle Shoals, it is asserted with confidence, will make it possible for Ford to realize his dream of retailing a car, truck and tractor for $1000.

These are some of the things Sheffield and Florence expect Ford to do. They are confident, however, that the development of their cities will not be confined to Ford activities. They see in the future scores of smaller plants springing up to supply Ford with some of the parts and accessories he needs, but will be too busy on bigger things to make.

As a matter of fact, the South is no stranger to hydroelectric power and the extent to which it has been developed in that section of the country is a revelation. It seems almost that wherever you go in the South you are passing under a succession of high tension transmission lines, the energy for which is supplied by water power.

That is why the power interests of the South are opposed to acceptance of the Ford offer. These interests in Alabama, Tennessee and Georgia are closely allied and exercise a virtual monopoly in their respective States.

MUCH has been written of the relationship of the Alabama Power Co. to Muscle Shoals and the possibility of having it exploit the power produced there. As a matter of fact this corporation gets no power from Muscle Shoals. Its only present relation to the project is a cancellable lease on the steam power plant which was built by the War Department to supply power for the nitrate plants pending completion of the Wilson dam.

This plant is leased solely for emergency purposes and almost never has been used. Its only value is to give the Alabama company a source of power in case of emergency when something goes wrong with its hydroelectric plants. This company and its allies in Georgia and Tennessee monopolize the water power in the three States. The Alabama Power Co. is building its huge Mitchell dam across the Coosa River in southern Alabama and not the Tennessee.

The proposition made by the Alabama Power Co. to the War Department for taking over the Muscle Shoals project gives some interesting facts about its operations and about its views of future developments. The proposition said, in part:

"For many years the Alabama Power Co. has been serving electricity to the industries and the public in Alabama. It is an Alabama corporation having several

thousand stockholders in Alabama. It has now more than 17,000 customers and serves more than 50 municipalities. It has more than 1500 miles of transmission lines, an installed electric generating capacity of 175,000 hp. and is engaged in constructing a new hydro-electric plant on the Coosa River of 110,000 hp. capacity. Its facilities are now being used to supplement the power supply in Tennessee, Georgia and South Carolina and even as far away as North Carolina, 600 miles distant, and can be used in even more distant localities.

"FOR many years this company has been identified with the Muscle Shoals situation. For several years before the war it had owned the Wilson dam site and at the outbreak of the war it was actually proceeding with plans for a power development at this point.

"After this country entered the war the Government desired the site for war purposes. We thereupon donated the site to the Government and transferred to it for $1 titles and rights in connection with which we had already spent just under $500,000.

"We are assured by a number of important industrial enterprises that if the power from this development becomes available to the public they will establish new plants and factories in this locality. If the Muscle Shoals power can be made available for everybody, we believe that not only will a number of new industries be established at and near Muscle Shoals but the industrial development of Alabama, Tennessee, Georgia, North and South Carolina and, indeed, of the entire South, will be promoted. Hence our willingness to assume the responsibilities involved in our offer."

You will be told at Sheffield, and doubtless with truth, that Thomas A. Edison is co-operating with Ford along electrical lines in connection with Muscle Shoals. The "wizard" is supposed to be developing something new in the way of electric furnaces which will improve and expedite production.

When asked for evidence they point to the fact that Edison accompanied Ford on his second visit to the Shoals and expressed amazement at its possibilities and potentialities, both for war and peace.

Henry Ford is something of a fetish not only in Alabama but throughout the South. The negroes seem to regard him as a sort of second Lincoln. It is felt in all quarters that he is the one man in the country who can and will develop the full resources of the Tennessee if he is given the opportunity by Congress.

NO discouragement seems to be felt because no action is likely at the present session on the Ford offer. He is hailed in the South as a fighter who never stops until he gets what he wants.

It is related that on his second visit to Muscle Shoals, when he stood in the circular lobby of the Sheffield hotel surrounded by the members of a citizens committee, he was asked:

"Mr. Ford, what will you do if Congress refuses to accept your offer?"

Ford clenched his fists and with an emphatic downward motion of his arms, exclaimed:

"I want Muscle Shoals and I'm going to get it. I'm no quitter and if Congress turns me down I'll only fight all the harder."

Edsel, who stood beside his father, nodded his head approvingly, although he was a reluctant convert to the idea of exploiting Muscle Shoals. He was a doubting Thomas until his father dragged him off to see them and then he became even more enthusiastic than his dad. He was the first to grasp the possibilities of a huge tire and fabric mill.

THERE are many legends as to the origin of the term "Muscle Shoals." The one most generally accepted in the district goes back to Indian days. It is said that when the Red men navigating their canoes came to these rapids in the Tennessee they found the passing of the shoals so difficult they developed a prodigious amount of muscle and hence the name, "Muscle Shoals."

Henry Ford is quoted as having declared that if he gets Muscle Shoals it will give employment directly and indirectly to 1,000,000 men. It is said that 8000 employees of the Ford plants in Detroit already have filed applications to be transferred to Sheffield. There is no doubt in the mind of anyone in that district that Ford's prediction of a million workers will be fulfilled within ten years if only it is possible to get favorable action from Congress. But they feel that will be only the beginning and they will point out that Ford contends one man should be employed for every horsepower generated and that there are 1,000,000 hp. in the Muscle Shoals.

FIGURING on the man per horsepower basis, they assert that Ford will have developed 300,000 hp. within five years after he gets the property.

Whether or not this is true, foundations now are being laid for a gigantic hydro-electric power house on the Sheffield side of the Wilson dam. Plans have been completed for an initial installation of four turbines which will generate 30,000 hp. each. Ultimately 14 more of 36,000 hp. each will be installed.

Ford's development plans do not end with completion of the Wilson dam and utilization of all the power it can generate. When it is finished a lake 15 miles long will be created and the islands in the river will be submerged. Some 15 miles beyond the far end of the lake Ford would build what would be known as No. 3 dam. It would be 6250 ft. long but only 40 ft. high and would develop an additional 300,000 hp.

Conservation dams also would be built by Ford in the upper Tennessee. The purpose of these dams would be to hold in storage the flood waters which come down stream in the spring and make the surplus available for capacity operation of his power plants when they otherwise would be partly idle at slack water.

No. 1 dam, which would be for navigation purposes only, would span the river between Sheffield and Florence. With the completion of all three dams it would be possible to eliminate the series of locks which has made navigation possible past Muscle Shoals and provide for navigation of the Shoals even in slack water.

In this connection it should be remembered that since work was begun on the Wilson dam more than four years ago, through navigation of the Tennessee has been impossible. Barges coming up from the Ohio have had to stop below the Florence bridge. This has been a rather serious blow to commerce in Chattanooga and other cities farther up stream for the time was when barge traffic on the river was not inconsiderable for a long distance. The barges used are similar to those in operation on the Ohio and Mississippi.

This is one reason why Chattanooga and Knoxville are exceedingly anxious to have the Ford offer accepted. They point to the statement of the late Senator John T. Morgan in his report to Congress on "Navigation of the Tennessee River."

"A just and wise national policy will give the Tennessee River its rightful position as the foremost tributary of the Mississippi River and as a contributor to the wealth and commerce of the country. The overruling Providence that controls the destiny of the United States and of all nations and peoples seems to have held these great resources in reserve to supply the wants of other localities as they are disclosed by the rapid growth of the facilities of transportation."

People in the towns along the Tennessee will tell you that one of the reasons why their river has not been developed is the jealousy of Congressional representatives of the territory served by the Ohio. As a matter of fact Congress has made surprisingly small appropriations for the improvement of the Tennessee and surprisingly large ones for the improvement of the Ohio when their relative importance in the movement of commerce is considered.

Until Ford made his offer private capital was almost indifferent to the possibilities of the river. A syndicate was formed in 1910 with a capital of $300,000 to build a dam at Muscle Shoals, but President Taft vetoed a bill which would have given it water power rights.

Carrying out of Ford's plans would not benefit water transportation alone, for upon them depends electrification of the Louisville & Nashville Railroad from Sheffield to Nashville, a distance of 130 miles. Additional railroad electrification is possible for Sheffield is only 128 miles from Birmingham, 160 from Chattanooga, 148 from Memphis, 444 from Chicago and 784 from Washington. One of the main lines of the Southern starts at Memphis and runs through Sheffield to Chattanooga, Knoxville and Washington.

As a sidelight on the possibilities of river navigation it is pointed out that there is timber along the river in Alabama and Tennessee which never has been touched and which could be floated down to Sheffield. Another interesting point is that W. B. Mayo, chief engineer for Ford, testified that it might be more profitable to develop coal mines on the river and transport coal by water than to haul it by rail after the dams are completed.

If Ford is given the chance to develop this section of the South he will not be starting upon desert soil. Florence now has a population of 12,000, Sheffield of 8000 and Tuscumbia of 6000. All are attractive little cities, especially Florence, which has a state normal school. The limestone cliffs overhanging the Tennessee offer ideal locations for handsome homes.

Housing would not offer a difficult problem for the pioneers of the Ford city building army. The government provided housing facilities for nearly 25,000 workers during the war and some of the barracks now standing could be made habitable without difficulty. The government built at Sheffield 200 cottages of four, five and six rooms and bought material for 500. It also built at Tuscumbia a large number of pretty stucco houses with red tile roofs. All these would be available for homes as a beginning and there is unlimited room for expansion on both sides of the river. Florence and Sheffield are connected by a bridge which carries a trolley line and vehicle traffic on its double decks. Around plant No. 2 alone he would have 4200 acres of land.

The government has expended $90,000,000 at Muscle Shoals, of which $65,000,000 went for nitrate plant No. 2; $13,000,000 for nitrate plant No. 1 and $17,000,000 for the Wilson dam. Work already has been resumed on the dam with an unexpended balance from a previous appropriation with the building of coffer dams, possible only at slack water, in preparation for use of the additional appropriation which will be available Oct. 1. These operations will again bring temporary prosperity to the "tri-cities" which have been sadly quiet since work was suspended after the armistice.

Notwithstanding the fact that business slumped suddenly from unheard-of levels to those of pre-war days, Sheffield and its neighbors have gone on patiently doing as much as they could to provide for the future. Among these activities have been the building of highways in expectation of a tremendous increase in tourist and truck traffic in the near future.

Colbert County (Sheffield) and Lauderdale County (Florence) each have appropriated $250,000 for highways. The roads will radiate throughout the counties and reach the Mississippi line. The Jackson military highway which starts at Chicago and touches Louisville and Nashville, runs directly through the center of the Muscle Shoals district. Work also is being pushed on a road to Albany and Decatur to connect with the Bee Line highway from Florida resorts to northern cities which are of commercial importance.

BIRMINGHAM is full of reports that a company recently formed there which is buying and obtaining options on coal and iron lands is working in behalf of Ford, but those familiar with his plans do not believe it.

Another report is that Ford is back of a project for building a railroad from Muscle Shoals to Pensacola, Fla. The line has been surveyed and a right of way staked out, but it is much more likely the promoters hope to unload on Ford than that he is back of the project.

The Louisville & Nashville Railroad, which refused to permit Ford to operate over its lines in connection with the movement of coal over the D. T. & I. is very strong in this section.

It may be said in all fairness that the entire South, except for a comparatively few bankers and other wealthy men allied directly or indirectly with power interests, want Congress to accept the Ford offer without delay. They believe that the big power, fertilizer and aluminum interests are bringing evil influences to bear upon Congress to prevent its acceptance.

They are confident that with Ford in the saddle a great industrial metropolis would rise at Muscle Shoals which would be of prodigious benefit to a vast territory.

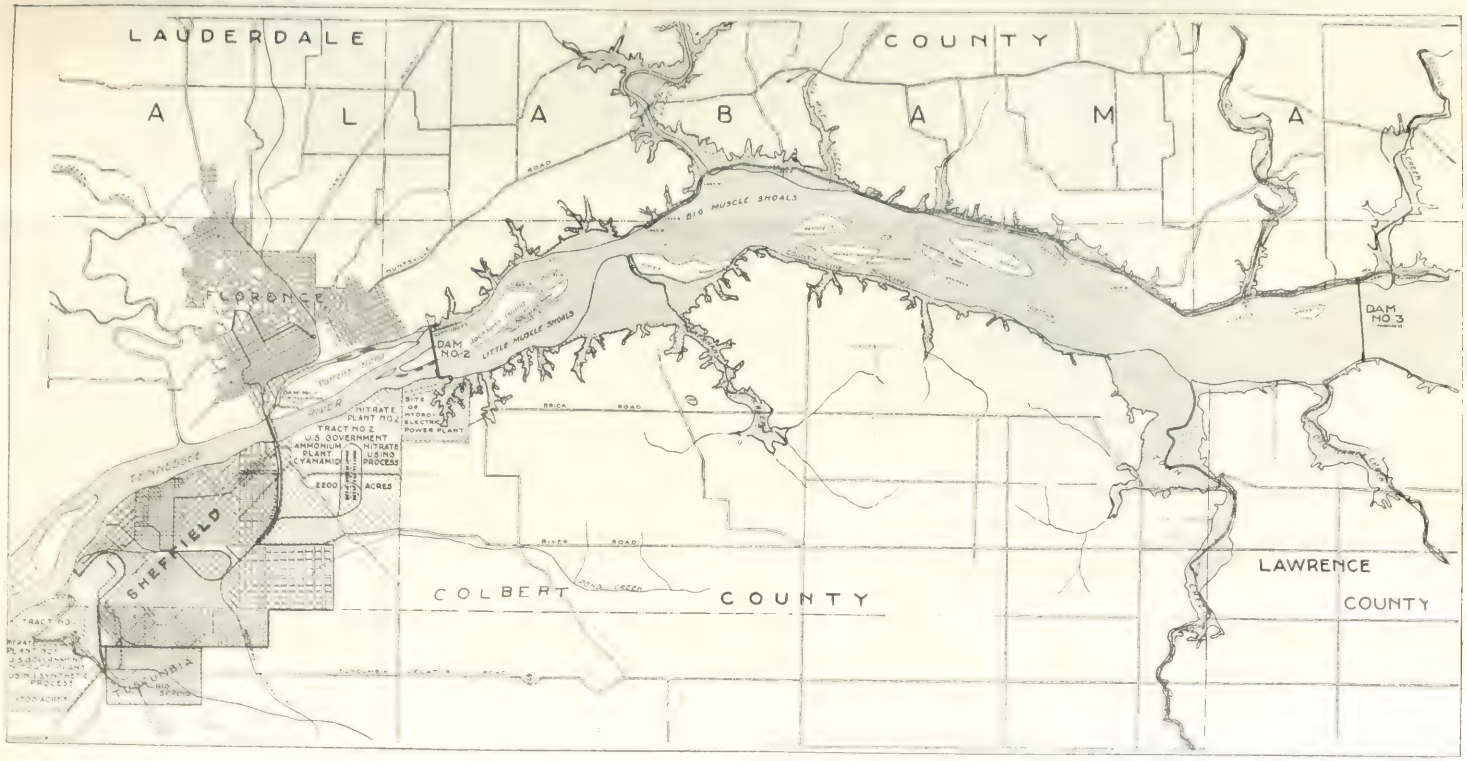
They see in Ford development of motor vehicles and motorized farm implements modernization of the South as an agricultural section. They believe also that his operations would benefit the entire country.

As a corollary they know that he would produce fertilizer at a cost which would permit him to sell to farmers more cheaply than they can buy to-day and thus benefit agriculture throughout the United States.

They feel that his expanded operations would benefit the entire automotive industry because every user of a Ford car is a potential buyer of an expensive vehicle.

Last, but by no means least, they believe creation of a great city at Muscle Shoals would do more than anything else could to cement the interests of the North and the South and destroy the last vestiges of sectional feeling.

Muscle Shoals Project Which May Develop 1,000,000 Hp.



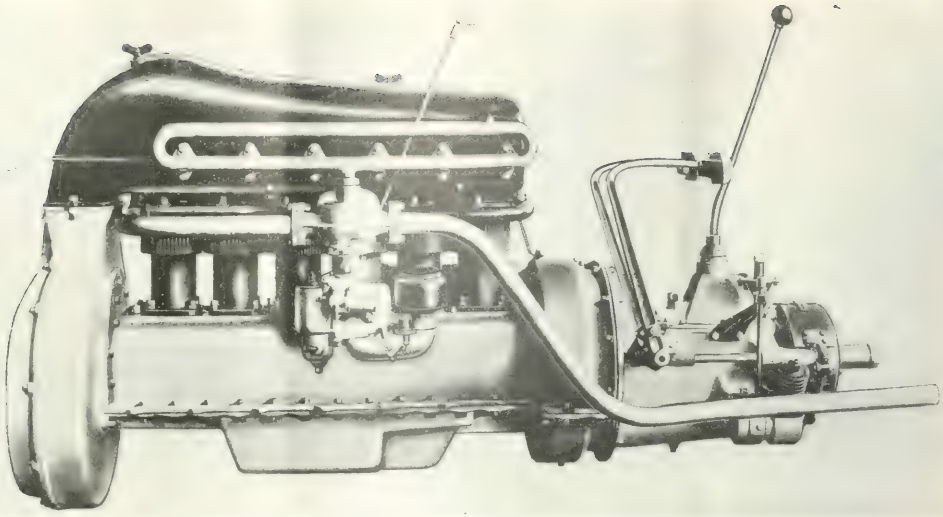
Here is a map that gives a good general picture of the Muscle Shoals layout. The course of the Tennessee River is shown, together with the location of the various dams, concerning which there has been so much discussion in the daily press.

The main highways running through this district are also shown.

Dam No. 2 is the now-famous Wilson dam upon which construction has already been started. Photographs of this dam are shown on another page.

Dam No. 1 is of less magnitude and of less commercial importance than the other two, since it will simply be for navigation purposes. It will have nothing to do with the big power development plans. No work has been done on Dam No. 1

Dam No. 3 is also in the "proposed" stage. It would be located at some distance up the river from Dam No. 2 and would aid in the power development project.



Inlet side of the new Franklin unit powerplant. The exhaust pipe is brought around the engine to provide heat for the new vaporizer

New Franklin Has Remodeled Cooling System

Sirocco blower in front of engine forces air through volute casing and rearranged air jacket. Flywheel fan eliminated and power consumption decreased. Unit powerplant now employed. New vaporizer, air cleaner and electric primer among improvements.

By P. M. Heldt

A NEW six-cylinder Franklin car, known as series 10-A, has been announced by the H. H. Franklin Manufacturing Co. to take the place of the model heretofore manufactured. In a general way it is the same type of car as the previous one, having the same cylinder dimensions and the same wheelbase, but important changes have been made in the carburetion and cooling systems, the chassis now has a unit powerplant instead of a separate gearset, and minor improvements have been made in several other units.

The most important change is that involved in the redesign of the cooling system. The fan, which was formerly a part of the flywheel, and arranged to draw air through the jacket space, is now displaced by a blower of the Sirocco type mounted on the front end of the crankshaft and arranged so as to force air through a modified jacket space. This blower handles more air than the flywheel type, but the blower itself and the delivery system connecting it with the cylinder jackets, including the volute blower casing, are so designed that the power required to move the greater volume of air is less than that consumed by the flywheel fan.

Another important change is the addition of an exhaust-heated fuel vaporizer intended to prevent liquid fuel from reaching the cylinders. An electrically heated priming device is provided to facilitate starting, especially in cold weather.

In starting upon the development of a new model the chief objects which the Franklin Co. had in view were: (1) to produce an engine capable of greater output for the same cylinder dimensions; (2) to provide a more efficient cooling system whereby more air could be circulated through the cooling jackets with less expenditure of energy; (3) to make possible the use of a unit powerplant, which facilitates chassis assembly, and (4) to provide a vaporizer that would maintain the temperature of the incoming gases within narrow limits and re-circulate any unvaporized fraction of the fuel until vaporized.

In the previous Franklin engine the jackets were surrounded by a horizontal deck dividing the upper and lower

part of the space between engine and hood. Air was drawn into the upper part of this space through a grating in front of the bonnet, passed through the jackets to the lower part and was exhausted therefrom by the flywheel fan. The new design obviates two disadvantages encountered with the old arrangement.

With a flywheel fan it is difficult to find room for a volute of adequate size around the flywheel, which is required for efficient fan operation. The flywheel fan is therefore replaced by a blower at the forward end of the engine, and with an engine of this size (30 hp.) it is still possible to accommodate a blower with an adequate volute between the frame members.

THE other feature referred to has to do with freedom from leaks of the channel or passage for the cooling air. In the new design the air passage outside the jackets themselves is formed by rigid aluminum castings and is of such form that the air speed is substantially the same at all sections. There being no abrupt changes in section, the likelihood of forming of eddies, which are always a source of loss, is minimized, and, moreover, the rigid air passage walls are in no danger of being bent out of shape in service, with resultant loss of cooling air. The final result of these improvements in the cooling system has been that now about 2.5 times more air is circulated through the jacket space at a given engine speed, while a material reduction in the power consumption of the fan has been effected.

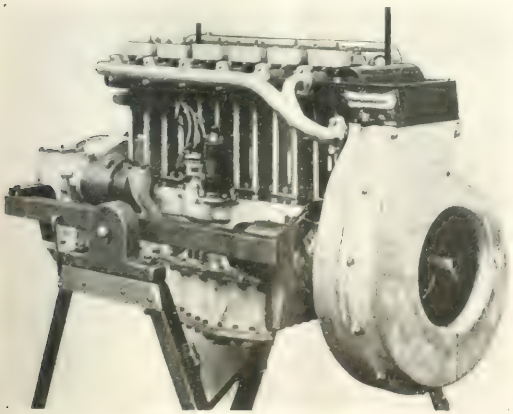
The large open grille at the front of the hood is said to allow free passage for fully four times the volume of air used by the blower. This excess is used to cool the outer surface of the cylinder fins and the aluminum crankcase, which receives its heat partly from the oil.

That the new engine is adequately and positively cooled for all conditions is said to have been demonstrated by trips through Death Valley in a temperature of 120 deg. Fahr., and up Pike's Peak to 14,900 ft. elevation.

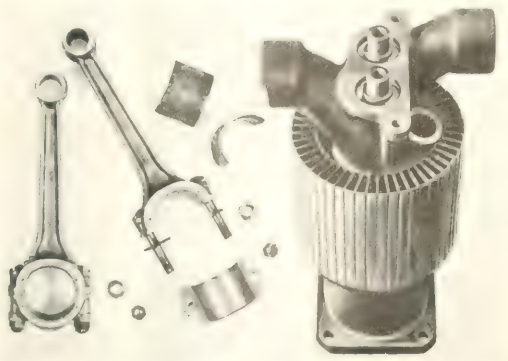
The engine has six $3^1/_4$ x 4 in. cylinders, cast separately, as in the past. Cylinder and head are a single casting, with the sheet steel cooling fins set into the mold and cast into the cylinder wall. A change has been made in the form of these fins whereby their cooling capacity has been increased. Formerly the fins were flat strips and were surrounded by a separate sheet iron jacket, which, since it did not have any intimate metallic connection with the fins, had no effect as cooling surface. Now the outer part of the fins are turned over at approximately right angles, so their edge comes close to the next fin, thus forming a closed jacket space without a separate outer jacket. This form of construction has made it possible to reduce the jacket diameter to 5 in. as against the $5^1/_2$ in. previously. The axial length of the cooling fins has also been reduced to 5 in. as compared to $7^1/_4$ in. formerly. In spite of the reductions in jacket diameter and length, the fin cooling area remains the same.

The blower of the cooling system is mounted on the crankshaft at the forward end and is of the Sirocco type, with a $14 \times 3^1/_2$ in. impeller. This impeller is placed in a volute housing to increase its efficiency and air capacity. The air inlet to the housing is smoothly rounded so as to avoid the formation of eddies and its back plate forms the cover of the case enclosing the chain which drives the camshaft and generator. The aluminum air housing extends lengthwise over the top of the cylinders and is provided with six circular openings fitting the upper ends of the cylinder jackets. This housing is made in two parts, with a joint in a horizontal plane at the center of the inlet and exhaust fittings. Deflector plates are located inside the air housing so as to distribute the air equally to all of the jackets. The air housing is held to the top of the engine by means of two studs with wing nuts and can be quickly removed. Single cylinders can be removed without disturbing adjacent parts, and the engine is generally more accessible owing to the elimination of the sheet metal decks formerly employed.

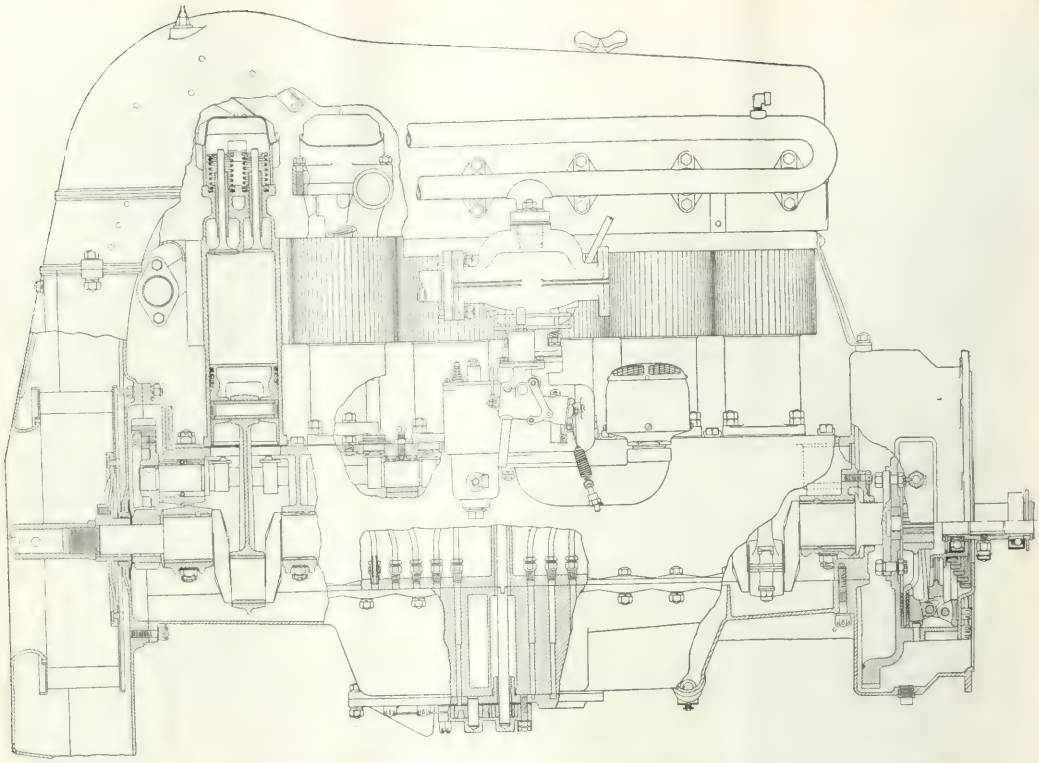
TURNING now to changes in other engine parts, it is to be noted that the wrist pin floats. It is held from drifting in the piston bosses by means of a spring steel ring over its ends, and is thus easily removed by taking this ring off. This ring when in the free state has an outside diameter smaller than the cylinder bore, and consequently does not bear against the cylinder walls. Die cast aluminum pistons, which the Franklin company has successfully used for a number of years, are continued in the new model. An innovation is the use of connecting rods of drop forged duralumin. The Franklin company is among the first to use connecting rods of this material in a stock model. The use of a light alloy in the connecting rods has resulted in a considerable lightening of these parts. The steel connecting rod formerly used weighed 2.2 lb.,



Three-quarter front view of new Franklin engine showing volute casing for the blower, and the separate lighting generator and starting motor



The forged duralumin connecting rod which weighs only $1^1/_4$ lb. as against 2.2 lb. for the steel rod formerly used. The new Franklin cylinder, showing fins bent at right angles to form integral outer jacket wall which becomes effective cooling surface. Fins are of steel and cast into the cylinder walls



Side elevation of engine, partly in section, showing blower mounting at front end and air duct which conveys air to cylinder jackets

while the duralumin rod with die cast big end bushing weighs only 1.25 lb. The rod is of I-section and has a sectional area about 20 per cent greater than the steel rod formerly used.

The Franklin company is one of the pioneers in the use of the case-hardened crankshaft, which will be continued in the new Series 10. All of the bearing surfaces are on die cast bushings of their own manufacture. These are backed directly by the aluminum of the crankcase and duralumin of the rods, thus providing each bearing with the unusual capacity for radiation of heat. The upper end of the duralumin of the rod bears directly upon the steel of the piston pin. The weight of the piston with rings, piston pin and piston pin retaining ring, is 1.394 lb.

A seven-bearing crankshaft of substantial dimensions is used, the diameter of all bearings being 2 in. The connecting rod bearings measure 1 11 16 in. in length each, while of the seven main bearings the front one is 2⅜ in. long, the rear one 2⅝ in., and each of the intermediate bearings 1 21/32 in.

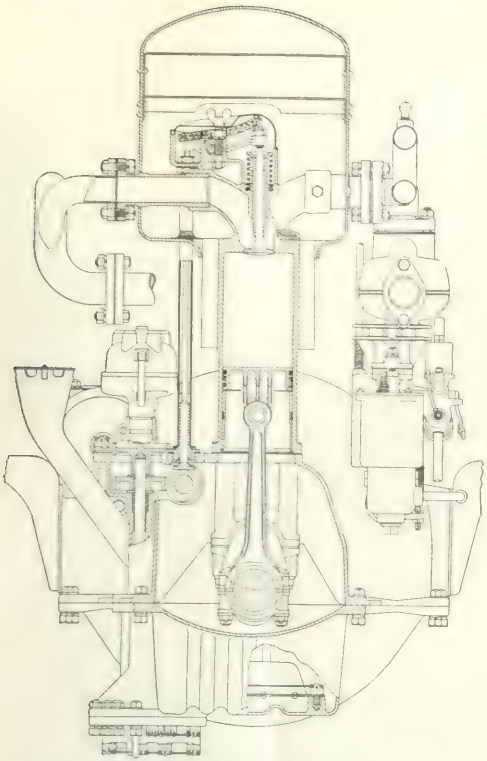
The crankcase is an aluminum casting, and, in order to insure greater rigidity, the dividing plane is now located 2⅝ in. below the crankshaft axis.

At the forward end the engine is supported by an angle-shaped, pressed steel member extending between the side members of the main frame. This support is now placed ahead of the forward cylinder instead of between cylinders Nos. 2 and 3. At the rear, supporting arms of pressed steel are bolted to the sides of the bell housing, the ends of these arms resting on top of angle iron brackets secured to the inside of the wood frame sills.

A triangular chain drive is used for the camshaft and generator. Adjustment for this drive is obtained by a pivotal mounting for the generator. The latter is bolted to the rear of the timing gear housing by means of three bolts, the lower bolt passing through a round hole in the generator flange, while the two other bolts pass through elongated holes, so that the generator can be slightly swung around the lower bolt for purposes of chain adjustment. This adjustment is effected positively by means of a setscrew between the cam gear housing and the generator body, which is locked after the adjustment is made.

There is a separate duralumin flange between the cam gear housing and the generator, on the hub of which the chain sprocket rides. This permits of removing the generator without disturbing the chain drive. A hardened plug is forced into the end of the sprocket, and a hardened plunger pressed against this plug by a spring, takes up end thrust on the shaft.

The camshaft is supported in four bearings of die cast aluminum. The cams operate against mushroom tappets from which tappet rods extend up the side of the cylinders through steel tubes, which also act as supports for one end of the rocker arm housing. The other end of this housing bears on the cylinder direct. The point of contact on the cylinder can be changed from one on the near side to one beyond the plane of the valve stems, depending upon whether the valve stem clearance is intended to increase or decrease from a cold to a hot engine. For various reasons a point was chosen that would show from zero to 0.002 in. increase in tappet clearance as the engine heats up.



Transverse section of engine. Note method of mounting rocker arm casing to compensate for effect of heat expansion in changing clearance of tappets

A rather unusual feature on passenger cars is the provision of an air cleaner of the self-cleaning centrifugal type on the carbureter air inlet. The carbureter, by the way, is cast in aluminum for the sake of lightness. The volume of air entering the cleaner is said to exceed by one-quarter the volume that enters the carbureter.

The whirling action set up by the vanes and rotor in the cleaner cleanses the main charge by centrifugal separation to the extent of throwing all of the dirt particles out into the excess one-quarter volume, which is then discharged at the lower circumference of the cleaner. This process is continuous under all conditions and requires absolutely no attention.

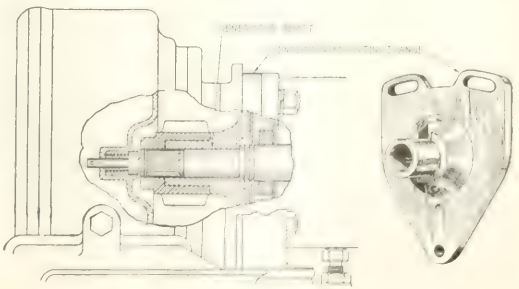
The carbureter is of the Franklin company's own design and is of the supplementary air valve type. Fuel enters the float chamber at the bottom through a strainer of 112 mesh wire gauze, which can be removed together with the drain plug. The settling chamber in which this strainer is located is of unusually large size. At the top of the float chamber is a so-called "tickler" which is handy for ascertaining that there is gasoline in the carbureter. The fuel nozzle contains a needle valve which is controlled from the dash, a feature which has been found on Franklin cars for several years, but the hot air and choker connections formerly used are now eliminated.

Special efforts have been made in the design of the carbureter to facilitate starting in cold weather, and to this end the gasoline is electrically vaporized and superheated. When it is desired to start in cold weather, the throttle is first closed tight, the gasoline valve opened one whole turn and the primer button on the dash is pressed for a few seconds. It requires 40 seconds at 20 deg. Fahr. below zero. The primer button closes a solenoid actuated choker, opens the primer vapor passage, and allows 80 amperes to flow through the heater coil, which is enclosed in a special porcelain tube. One end of both the tube and the coil is touching gasoline. This forms a gray vapor or permanent gas which soon fills the suction yoke and provides an ignitable mixture in sufficient quantity to keep the car running at 18 m.p.h. for an indefinite period. At 20 deg. Fahr. below zero it has been found that the starting motor need never be applied longer than 10 sec. and will often effect a start in 5 sec. Both the old cold choke method and the partial combustion system of starting are said to frequently require the engine to be cranked for from 1½ to 3 min. when starting at —20 deg. Fahr. The heating element draws 80 amp. for 40 sec. and the starter 400 amp. for 10 sec., or a total of 7200 amp. sec., as against 400 amp. for 100 sec. (40,000 amp. sec.) said to be required in other cars. After the engine has fired for about one minute at —20 deg. Fahr. the aluminum exhaust vaporizer becomes sufficiently heated to run directly from the main carbureter.

The engine receives a rich mixture from the vaporizer and fires slowly at first. The throttle valve is then opened slightly until the engine has picked up a bit. As soon as possible the gasoline needle valve opening is decreased to the running position of ⅝ turn open. During warm weather it is not necessary to use the electric primer.

Directly above the carbureter is located the gasoline vaporizer through which the mixture passes on its way to the inlet manifold. This is in the form of an aluminum casting through which there is a central vertical mixture passage with circumferentially corrugated walls, which is surrounded by a heater jacket through which all of the exhaust products pass. Into the outlet of the mixture passage is set a drawn bushing, slightly contracted at the bottom, so that any unvaporized fuel adhering to the walls of the mixture passage is separated from the main stream in the annular space between the bushing and the wall, and returned through two ½-in. steel tubes to the lower part of the gas heater, into an annular space outside a sheet metal venturi tube. At the throat of this venturi are drilled a number of small holes. The suction at this point draws the fuel, which has been vaporized during its passage down the almost red hot return tubes, back into the inlet passage.

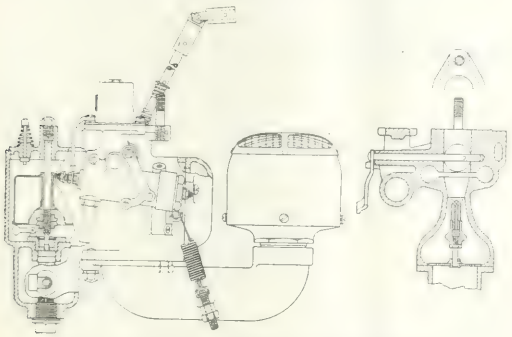
The gas heater is said to keep the temperature of the mixture very nearly uniform throughout the whole range of engine operation. Tests have shown that the inlet manifold temperature remains between 156 and 166 deg.



Sprocket which drives lighting generator is so arranged that the generator can be removed without disturbing the sprocket or chain and thus upsetting the timing

Fahr. throughout the entire operating range above 15 m.p.h. on direct drive. At lower speeds the inlet gas temperature is 15 deg. Fahr. cooler. In case all of the fuel is not vaporized on the first passage through the gas heater the unvaporized portion is trapped and recirculated.

The changes made in the carbureter design as above described have not only facilitated starting in cold weather but also increased the operating range of the engine. The carbureter is not provided with a choker valve and draws cool air at all times through the dust separator attached to the carbureter itself. This separator measures 3½ in. in diameter by 4 in. high and contains



Sectional view of carbureter, showing air cleaner used on inlet

one rotating part. It is automatic in operation and is self cleaning.

The improved Atwater-Kent closed circuit ignition system is standard equipment. The distributor, which is more accessible than formerly, is provided with an automatic advance governor to follow the special timing curve found best for the Franklin, but an auxiliary hand spark control mounted on the cowl board is provided. The engineering department has provided means for furnishing the engine with a dry gaseous mixture of uniform temperature, but is quite unable to cope with the changes of fuel and the amount of carbon that may be allowed to accumulate in the combustion chamber. The hand spark control has been added to compensate for these conditions, which are bound to come up and which otherwise would be beyond the driver's control. The ignition and lighting circuits are operated by means of a Briggs & Stratton switch on the instrument board. The electrical equipment, aside from the ignition system, consists of a Northeast generator and starter, with third brush output control for the generator and new Bendix drive for the starter, which meshes into a heat-treated steel ring gear shrunk on to the cast iron flywheel. The storage battery furnished with the car is a Willard 6-volt threaded rubber separator type having a capacity of 132 ampere hours at a 5 ampere discharge rate. All wiring is on the ground return system. The wiring consists of Flexocord cable which carries its own armoring, and has been simplified. Wires of different colors assist in tracing circuits.

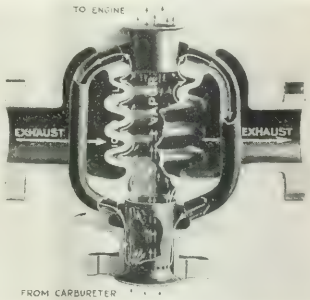
Lubrication is by the force feed system. A gear pump is located at the bottom of the crankcase and is driven through helical gears from the camshaft. From the pump, distributor plate oil leads extend to all of the seven main bearings and to the front compartment. A change which has been made from the systems as installed on the previous model consists in retaining all piping on the upper half of the crankcase, with holes extending from the pump distributor through holes in the case gasket to the inlets of the various leads. The crankshaft is drilled to permit of forcing oil under pressure to the crankpin bearings, while the spray from these bearings is depended upon for lubricating the camshaft and cylinders.

The lower flywheel guard has been eliminated, thus increasing the full load ground clearance 25 per cent.

A Borg & Beck 10-in. plate clutch is fitted, but the Franklin company uses its own three-speed gearset fitted with standard S.A.E. shift. The tire pump is now driven off the idler in the gearset. Instead of stub teeth of 6-8 pitch, full depth 6 pitch teeth with a 20 deg. pressure angle are now used in the gearset, the latter having been found to reduce the noise of operation. The low gear ratio has been changed from 3.15 to 3.625. The gearset housing is of aluminum. An improved rocking pin ball-handled lever is used for operating the gears and a Yale lock is now incorporated. This is so arranged that a tongue is forced down between two steel balls and shifts them into slots in the shifter rods, so that the gearset can be locked in either neutral or reverse. The brake and clutch pedals are now mounted on the bell housing.

Back of the gearset is located the transmission brake, and an oil collector is provided to prevent oil from the gearset getting on to the friction surface. A shield has also been fitted to prevent water from getting on to the brake band. Two Spicer universal joints are combined with a Franklin tubular propeller shaft of nickel steel to form the connection between gearset and rear axle. The propeller shaft is 1⅛ in. in outside diamater and has a wall thickness of ⅛ in. It is made from 5/16 in. walled tubing and is turned down in a lathe on the outside between the end portions, which are later splined.

The rear axle is of the semi-floating type and is provided with an underrunning truss. The axle housing is built up of a cast aluminum center part and nickel steel tubes with slightly tapered ends, which are pressed into the aluminum housing and hot riveted in place. The spring saddle, brake brackets and bearing housings are all drop forgings. The axle is fitted with Gurney ball bearings



Sectional view of fuel vaporizer. The liquid fuel trapped on the walls is vaporized by passage through the hot tubes and then returns to the air stream

of a type capable of taking thrust loads equal to their radial load capacity. The emergency brake is actuated by a cable which is readily adjusted for length by removing a pin and pulling up to next hole.

The front axle is of the regular Franklin tubular type with drop forged spring saddles. The new car has a 115-in. wheelbase and the standard 56-in. tread. It is fitted with full elliptic springs, of which the rear ones are 38 in. in length instead of 36 in., while the front ones remain 36 in. long.

Chassis points requiring lubrication are provided with connections for applying grease or oil by a pressure gun.

There has been no change in the steering gear and the weight of the whole car remains practically the same as before, 2450 lb. The tire equipment consists of 32 x 4 in. Goodyear cord tires, with all-weather tread for all four wheels. A spare tire carrier is provided at the rear.

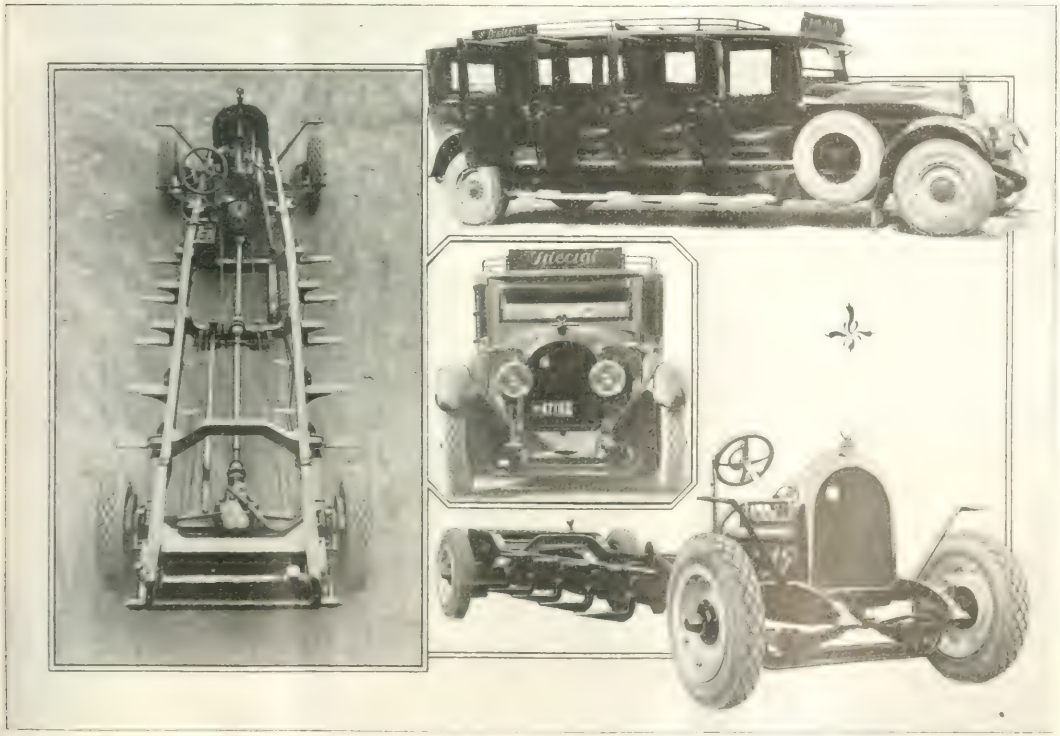
Kissel Producing 18-Passenger Coach

Is among first passenger car builders to enter bus field. New chassis has 202 in. wheelbase and 66 in. track. Axles and frame special. Latter has 8 in. side rails with kick-up front and rear. Four-joint propeller shaft and double-reduction axle employed.

THE demand for easier-riding buses has led the Kissel Motor Car Co. to enter the bus field with a new vehicle built along passenger car lines but designed to carry eighteen passengers. The new product, to be known as the Coach Limited, is said to provide the riding comfort of a sedan and is, except for size, similar in most respects to a closed car. This type of vehicle has been turned out by other manufacturers, chiefly builders of trucks, but the Kissel company is believed to be the first, or among the first, passenger car builders to turn out a bus chassis.

The engine used is a Kissel six, 3 5/16 x 5½ in., said to develop 61 hp. at 2300 r.p.m. A multiple disk clutch and three-speed gearset complete the unit powerplant. The latter is connected to the rear axle by a two-piece propeller shaft fitted with four metal universal joints. The center joint is supported in a self-aligning bearing in a bracket bolted to a heavy cross-member of the frame.

A stiff frame with side rails of ¼-in. stock 8 in. deep is employed. This is provided with five cross-members and is 43 in. wide. Each side rail carries five step brackets, arranged to support the running boards, and out-riggers for the body which measures 76 in. at the widest point. The side rails are kicked up over both front and rear axles.



Four views of the Kissel "Coach Limited," a de luxe type of bus. Note the type of frame employed, with front and rear kick-up, also the four-joint propeller shaft with bearing on central cross member, and the front axle with unusually large drop. The body is arranged to seat 18 persons including driver, and the roof is constructed to carry 1000 lb. of luggage

The double-reduction rear axle has a cast steel housing arranged for 48-in. spring centers and 66-in. tread. The final reduction is 6.33 to 1. Total reductions on low gear are 23.16 to 1, second gear 11.45 to 1 and reverse 28.99 to 1. The front axle is a conventional type of drop-forged I-beam section, but has an unusually large drop. It has 30-in. spring centers and 64-in. track at ground. All springs are semi-elliptic type and are 2½ in. wide. Those in front 38 in. and those in rear 60 in. long. A Ross screw-and-nut type of steering gear is employed. All brakes are on the rear wheels and have 2½-in. facings. The foot brake measures 17 in. and the hand-operated brake 12 in. in diameter. Wheels are a special aluminum disk design and are arranged to take 32 x 6-in. pneumatics all around. The wheel base is 202 in. When loaded the top of chassis is 22½ in. from the ground.

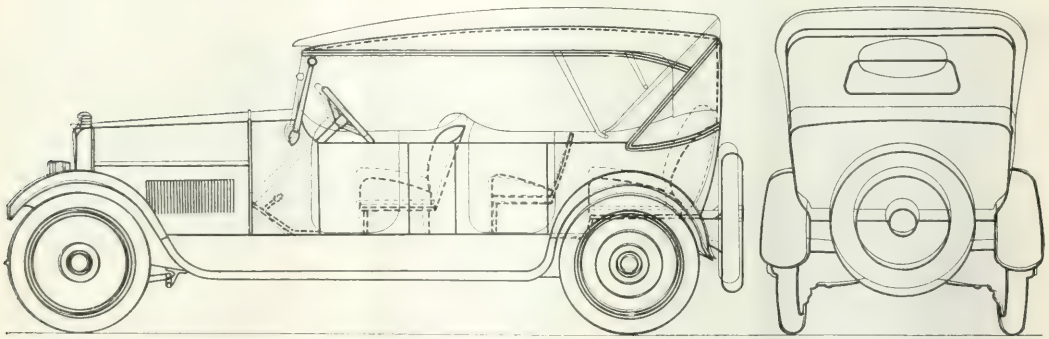
There are two gasoline tanks. That in the rear of the chassis holds 30 gal. while the emergency tank under second seat holds 9 gal.

The chassis is said to weigh 4850 lb. when light or 5120 lb. when filled with fuel oil and water. With body the weight is given as 7780 lb.

The body is fully inclosed, and, except for its unusual length, has much the same appearance as a sedan. There are four doors on the right side. The three-ply veneer roof, fitted with a rail, is designed to carry 1000 lb. of luggage. The length of the body is 194½ in. and the highest point is 79¼ in. from the ground. A special device for locking or releasing all four doors from the driver's seat is provided.

The seating capacity is 18, including driver. There are five cross-seats, designed to conform to the back and to give unusual comfort in riding. The seats as well as the entire interior are covered with Spanish leather. The windows are large and are arranged to be lowered when desired. Ventilators are provided in the roof and Perfection heaters, for winter use, in the floor. There are also eight dome lights in the ceiling.

Body Lines of New Marmon Seven-Passenger Phaeton Compared with Former Model



These drawings are taken from promotion literature sent to dealers by the Marmon factory. They illustrate an excellent method of visualizing new body lines as compared with the old. One glance at these outline drawings gives a clearer picture of the changes in the new Marmon bodies than ten pages of description could do. They are of interest, too, in picturing the trend of practice in modern body design

Demonstration of Landing with Skid

ON Aug. 21, in the presence of Brigadier-General William Mitchell, assistant chief of air service, and Majors P. D. Milling and Walter Weaver, commanding officer Mitchel Field, a demonstration of landing with skid took place at the Sperry Field, Farmingdale, L. I.

The machine flown was a U. S. Air Service messenger bearing a combination wheel and skid landing gear designed and manufactured by Lawrence B. Sperry.

While in flight Mr. Sperry released the entire wheel and landing gear so that it fell clear of the airplane, thus relieving the craft of extra weight and interference. He then made a perfect landing, bringing the machine to a dead stop 50 feet from the place where the skid first struck the turf.

This is declared to be a remarkable record, and to open new possibilities for the landing of planes in spaces as small as the average tennis court.

It also facilitates operations over water and rough stretches of country where landing would otherwise be unsafe or impracticable.

How the Delco Plant Cut Unit Production Costs

Careful time studies, simple wage system, maintained piece rates and development of responsibility on part of individual worker responsible for materially decreased costs. Wages 75 per cent higher than prevailing union rates. Unit costs extremely low.

By Harry Tipper

THE great ambition of every production manager is to reduce production costs per unit of product, without getting into expensive wage disputes, interruptions in production itself, or poorer quality of work.

Out at the Delco plant of the General Motors Corporation in Dayton, they have succeeded in making a considerable reduction in the general cost per unit of production, while the workers are able to earn almost as much as they did during the peak of prices and the quality of the product has improved during that time.

The story of this development shows how essential to improvement in production is a careful consideration of small matters and a thoroughly nurtured spirit of organization and fellowship.

The plant of the Dayton Engineering Laboratories Co. is well lighted, well arranged and cared for. So are many other plants. There are very few special machines and not many new applications of general equipment. The departments of the factory are arranged with proper consideration of the movement of the fabrication and the progress of product from point to point has been carried out as well as location of plant buildings will allow.

Obviously this is no ideal plant, theoretically perfected in the mind of an engineer, as mechanically without waste of space and motion. It is an excellent example of sound development in factory building, where the problem of manufacture has increased in size and complication with considerable rapidity since the beginning of its work.

Plant Has No Unusual Advantages

THIS is one of the important points in the story of the production efficiency secured. There are no unusual advantages which place the organization outside comparison with other plants in the automotive field.

The manufacture of the product calls for a number of different jobs all through the plant. The ignition system for each automobile manufacturer demands its own tooling, set up and progress through the fabrication.

Despite these facts, the records show that the average earnings of the workers at this plant are almost, if not quite, as large as they were in 1919-20 and 75 to 80 per cent above the average union rates of to-day in that section. The records also show that in spite of these excess earnings, the cost of production has gone down.

The factory is largely run in departments, although some of the assembling processes are run entirely on the progressive and not the departmentalized system. The shaft making, screw machine, punch press, molding and other departments are laid out so that their work can be related to the sub-assemblies with the least possible difficulty. These departments work from stock into stock. A good deal of the electrical work is run on the progressive plan, the material coming out of stock and going through the different operations to assembly.

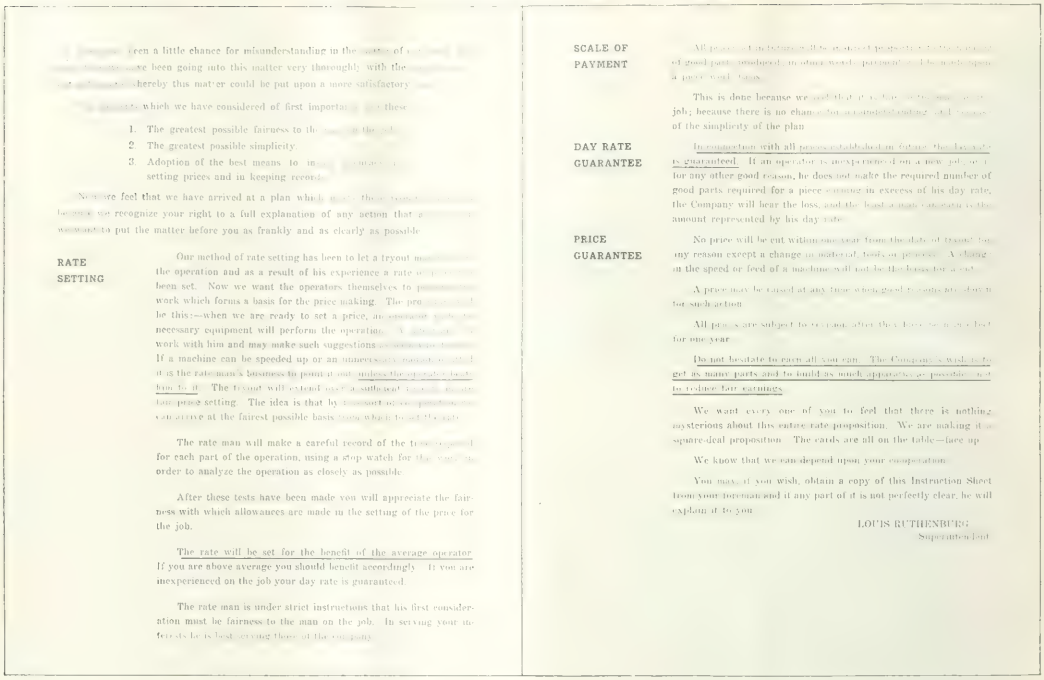
Items of Greatest Interest

THE interesting features do not lie in the plan of the factory or the character of its equipment so much as in the methods employed and the thorough organization behind the methods. The outstanding items of interest are:

(a) The plant is run on a larger percentage of piece work than any plant we know of covering a similar variety of operations.
(b) The wage system is so simple that any worker can check his own earnings at any time.
(c) The rate provides much higher earnings than day rates of union scale for an average skilled worker.
(d) The time study system brings the workers into agreement with the result of the time study by the time the studies are made. Once a rate has been developed by time study, the rate stands for a year, unless the operation is changed. Each time study includes a proper allowance for fatigue.
(e) Provisions have been made for rapid and definite review of grievances so that they are not allowed to fester.
(f) The employment office hires the help, follows the records of the worker, transfers where necessary, reviews grievances, conducts educational activities, reviews discharges or changes and takes the lead in many other affairs.
(g) All athletic and social developments are in the hands of the employed from the beginning. Nothing is provided by the concern although many things are made possible by the encouragement and backing of the company.
(h) The turnover is very low—the shop is open.
(i) There is a constant spirit of watchfulness for the opportunity to increase the efficiency of each operation or any piece of equipment.

The story of the piece work development is contained in the work on time study and wage system. It is a story of careful and patient examination into the conditions of each department and each operation, backed by a study, at least as conscientious, of the worker's desires and the working conditions.

The cards were always on the table. The feeling between the superintendent, supervisors, foremen and men



RATE SETTING

Our method of rate setting has been to let a tryout man [illegible] the operation and as a result of his experience a rate will be set. Now we want the operators themselves to participate in the work which forms a basis for the price making. The procedure will be this—when we are ready to set a price, an experienced man with the necessary equipment will perform the operation. We will then work with him and may make such suggestions as we have found. If a machine can be speeded up or an unnecessary motion eliminated it is the rate man's business to point it out, unless the operator beats him to it. The tryout will extend over a sufficient length of time to give a fair piece setting. The idea is that by this method we can arrive at the fairest possible basis upon which to set the rate.

The rate man will make a careful record of the time required for each part of the operation, using a stop watch for the purpose in order to analyze the operation as closely as possible.

After these tests have been made you will appreciate the fairness with which allowances are made in the setting of the price for the job.

The rate will be set for the benefit of the average operator. If you are above average you should benefit accordingly. If you are inexperienced on the job your day rate is guaranteed.

The rate man is under strict instructions that his first consideration must be fairness to the man on the job. In serving your interests he is best serving those of the company.

SCALE OF PAYMENT

[illegible] of good parts produced, in other words payment will be made upon a piece work basis.

This is done because we [illegible] job; because there is no chance for a misunderstanding and because of the simplicity of the plan.

DAY RATE GUARANTEE

In connection with all pieces established in future the day rate is guaranteed. If an operator is inexperienced on a new job, or if for any other good reason, he does not make the required number of good parts required for a piece earning in excess of his day rate, the Company will bear the loss, and the least a man can earn is the amount represented by his day rate.

PRICE GUARANTEE

No price will be cut within one year from the date of tryout for any reason except a change in material, tool or process. A change in the speed or feed of a machine will not be the basis for a cut.

A price may be raised at any time when good reasons exist for such action.

All prices are subject to revision after they have been in force for one year.

Do not hesitate to earn all you can. The Company wishes to get as many parts and to build as much apparatus as possible and to reduce fair earnings.

We want every one of you to feel that there is nothing mysterious about this entire rate proposition. We are making it a square-deal proposition. The cards are all on the table—face up.

We know that we can depend upon your cooperation.

You may, if you wish, obtain a copy of this Instruction Sheet from your foreman and if any part of it is not perfectly clear, he will explain it to you.

LOUIS RUTHENBERG
Superintendent

Delco instruction sheet

permitted the most effective informal and formal discussions of matters at issue, so that there was little opportunity for the worker to become suspicious of the study or the developments.

Bonus System Formerly Used

UP to 1916, the wage system was a bonus system which Mr. W. B. Baker, the employment manager, indicated was sufficiently complicated to make him stop to think it over, if he had been away from the calculations for awhile. Of course, this is no new thing in bonus systems. Many of them have been too complicated for the worker to check up at any time. Such a system breeds suspicion because the worker's calculations of his earnings will disagree with his pay envelope from time to time and the explanation of the difference will not be visible to him. He will be inclined to believe that there is some juggling somewhere when he cannot see the reason. This old bonus system was discarded at that time and the new system introduced. Every production man knows the difficulty attendant to the introduction of any change in the system of payment in a factory. All such moves are suspected immediately and that suspicion must be disarmed if the job is to be put over without disrupting the production.

Thorough explanation to the worker, open methods of taking the time study, tests, and full consideration of all possible points of question, were mainly relied upon to enable the management to put the matter through. The piece work price is based upon a time rate and the time required for the operation as the result of the time study. The time study includes the allowances for delay and fatigue which are worked out as a percentage addition to the study. Once the time study has been worked out the operator is able to determine his pay quite easily from the piece price and the number of pieces produced and passing inspection. Each operator is provided with his go and no go gages, so that he can inspect his own work before it passes on to the regular inspection routine.

The number of different jobs passing through the Delco factory is considerable, and the piece work arrangement required a good deal of care in its working out so that these many changes could be made without difficulty.

For many of the departments the transfer to piece work required a good deal of original research, as these departments do not work at piece work, even in factories usually called piece work factories. In the Delco plant, piece work obtains in the automatic department, with the result that one man will operate five machines, whereas the average is from two to three machines per man.

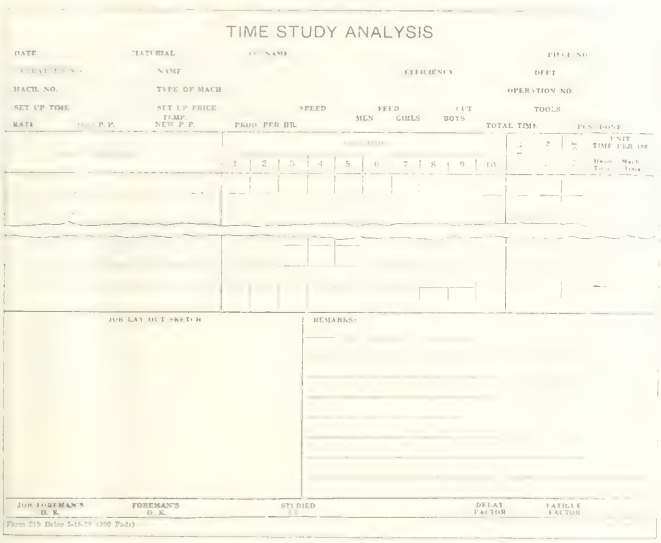
PERHAPS the most unusual application of the piece price is for the operators in the heat treating department. This is the first instance that has come to our attention of such a wage system obtaining in the heat treating work.

The wage system in this plant possesses the following important elements:

(a) A piece price based upon a time rate and the operating time.
(b) A time study which is open, can be checked by the workers and covers a fair average probability.
(c) Allowances for delay and fatigue made in the time study itself.
(d) Payment for idle time, beyond half an hour.
(e) Payment for overtime on specified increases of time rate.
(f) A guaranteed day rate for all employed who may not be able to make the piece rate for any reason.

As we have stated, the percentage of piece work in this factory is over 90 per cent. This piece work provides a much higher earning for the average individual than the rates required by the union scale in Dayton. In the molding department of the foundry, for instance, the union rates for the day for machine molding is $5.30, whereas the earnings in the Delco foundry run as high as $9 and $10. On the other hand, the average pace in day work in the union shops is about 40 flasks a day, whereas the production in this particular foundry runs as high as 80 flasks a day, so that the cost of the production is considerably less.

In the tool-making department the cost of tool making on the rates obtaining was a good deal higher than outside costs, when the union rate dropped from the high peak. Mr. Hughes, the supervisor of this department, called his men together and told them about the cost of production, and also the fact that the amount of tool work in the plant itself depended upon the ability to produce tools within the plant for a price which was in line with outside costs. The matter was gone into very thoroughly and it was indicated that the management did not want to reduce the rate and would not reduce the rate if the cost of production could be reduced. The net result of this was that the tool workers went to work with such capacity and energy that the making of tools in the plant itself dropped very speedily to a comparison with outside plants and to-day the tools are being made with less expense per unit of operation than in plants on the outside.



Time study analysis

The two or three important features to be considered in this piecework rate as established in the Delco plant should be of very considerable interest to engineers and production men in other plants in the industry. The form which is used for time study shows the introduction of the delay factor and the fatigue factor in connection with the time study itself, so that the pace set will be one which can be continued without undue fatigue and without introducing a number of small difficulties arising from slight delays. This is a very important element and these factors permit an allowance which will be subject to correction after the time of the guarantee is over, if they are found to be excessive, without disturbing the time required for the actual operation itself, and on a basis which will indicate their justice to the worker.

THE second important feature is the guarantee day rate for all employees who cannot make the piece work rate. Some sort of a guarantee of wage is necessary for the less efficient employees. The more efficient employee is not concerned with the guarantee, because he knows that he is capable of doing a sufficient amount of work to make more than his daily rate in his operations. Where the employee is less efficient, the guarantee operates to stabilize the efficiency, so that the average amount of production is higher than when all the employees are dependent upon the piece work rate. Apparently, also, it has operated to reduce the number of employees taking advantage of the guarantee day rate, because the piece work operations include 90 per cent of the total direct factory labor which, itself, is a very large percentage to be acquired in any factory following a number of different jobs with the varied types of operation required in this plant. The allowances for idle time at the day rate are quite important.

One of the very great grievances in the present coal strike is the amount of idle time which the miner must suffer without securing any compensation therefor. A number of contingencies arise in manufacturing work, particularly where there are a variety of operations and a number of different jobs going through the plant; which make it impossible for the operator to continue on with the work at all times and make it necessary for him to be idle from causes beyond his control or the control of the particular department in which he is working. These contingencies make a reasonable idle time payment very necessary if the plant is to be operated justly from the standpoint of the worker's opportunity to earn. The economic value of this is indicated in the net results secured in this plant, where the average earnings are high and the average cost of production per piece is low.

This factory enjoys a very low turnover of labor, so low that the percentage of turnover in the year is almost incredible from its relation to the ordinary practice. Turnover, as it stands to-day, is approximately less than 40 per cent per year, as compared with the turnover of from 150 to 300 per cent in the average factory operating in the metal trades.

In the rapid growth of the automobile business there is a tendency for the worker to roam from one job to another, and this tendency is illustrated by the high average turnover in cities like Detroit and Cleveland in the skilled trades required in metal trades factories. Evidently a very large proportion of the workers in the Delco organization are citizens of Dayton remaining at their work in the plant and forming a desirable and definite part of the community life in the city of Dayton itself. This is very important in its influence upon the efficiency of the plant and the possibility of maintaining an open shop.

Reducing Size of Combined Ignition and Lighting Systems

European practice offers suggestions. Innovations frequently impractical in production. Some successful magnetos have not been redesigned since 1910. Drawings show wide range of practice.

By Fred J. Hoffman

CONSIDERING the big strides that have been made in reducing the manufacturing cost of motorcycles, it should prove interesting to survey the ignition and, incidentally, the electric lighting equipment of these machines. Innovations are constantly being announced, but to the advanced student they very often reveal themselves, upon investigation, as mere readaptations of previously discarded fitments. Looking carefully into the subject and scrutinizing the designs brought out, one is led to predict a new era of increased use of electrically operated components. Some of the developments embody novel and practical ideas and conceptions, yet one should be on guard not to over-estimate their possible influence on the industry.

At the present time there is a demand for a combined ignition and lighting plant that is compact and self-contained. However, the development of such a unit within the space heretofore occupied by the magneto alone is a most difficult task. Combining the main features so well developed in the separate machines, in a single unit, is a problem that requires a thorough knowledge not only of past and present methods and trend of accepted theories of ignition, dynamos, batteries, etc., but also of motorcycle manufacture, performance, etc., the whole backed up by practical experience. A mere superficial knowledge of the subject and common intelligence are of little help. This assertion is substantiated by the large number of lighting devices already introduced which stand very little chance of commercial success. In the writer's opinion the separate unit machines, that is, a magneto and a dynamo jointly driven, will be the favored systems of the future. The construction which probably ranks next in

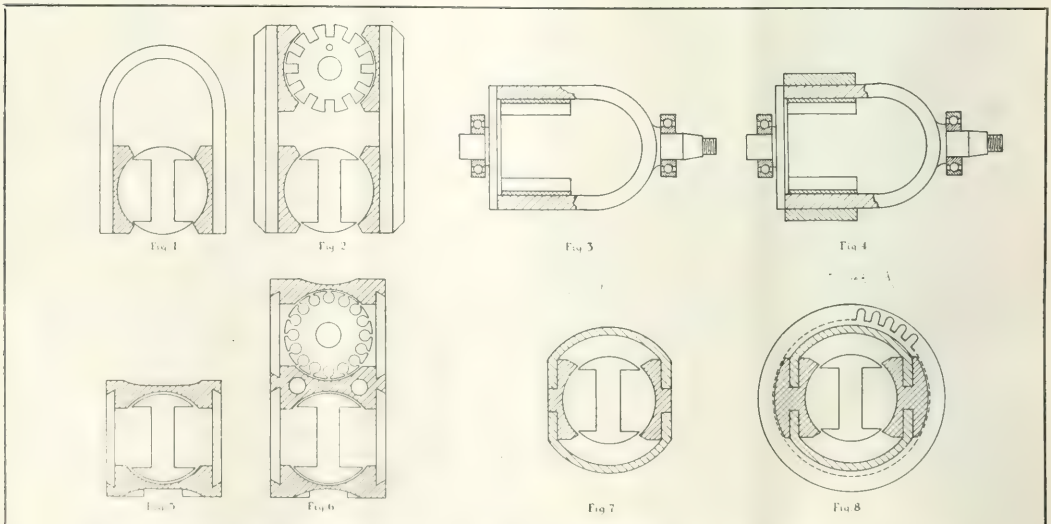
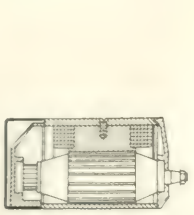


Fig. 1—Stationary field single pole pattern. Fig. 2—Stationary field double pole pattern. Fig. 3—Rotary field single pole pattern. Fig. 4—Rotary field double pole pattern. Fig. 5—Stationary consequent single pole pattern (Cobalt). Fig. 6—Stationary consequent double pole pattern (Cobalt). Fig. 7—Stationary consequent, single pole field circular pattern (Cobalt). Fig. 8—Rotary consequent double pole field circular pattern (Cobalt)


Fig. 9

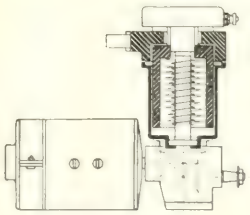

Fig. 10

Fig. 9—Lucas Co. dynamo with eccentric armature for belt drive. Fig. 10—Sparxlight Co. dynamo with rotary coil and contact breaker mounting

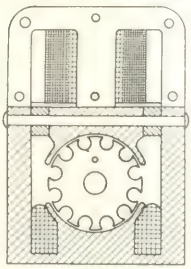
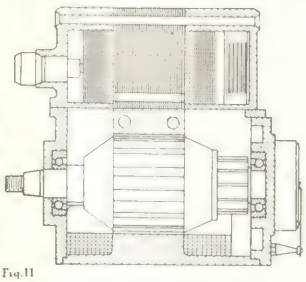
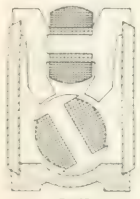
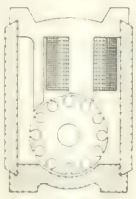


Fig. 11

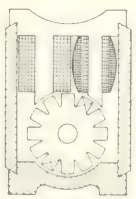
Fig. 11—Dynamo with timing arrangement on armature shaft and stationary coil (Nat'l Coil Co.)

value is that which uses the engine flywheel as an interrupter of the magnetic balance and as a carrier of certain component parts that make up the whole ignition and direct current generating portion. In other words, the flywheel is built as a magneto and generator.

The high tension magneto with its ordinary H pattern Siemens double wound rotary armature seems still to hold the lead. Experience in manufacturing this type of inductor with transformer coils has led to such a high state of development that it must be an epoch-making invention indeed that could displace it altogether, notwithstanding the fact that from the standpoint of electrical efficiency it is one of the worst devices ever built. Certain innovations and improvements in the way of ignition equipment have been brought out of late, yet it is by no means certain that the labor spent on them will bear fruit. This can be substantiated by the fact that standard magnetos which stand out as first class examples of 1910 design are still being manufactured unaltered. Much of the research work has been in relation to the composition of the steel used for the field magnets, and in this connection the cobalt may be mentioned.


Fig. 12


Fig. 13


Fig. 14

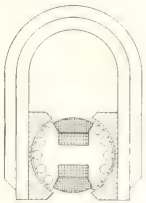

Fig. 15

Fig. 12—Single field dynamo with rotating Siemens armature and stationary coil (Smith & Co.). Fig. 13—Single field combined dynamo and coil stationary (Morris, Lister & Co.). Fig. 14—Pontois single field stationary d. c. winding and ignition coil, inductor type. Fig. 15—Horseshoe pattern permanent field combined H armature with H. T. winding and low tension multi pole armature (E. Harrison)

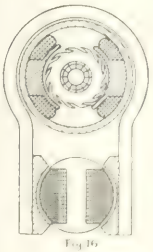
Position of the Magnetic Field

One of the most interesting features of igniters constructed on this principle is their diminutive size. However, magnetos of very nearly the same size are manufactured with ordinary material.

Another item that has aroused the imagination of the designers is the position of the magnetic field and its functions in relation to movements.

However, the work done along this line is also of doubtful value, for unless it can be shown positively that losses due to multiple airgaps, which can hardly be eliminated in such constructions, are reduced or, better still, entirely dispensed with, the innovations will have little appeal. It makes little difference whether the exciting field is of open or closed, stationary or rotary construction, so long as the ratio of weight to working output remains unchanged. It is well known that the permanent field is very far from comparing favorably with the electro-magnet.

Fitting a direct current generator to motorcycles for lighting and charging purposes together with a magneto ignition system, or using the generator for charging an accumulator and then firing the engine by means of a stationary induction coil, is not a new idea, and only the more extensive use of such systems on motor vehicles has brought up this question in connection with motorcycles as well. Though the system of ignition by coil and storage battery in conjunction with a dynamo generator is a little more complicated on the single tracker, its general adaptation stands some chance of success. But there is no question that the details must be worked out differently.


Fig. 16

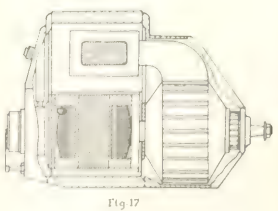

Fig. 17

Fig. 16—Lucas Co. independent dynamo and H. T. magneto in one unit arrangement, gear driven. Note the uni-directional armature slots. Fig. 17—H. T. magneto and dynamo single drive (Renault Freres)

Under the heading of combined ignition and lighting devices we can establish the following subdivisions:

1. Dynamo for charging only.
2. Combined dynamo and rotary coil.
3. Combined dynamo and stationary coil.
4. Combined dynamo and magneto.
5. Single unit magneto-dynamo.

No. 1 is probably the least favored, on account of the difficulty in fitting such a generator to any and every make of machine irrespective of year of manufacture.

No. 2, the combined dynamo and coil, is little known. This combination consists of a revolving coil with contact-maker attached and a dynamo, both positively driven and, of course, timed to the cycle of explosion. The dynamo provides current for the storage battery, and this in turn feeds the coil.

No. 3, the combined dynamo and stationary coil, is a similar combination of ignition and charging design but has the contact maker on the dynamo. It has to be of a slightly larger size than the generator usually employed, the reason for this being the lower speed. Otherwise there is scarcely any difference, and the function is the same. The manufacturing cost of No. 3 is slightly lower, and for this reason its commercial changes are somewhat better.

No. 4, the combined dynamo and magneto, each machine a self-contained and independent unit, is probably the ideal system. The application of two already standardized units is very much favored, for the reason that it involves no radical features, and is easily understood by every user and repairer. There are some minor drawbacks, such as the necessity for gearing, etc., but with the proper care these parts can be made quite efficient and fool proof.

No. 5. At first sight the single unit system seems to meet all the requirements and possess all of the features of any combination yet described, but this certainly is not a criterion. The simplicity resulting from the absence of gearing is no doubt an advantage, but, on the other hand, it must be remembered that one armature carries the d. c. charging and lighting winding and also the alternating ignition coil, and a breakdown means a total failure of the engine and the illumination. Duplex windings are not so safe as two separate individual constructions and, therefore, though the basic principle is correct, the manufacturing difficulties make the advantage dubious.

Super-Micrometer a New Precision Measuring Instrument

A NEW precision measuring instrument termed the Super-Micrometer and said to be capable of making measurements to the nearest ten thousandth of an inch has recently been placed on the market by the Pratt & Whitney Co. It is simple and rugged, being designed for use on the inspector's or toolmaker's bench. As will be seen by the accompanying cut the instrument consists of a rigid cylindrical bed, a dividing head, and an adjustable foot stock. The screw has a working range of ½ in., graduated by 500 1/32 in. divisions on the periphery of the duralumin index wheel. Means are provided to take up wear or slight errors in lead, while springs take up backlash and maintain a constant pressure on the thrust bearing. The foot stock can be moved into position by a rack and pinion and is then securely clamped in place.

The index wheel is revolved by a fine round belt, the slipping of which enables the operator to apply the same pressure to the anvils each time a measurement is made. Variations in belt tension do not affect the accuracy, inasmuch as the pressure applied is the same as when the zero setting is made against standard inch blocks, prior to using the machine. The latter has a range of 8 in. between anvils.

THE Portuguese West Africa government has appropriated $56,000 for the purchase of light passenger cars, motor trucks and motorcycles for use by the federal government, the automotive division of the Department of Commerce has been advised.

Bids for light types of passenger cars and trucks will soon be opened by the authorities at Angola. Only light automotive equipment can be used because of the roads in the provinces.



The Pratt & Whitney super-micrometer

British Standardize on American Nomenclature

Engineering Standards Association issues report which favors use of terminology long since standardized by S. A. E. except in cases not likely to be generally used in Great Britain or where its use might involve confusion with other parts used ignored to date.

By M. W. Bourdon

AN interim report recently issued by the British Engineering Standards Association deals with the nomenclature of automobile parts. There are certain sections as yet uncompleted—body-work, accessories, ignition apparatus and electrical equipment—but otherwise the chassis is dealt with pretty thoroughly.

The following main principles have been observed in the preparation of this report, which has the official recognition and approval of Government Departments as well as of Automobile Engineering Associations:

(a) Established conventional names have been adopted as far as possible; the terms which are suggestive have been used to aid memory; and brevity has been observed wherever possible.

(b) American terms standardized by the (American) Society of Automotive Engineers have been adopted, except in certain cases where there is no likelihood of these terms being generally used in Great Britain or where their use would involve confusion with other parts.

The word "bush" is used to indicate a removable and renewable lining in a plain bearing. While this is in accord with convention when the lining is a complete cylinder, it is a distinct departure from established practice to term a split liner a "bush"; the renewable portion of a connecting rod big-end is, for example, called the "connecting rod bush" in this report. Quite legitimate, no doubt, and possibly better than merely "bearing" or "bearing liner"; but likely at first to cause some confusion with the wrist pin bush—this pin, by the way, still being called the "gudgeon" pin.

The gasoline tap is called "fuel valve"; the term "accelerator pedal" is definitely adopted, and "valve spring seat" indicates the part usually termed valve spring washer or cup in England, but otherwise there are no variations of note in connection with the engine.

PLATE clutch is standardized as meaning the type with one plate clamped between two others, and disk clutch as one having more than three disks, nothing unusual in either case. But "transmission shaft" as a term denoting the driven shaft in a gear-set (Anglice, gear-box) is quite new. So also is "gear shift fork" hitherto known as the gear striking fork. "Striking rod" is now to be known as a "shift-bar."

No attempt has been made to standardize nomenclature for universal joints. As a result "star joint," "Hooke's joint," "cross pin joint" and one or two other terms will seemingly still be used to denote identical or similar designs. The same with "pot joint," "cardan joint," "sliding block joint," "pin and nut joint" and "De Dion type joint," all of which have been and are still used indiscriminately to describe the same type.

"Three-quarter floating axle" is a term which has been used comparatively rarely in England up to the present, but it is adopted in this report. The former non-floating type becomes semi-floating, and the latter becomes three-quarter floating, the definitions for these two and the other alternative being the same as those standard with the Society of Automotive Engineers.

Another deviation from previous nomenclature is in regard to the differential. Instead of "sun pinion" and "planet pinion" we have "side gear" and "spider pinion" respectively. Then, "lining" is applied to both internal and external brake shoes or bands. Brake "equalizer" takes the place of "compensator," while in the steering equipment section "steering knuckle" is used where "swivel axle" or "stub axle" has hitherto prevailed. The steering swivel pin becomes the "knuckle pivot." "Push-and-pull rod" and "drag link" are shelved in favor of "connecting rod," and "cross-rod" is standardized instead of "coupling rod."

SEMI-ELLIPTIC springs are to be known as half-elliptic, the latter a term used occasionally but not universally by any means up to the present; but while the quarter-elliptic spring is first definitely distinguished from the full cantilever, some explanation is needed to distinguish these two and the "half cantilever," the latter, a descriptive term which is just now, to the best of the writer's knowledge, used for the first time in England.

While, as stated, body-work is not dealt with in the interim report, we have an indication that the American term "cowl" will be used in place of "scuttle." But "bonnet" is also mentioned incidentally as meaning the engine covering and "hood" as still signifying the folding top of an open body.

As the first, and some people will say—not without reason—a somewhat belated attempt to standardize automobile nomenclature in England, this report should have aroused at least a little interest concerning variations if nothing else; but the writer has yet to observe any automobile journal in its country of origin which has done more than given a brief announcement that it has been issued. And in the one or two subsequent issues there is no evidence of any attempt to follow the standards thus set; in fact, they are seemingly ignored!

New Foundry Process Secures Uniform Hardness in Cylinder Bore

Barrels cast on metal faced cores. Uniform crystallization obtained. Average cost reduction of 75 cents per cylinder claimed for metal faced core over sand core method.

IN the recent description of the new Buick models published in AUTOMOTIVE INDUSTRIES July 27, it was briefly mentioned that a new foundry process was being employed in order to secure a uniform Brinell hardness over the entire internal bore of the cylinder. This process was recently invented by T. P. Greehow of the National Laboratory of Foundry Engineers. This invention covers a method to regulate gray iron mixture so as to give a uniform hardness test from the top to the bottom of the cylinder barrel. It was found after a series of tests on various mixtures that the Brinell hardness number of the test blocks would run at 235 or over on a barrel sample, while at the section covered by the water jacket, it would Brinell as low as 146. This, of course, is due to the annealing action of the thicker mass of metal, as well as the core in the water jacket space of the cylinder casting.

The variations of hardness found on samples taken from different parts of the cylinder castings indicated some interesting variations. For instance, Brinell tests taken on opposite sides of the walls cut from between two barrels disclosed the fact that while one cylinder in the pair gave a satisfactory hardness test, the other was below the specification limit. At the same time, flanges, bosses and other parts would be so hard as to necessitate the slowing down of the machine shop operations and the rejection of many cylinders that proved too hard to machine even at the reduced speed. The new method consists of casting the barrels on metal-faced cores and it is claimed that when finished, these present a remarkably dense, smooth surface, which indicates a uniform crystallization brought about by a thorough breaking up and even distribution of the graphitic carbon. Such a surface is also claimed to produce the best conditions for lubrication. The illustrations herewith show the core making details which are followed to obtain the results.

In the sketch, Fig. 1, is the engine cylinder casting of which Fig. 2 is the jacket wall. The casting is shown of irregular shape, illustrating the variable distribution of the mass of metal and consequent unequal heat retaining capacity.

The cylinder casting is shown, Figs. 1 and 2, as embedded within the usual sand mould 3, and containing a core 4.

In order to compensate for variations of a mass of metal comprising the casting, the metal faced plates 5 are varied in thickness throughout their extent. The segmental face plates 5 are shown with an offset or shoulder 7, thereby compensating for the annealing condition existing in the water jacket. To allow for contraction of a casting and to enable the face plate 5 to be readily removed from the barrel, they are spaced about 3/16 of an inch apart.

In order to locate the face plate in properly spaced relation for embedding in the core 4, the plates are pro-

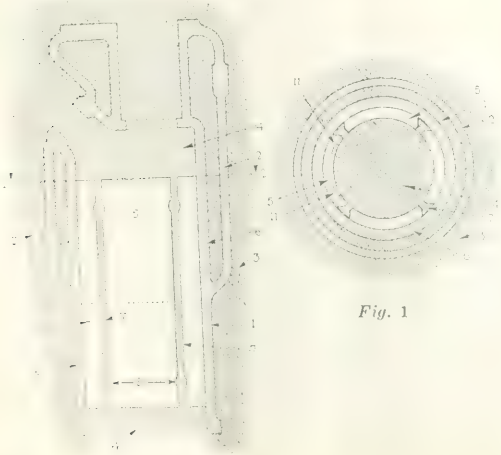


Fig. 1

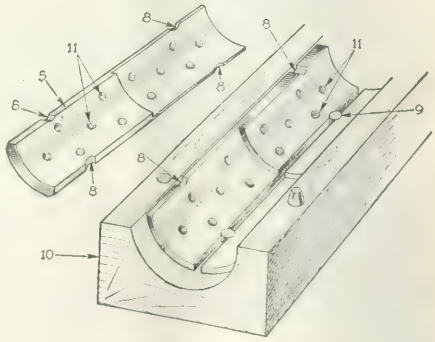


Fig. 2

AVERAGE BRINELL OF BARRELS CAST ON METAL FACED CORES AFTER FINISHED MACHINE OPERATION.

Section under water Jacket	190
Section under exposed part	204

AVERAGE BRINELL OF SPECIAL SOFT MIXTURE FOR EXPERIMENTAL TESTS.

Average Brinell under Water Jacket—Sand Cast	99
Average Brinell under Water Jacket—Metal faced core..	179

This test was applied to two barrels (one sand core and one cast on metal faced core) of same cylinder block. Note that Brinell test raised from 99 to 179.

SPECIAL SOFT MIXTURE—ONE BARREL OF PAIR CAST ON METAL FACED CORE, THE OTHER BARREL CAST ON SAND.

Average Brinell under water jacket—metal faced core..	210
Average brinell exposed part—metal faced core	214
Average Brinell under water jacket—Sand core	126
Average Brinell exposed part—Sand core	137

	ANALYSIS SAND CAST	ANALYSIS METAL FACED CORE
Silicon	3.04	3.04
Sulphur	.093	.093
Phosphorus	.32	.32
Manganese	.73	.73
C. Carbon	.47	.46
Total Carbon	3.14	3.14

COMPARATIVE BRINELL TESTS SHOWING THE RELATION BETWEEN CYLINDER BARRELS CAST ON SAND CORES, AND THOSE CAST ON METAL FACED CORES.

Sand Cast		Metal Faced	
Top	Bottom	Top	Bottom
170	187	196	196
166	187	196	196
156	174	202	196
163	179	202	196
143	179	196	196
143	187	196	228
114	183	196	228
116	187	202	212
163	183	207	212
183	196	207	217
159	192	212	212
163	196	207	217
166	207	217	212
179	196	207	207
170	207	207	207
166	192	207	192
166	179	207	207
159	202	207	202
153	192	202	202
163	187	202	196
159	183	207	196
Average		Average	
Top	Bottom	Top	Bottom
160	189	203	206

In each of the above cases the metal cast against sand cores was barely machinable, while the metal cast against metal faced cores was machined at productive speed.

vided with accurate marginal notches 8; which engage locating pins 9, in the bottom of the halves of the core box 10. The pins 9 project from the bottom of the core box and receive the notches 8 of the face plate on opposite sides. The locating pins will leave depressions or holes in the core upon its removal from the core box. These holes are closed by being filled with core sand.

To afford anchorage for the face plate in the core, the interior faces of the plates are formed with a number of depressions as at 11. In addition the face plates are formed with draft or taper which further assists in holding the plates in place and prevents them from leaving the core while being handled.

After the barrels have been made the cores are run into the oven for drying. From the oven they are taken to the core cleaners, brushed off and handled in the usual way until they reach the assembly. Just before being assembled the face plates are quickly coated with a special preparation that causes the plates to leave the barrels easily, and which gives them a perfectly smooth surface. This special preparation, used in coating the metal faced cores, plays a most important part in giving the metal its density, Brinell hardness and machinability. An examination of the physical structure of iron cast by this method shows it to be identical with air furnace iron. After casting the cylinder blocks are taken to the "knock-out," where the metal faced cores are removed without an extra operation.

Experiments conducted with a view of determining whether the time of removing the core made any difference, either in the density of Brinell hardness of the barrels, proved this to be a matter of no importance.

It is claimed that the cost of making a finished cylinder block on metal faced cores averages, at least, 75 cents per cylinder less than the cylinder cost on sand cores, this difference being made up by decreased cost of tool upkeep, increased speed in reaming and machining, and reduction of losses due to segregation, sand holes, leaks, etc.

Barrels cast on metal faced cores will not ream off, as there is no line of least or greater resistance due to variable density and hardness in the barrel.

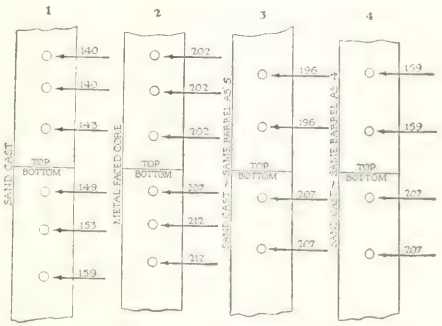


Fig. 3—The samples shown in Nos. 1 and 2 were cut from the same barrel. Sample shown in No. 1 was cut from the section of the barrel not covered by the metal faced core while No. 2 was taken from the section of the same barrel covered by the metal faced core. It will be noted that the Brinell test has been raised from a minimum of 140 to a minimum of 202. Nos. 3 and 4 indicate a wall cut from between two barrels cast entirely on sand cores. It will be noted that while the Brinell on one side of this wall representing one cylinder was very satisfactory, the other side of the wall representing the other barrel was not at all satisfactory as far as the Brinell hardness was concerned

ANALYSES OF SAMPLES FROM ABOVE SPECIMENS.

	Sand Cast			Metal Faced Cores Cast on		
Silicon	1.90	2.39	2.16	2.97	2.99	3.20
Sulphur	.123	.138	.125	.121	.099	.107
Phosphorus	.13	.13	.12	.12	.21	.11
Managanese	.70	.69	.82	.52	.66	.67
Combined Carbon	.46	.37	.39	.10	.16	.07
Total Carbon	2.97	3.17	3.10	3.02	3.27	3.17

MANUFACTURERS of motor vehicles who are desirous of entering the Chinese market should not do so within the next six months, advises Trade Commissioner Hoyt in dispatches to the Department of Commerce. The stocks of dealers, who usually handle two or three makes, are large at the present time and are being disposed of slowly. However, the good roads movement inaugurated in 1921 is spreading over a great part of the country and the market in China will bear watching, he states.

Combining Accuracy and Quantity in Differential Carrier Manufacture

New methods developed in Hudson-Essex plant in producing this unit. High degree of accuracy obtained. Supports for bearing cages integrally ground, instead of reamed as usual.

By J. Edward Schipper

EVEN a slight degree of misalignment in the supporting members for the gears and bearings in the rear axle is sufficient cause for extremely rapid wear. In fact, the accuracy required in bearing manufacture is largely nullified if the supporting members are not in themselves sufficiently accurate to derive all of the benefits of close limits and extreme accuracy in the anti-friction units themselves.

In AUTOMOTIVE INDUSTRIES for Aug. 17 the operations on the pinion shaft for the Hudson rear axle were described. In this same shop, which takes care of the entire axle output for both the Hudson and Essex cars and which has a capacity of probably 300 axles per day, there is a line up for the differential carrier which involves some methods which are new in manufacturing this unit. In fact, visitors from the plants of high priced cars who have followed through the processes used in the Hudson plant, have expressed themselves as surprised at the measures taken to secure accuracy in the bearing supporting surfaces. An example of this which will be explained in detail later is the practice of integrally grinding the supports for the bearing cages in place of reaming them, as is customary in most axle shops.

The carrier is a malleable casting of bell mouth shape, as may be noted from Fig. 1, which illustrates the first operation. The machine illustrated is a Gisholt, No. 5, the operations being to bore, face and turn the outside diameter. These three operations are handled on the same machine, 8 min. per casting being required to perform the work. The casting is located on an internal three-jawed chuck.

Drilling

The second operation is performed on a Baush multiple spindle drill upon which all of the flange holes and the four boss holes for holding the bearing caps are drilled. There are fourteen spindles on this machine. The work is located from the inside of the cross bearing. Another drilling operation is performed on a Tripp, two spindle machine. This drills a ¼-in. pipe hole and drills the lock bolt hole. Location for the work is on a mandrel through the bearing openings and against a V-block which butts against a lug on the casting. The holes for the 1-in. pipe slug and also the ½-in. pipe slug through which the rear axle doping operations are performed are handled on a Carlton radial single spindle drill with a Magic chuck for changing from the 1-in. to the ½-in. drill. This machine is shown in Fig. 3.

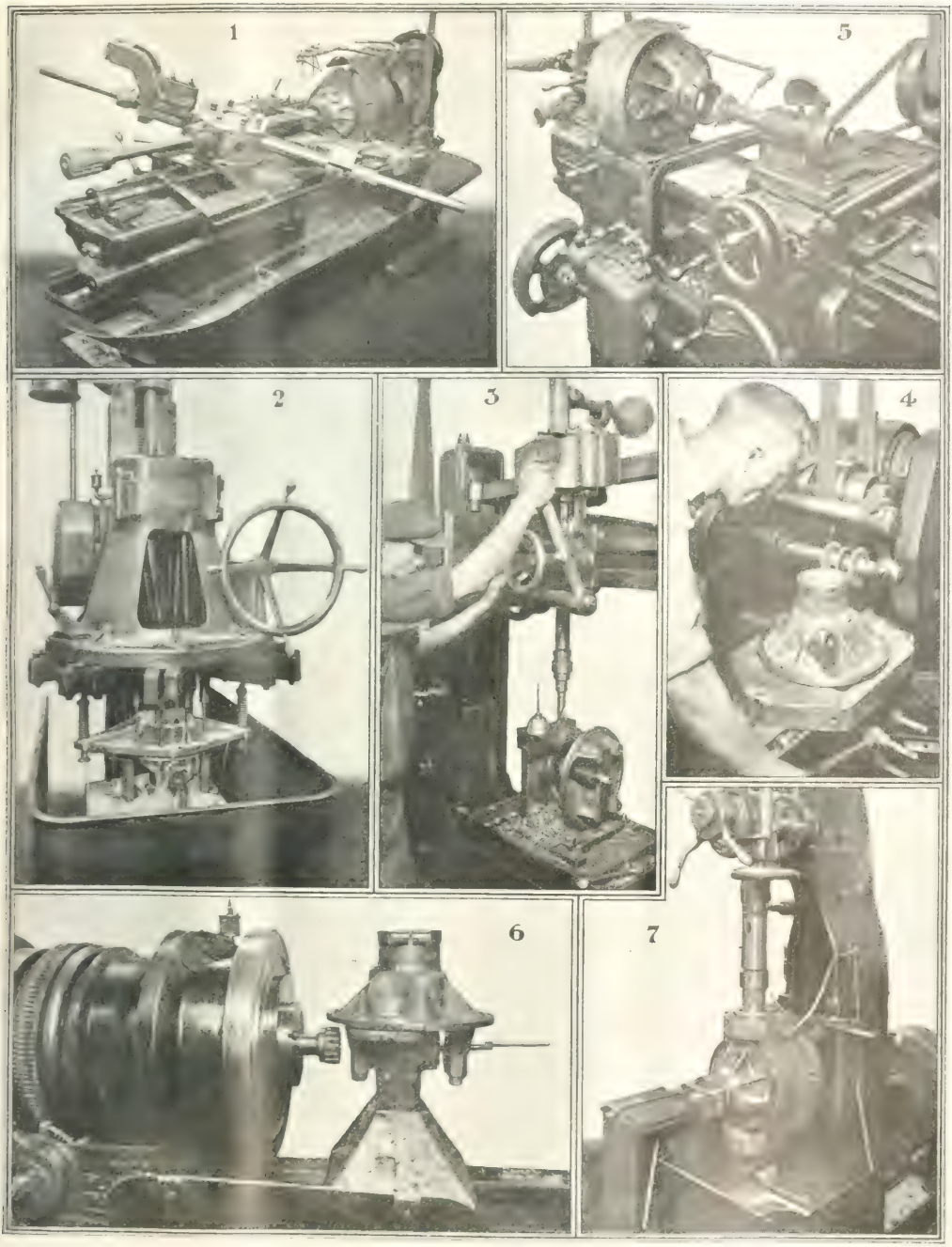
The next two operations are handled by the same man. The first of these is to slot the lock bolt hole, the operation being performed on a Toledo hand mill, as shown in Fig. 4. As will be noted, there are three cutters on this machine for slotting, as well as straddle milling. The work is located on two dowel pins through the flange holes and is supported by a mandrel passing through the center of the casting.

The other operation performed by the same machinist is on a Barnes single drill press which taps seven holes, one of them being a ¼-in. pipe thread, another a ½-in. pipe thread and the third a 1-in. pipe thread for the various drain and filling plugs, and the other four are all 9/16-in. holes.

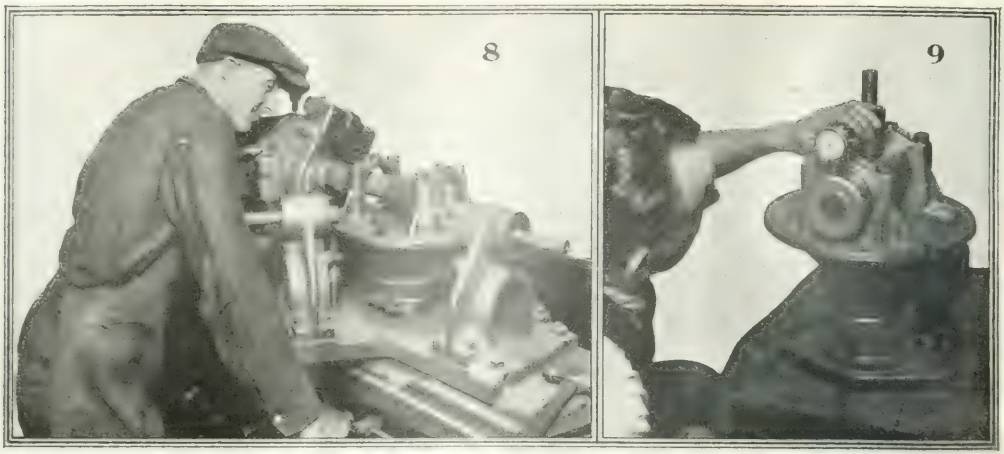
Grinding

One of the most interesting operations on the entire carrier is that next performed on a Heald grinder. This machine internally grinds the bore for the pinion bearing cage. The work is located from a plunger in the center of the bore for centering, and endwise it is held against stops which butt against the open end of the flange for end location. The plunger is ingenious in its action, as after performing the function of locating the bore, it backs out of the way so that the grinder can pass through the bore. The plunger is an exact fit, being of the same diameter as the Gisholt bore, which was the initial operation on the casting. Very close tolerances are held on the grinding operation at this point, a limit of plus .0005 in. and minus .001 in. being rigidly adhered to. The grinding operation is illustrated in Fig. 5.

A Hall planetary thread miller locating from the finish bore threads for the bearing cage. This location is held by means of an expanding collar. The operation is shown in Fig. 6. Following the thread milling operation, the caps are put on the bearings. These have not as yet been machined and the first operation on them is a Foote-Burt boring mill which bores out for the differential. This work is located from the finish ground bore and against the flange. As shown in Fig. 7, there is an indexing fixture employed in this work. The fixture is reversible, permitting each side to be bored. A feature which may be noted is the opening in the fixture for the tube carrying the cooling fluid to the machine. When the fixture is ro-



1—*First operation on Hudson differential carrier. Boring, facing and turning on Gisholt No. 5 machine.* 2—*Baush multiple spindle drill on flange and boss holes for Hudson differential carrier.* 3—*Drilling 1 in. and ½ in. pipe slug holes on Carlton drill with Magic chuck.* 4—*Slotting and end milling the lock bolt holes on Toledo hand mill.* 5—*Heald internal grinder grinding surface for pinion bearing cage.* 6—*Type of Hall planetary thread miller which is used for threading pinion bearing cage, differential adjusting nut. Operation herewith is on differential adjusting nut.* 7—*Foote-Burt boring mill boring for differential*



8—Heald eccentric grinder grinding internally for the differential bearing. 9—Gaging accuracy and alignment of differential bearing, the seats for which have been ground on the Heald eccentric grinder

tated to get the other index, the tube is merely pulled from the hole and inserted in the corresponding hole on the other side. The tool carries a pilot which passes directly through the casting and pilots in the ground bore on the opposite side from that on which the cut is being taken.

The bearings for the differential are also internally ground on a Heald eccentric grinder. This grinding operation is held within .002 in. limit. The work is located from the finish bore and by three plungers against the flange. It will be noted that the grinding tool goes directly through both bearings so that there is no chance of misalignment and it is not even necessary to use an indexing fixture at this point. The fixture is rigid, permitting the grinder to take off both bearings on one set-up. The method for checking this operation is shown in Fig. 9. An amplifying gage is employed to locate any variations, each carrier being checked for accuracy in the line-up of these two bearings.

The final operation is performed on a Hall planetary thread mill which threads for the differential adjusting nut. The work in this case is located from the two ground bearings on two taper plugs. The adjusting nut thread is cut on one side and the casting then turned around and threaded on the other on a reversible fixture. Following this, the castings are washed in kerosene and forwarded to the assembly department.

The Motor Bus in Argentina

THE motor bus in Argentina has not yet passed the experimental stage; in fact, it can hardly be said to have been given a fair trial. There is no city in the Republic with a line of motor buses in any way similar to those in some of the other great centers of the world.

More than two years ago, a concession was secured from the municipal authorities of Buenos Aires to run a line of buses starting from the Plaza de Mayo, in front of the Government House (Casa Rosada) along Avenida de Mayo—18 blocks—to the Plaza del Congreso; doubling there to the left along Callao for 16 blocks and thence along Avenida Alvear to Palermo Park and the Race Course. Certainly no more ideal route could be found in any city since the whole length of the run is along broad avenues where even the largest buses would not interfere with traffic and where an express service could be maintained. Likewise, sightseers on these buses would have a splendid opportunity for seeing the city, as they would traverse one of the busiest commercial districts and also ride through the most fashionable residential section. The same concession also included the running of buses along the Avenida de Mayo and continuing up Rivadavia, this latter street being very long. It is understood that the time limit allowed for this concession will soon expire and since no definite plans have been made to begin operation, it is felt that nothing will come of it.

There are probably not more than ten motor buses now in operation in Buenos Aires. In this number, are included those operated by the police and fire departments and also two or three others which are the property of private schools. Even these with the exception of the fire department vehicles, are not properly speaking buses at all but ordinary passenger car chassis, equipped with special bodies.

Outside of Buenos Aires, in some of the smaller towns, particularly in mountain and seashore resorts, a few automobile buses are being used. These, however, are largely built on light ton truck chassis. In the same way, in some rural towns and cities, with populations up to 30,000, motor buses are used between the railroad stations and hotels and also for carrying passengers from the towns to nearby parks or to race courses.

No active propaganda has yet been carried out in Argentina looking towards the popularization of this medium of passenger transportation. No doubt, Argentina offers a potential market for this class of vehicles and the situation should be carefully investigated.

Safeguarding Flying During Fogs or at Night

It is claimed that connection with the ground can be made at a 10,000 ft. altitude. At a height of 6,500 ft. it is possible to maneuver an aircraft by means of ground signals which are transmitted very distinctly.

A SYSTEM to safeguard flying at night or during fogs, similar to that used for guiding vessels, was evolved from experiments using an old electric transmission line partly surrounding the Villacoublay (France) landing field.

The results of these experiments were presented by E. F. Fournier before the French Academy of Sciences in a paper "On the Solution of the Problem of Guiding Aircraft During Fogs or Pitch-Dark Nights" by William Loth.

After putting the electric transmission line into shape, a study was first made of the magnetic field of the wire within a wide radius. The wire carried an alternating current of 60 cycles per second frequency, and its two ends were grounded. This field may be regarded as the resultant of that due to current in the slack wire, the field produced by the return current and that due to the currents induced in surrounding conducting masses. These fields are subject to two displacements of phase, one in the direction of the wire, the other in a direction perpendicular thereto.

The guiding apparatus for charting and following the wire consists of three frames, two of them vertical and perpendicular to each other, the third horizontal. Receiving is by sound, by means of a telephone connected successively to the three frames (coils) or to a combination of any two. An optical receiving apparatus may also be used.

It soon became evident that the operation was considerably affected by the parasitic noises of the magnetos; in fact, these noises became so strong as to completely prevent receiving by audible means. A new problem therefore arose. In order to solve it, the first step taken was to plot accurately the magnetic field of the magnetos. It was learned from this investigation that by grouping the magnetos in a certain way and developing a special type of magneto, interference with the signals was greatly reduced.

AT the present time the noises due to the magnetos have been almost completely eliminated. This has been accomplished as follows: Close to the magnetos is placed a receiving frame whose characteristics, such as surface, impedance and inductance, are so calculated that by connecting this frame in series with the main receiving frame, which is further removed from the magnetos, the currents induced in these two frames by the magnetic fields of the magnetos, annul each other. This arrangement, combined with discontinuous receiving, obtained by cutting out the receiver at the moments the sparks pass, permit of excluding from wireless telegraphic and telephonic circuits parasitic currents due to magnetos.

In order to increase the strength of the signals, a low frequency amplifier was added and adjusted so as to be in resonance with the variable current flowing in the guide wire, which current itself was in resonance in that wire. The receiving apparatus, which weighs only a few pounds, is invisible from the outside.

One of the vertical frames is placed in the direction of the axis of the plane or dirigible. The strength of the signals is at a maximum when the plane is proceeding in a direction parallel to the guiding wire. It becomes less the more the plane is inclined to the direction of the guide wire. No signals are received when the plane occupies a position perpendicular to the wire.

The receiving conditions of the transverse frame are the exact reverse. These frames, while remaining perpendicular to each other, may be placed at an angle of 45 deg. to the axis of the plane, and may be connected to a goniometer giving the inclination to the route.

THE horizontal frame receives from one side or the other of the line. Reception is completely stopped when the plane is perpendicularly over the guide wire. The direction of inclination toward the right or the left is obtained by connecting the two vertical frames in series, first one way and then the other. Instead of using lateral frames, either simple or grouped in series, passage from one side to the other of the guide wire may be recognized by connecting the longitudinal and the horizontal frame in series, first one way and then the other.

Landing is effected by connecting the transverse frame and the horizontal frame in series, successively in the two opposite ways. This throwing in series also indicates the rise of the guide wire on the side of a mountain or its descent.

The results obtained were as follows: Connection is made in the horizontal frame at 10,000 ft. altitude; in the vertical frames at 8500 ft. At a height of 6500 ft. one can hear distinctly over the assembly of the guiding apparatus and one may begin to guide the plane without interference from engine noises or by the magnetos. At 5000 ft. the reception is strong enough. At 3250 ft. it is strong. At 6500 ft. altitude connection occurs at 6500 ft. lateral distance from the wire. At 5000 ft. it is still further increased and on the ground it is nearly ten miles to each side of the cable.

These results are the minima. They were obtained with a line about two miles in length, of a devious character and having eight sharp turns. The longest straight portion was only 1800 ft. long. The results should be still further improved on a straight line of greater length. Already, according to the opinion of specialists, they suffice for the guiding of airplanes and dirigibles. The current strength in the line varied between 2.8 and 4.2 amperes. On landing fields the installation of wires would permit planes to always land facing the wind.

How Motor Transport Was Saved from Destruction in England

British railroads, feeling the pinch of truck competition, attempted to have legislation passed giving them monopolistic power. Truck interests successfully opposed these efforts. American truck manufacturers can profit by experience of motor transport abroad.

By M. W. Bourdon

FROM reports received in England it would seem that there is developing in the United States, in California in particular, a situation which has had its parallel in England during the past two or three years and which reached its culminating point in June last. That is to say, the railroad companies having commenced to feel the competition of truck operators, are beginning to make endeavors to handicap the latter, or as an alternative considering the question of becoming truck operators on a large scale themselves.

The British truck industry, as made up of manufacturers and users, has passed through a crisis of late in this connection, for it has had to combat what threatened to be an attempt on the part of the North Western and Midland group of railroads to secure a monopoly of road transport within the area in which that group operates. Needless to say the railroad authorities strenuously denied that they had anything in the nature of a monopoly in view, but it was evident that that was their purpose. Their ultimate object was to stifle competition by cutting rates, break up the existing road transport companies, and then to redivert freight traffic to the railroads.

That is, at all events, how their intentions were translated by the truck industry, and as a result the latter, combining with representative associations of British industry in general, offered strenuous opposition to the railroad companies' endeavors. The history of this fight—for their very existence in the case of the road transport companies, if not, as some people maintain, for the truck manufacturers—contains some lessons and a warning which might well be taken to heart by truck interests in the United States.

Railroads Sought More Power

Fortunately for the British truck makers and users the group of railroad companies in question required the sanction of Parliament to operate as truck owners, other than at railroad terminals. Under their existing powers they can use trucks for collecting freight for rail transport and for delivering it to consignees after conveyance by rail. But they have never been permitted to collect, transport and deliver by motor trucks alone. The North Western and Midland group, therefore, endeavored to secure an extension of their powers by promoting a private bill in parliament, the effect of which would be to allow them to act in direct competition with truck owners. If they had been successful, the other railroad groups would certainly have followed suit and precedent would have smoothed their way.

This question as to whether the railroad companies should be allowed to operate "through" services of truck transport has agitated the whole of British industrial circles for over two years, for the freight owner has been disturbed at the prospect, as well as the truck and road transport industry, scenting danger to his own interests in the possibility of a monopoly governing both road and rail transport. Admittedly, there has been some divergence of opinion on the matter among freight owners, and a few local chambers of commerce have passed resolutions in favor of the railroad companies' plans. But the strongest bodies have been in opposition, and over fifty authoritative petitions against the proposals were put forward, including those of the London Chamber of Commerce and the Federation of British Industries, the latter one of the most influential bodies of manufacturers and traders in Great Britain.

Sources of Opposition

The original opposition was divided into three main sections: 1, truck makers; 2, road transport companies, and 3, general industrial undertakings, the latter being subdivided into (a) those which do not own trucks themselves but employ road transport companies as well as the railroads, and (b) those which run their own trucks.

The opposition of the truck makers was founded on the fear that the railroad companies would enter into competition with them as makers of trucks, and those, too, not only for their own use but for sale or hire to freight owners. This first section of the opposition continued its efforts almost up to the introduction of the bill into Parliament, but at the last moment was placated by an agreement under which the railroads undertook to refrain, for a period of five years, from manufacturing motor vehicles. The truck makers evidently took fright at the prospect of the railroads securing the powers they sought, despite all opposition, and sought to make the best bargain they could before it was too late. But they have been severely criticised for letting down the other sections, for having, as it were, "sold their birthright for a mess of pottage."

The fears of section 2 (the road transport companies) of the opposition were of obvious foundation. They saw themselves being forced out of business in a comparatively short time by rate-cutting on the part of the railroads in connection with road transport, and they refused to be put off by an amendment which was introduced into the

bill as originally drafted and which was said to have the effect of safeguarding the truck operators' interests. While the amendment appeared on the face of it to undermine the truck operators' opposition, the cloven hoof became apparent upon closer examination. It proposed that the railroad companies' rates for road services should be the same as those for transport by rail—excluding charges for terminal expenses, collection and delivery—but nullified that by stipulating that as in the case of railroad rates the companies should have the right to quote exceptional rates of not more than 40 per cent below the standard rates. The truck operators would have been quite happy to compete with rail transport rates less the charges mentioned, but the 40 per cent reduction possibility was another matter, it being held that the railroads would soon take advantage of their powers in that direction and hold as "exceptional cases" all kinds of freight really worth while from the truck operators' standpoint.

Coming now to Section 3 of the opposition—the freight owners—these formed the most influential body; they represented the general public as well as themselves, for their whole object was to keep transport competition alive so that they, and through them the public, could have the benefit of reasonable rates in the future and not be dependent upon the good will of a monopoly. They foresaw that the railroads were not desirous of permanently encouraging road transport at the expense of rail traffic, but were anxious to get control of the former, to stifle competition and then to be at liberty to charge what rates they liked for either road or rail transportation.

The majority of freight owners took this long view; the others saw only the prospect of the low rates due to competition in the immediate future, and took the word of the railroad companies that they were not out for a monopoly.

The freight owners who are also private owners of trucks (Section 3b) feared indirect hurt to their interests. They held that the railroads would cut rates far below those represented by the cost of operating their own trucks, and that either their trade competitors, the non-owners of trucks, would therefore have an advantage in freight charges or else they themselves would be compelled to sell their own trucks at any price they could secure and hand over their transport work to the railroads to get the benefit of the lower charges.

This would assuredly have happened, and the wholesale realization of their trucks by freight owners would, of course, have reacted upon the truck makers. The latter could not, apparently, take such a long view, and, as mentioned, were content to make a bargain to cover the next five years.

Despite the strength of the organized opposition the bill passed the "second reading," almost got through the "committee stage" and had only the third reading to face. Whether this opposition would have eventually been strong enough to throw out the bill on the third reading cannot be said; the collapse of the project was due to Governmental intervention. The Ministry of Transport had actually recommended the bill to Parliament on the second reading, but refused to accept the principle of certain amendments introduced between the second reading and the committee stage relating to the "machinery" to be employed for fixing rates and preventing unfair competition. The railroad companies refused to vary the principle, and dropped the bill forthwith.

THESE are the factions which combined to oppose the attempt of British railways to get a monopoly on transportation:

1. **Truck manufacturers.**
2. **Road transport companies.**
3. **General industrial organizations, including.**
   a. **Those which own trucks, but employ transport companies as well.**
   b. **Those which run their own trucks.**

The truck manufacturers compromised with the railroad interests before the end of the battle. But the public interest in permanently economical highway transport prevailed in the end. This story tells how this combined opposition operated successfully.

The fact is, the Ministry of Transport had not realized the full force of the contentions of the opponents of the bill until in the cross-examination of witnesses who gave evidence during the committee stage it became quite evident what the railroad companies were after. Thus it may be said that although the bill was dropped because of the intervention of the Ministry of Transport its withdrawal was indirectly due to the case put forward by the opposition.

It was the great increase in inter-city traffic which gave cause to the railroad companies to attempt to enter the road transport field, for there can be no doubt that the lower rates which the transport companies are able to quote, coupled with the greater convenience to the freight owner in having his merchandise conveyed from "door to door" and the greatly reduced risk of damage to fragile goods, has made an appreciable impression upon the railroad companies' revenue. They are, in other words, feeling the competition of road transport much more than they like and to an increasing extent.

Siam Passes First Bill for Federal Highway Aid

SIAM, with a registration of 1950 automobiles and trucks, is reported to have just passed its first bill for federal aid in the construction of highways in the Kingdom. The present administration is the first to officially have at their disposal automobiles for their use and are reported to be strongly backing good roads in that country.

That this is so is evidenced by the announcement at Washington of the Siamese consul that he has just purchased for use in his country the film productions of the American Highway Educational Bureau, to be used in fomenting highway construction in Siam to the end that more automobiles may be sold there.

The film shows the evolution of the modern highway from the mud road and how they are constructed.

Improving Tractor Sales and Service

Tractor prices now satisfactory. Better knowledge of territory and more adequate service essential to obtain increased sales. Dealers assisted financially by factory have advantage over others.

By Donald D. Blanchard*

TRACTOR dealers in Ohio have enjoyed a fair measure of prosperity during the past spring. Sales made this year are many times those made in the same period of last year. Price, terms and weather conditions have been important factors in the making of these sales.

The heavy price cuts made last winer evidently have brought the tractor down to a figure that is satisfactory to the farmer. At present prices the farmer seems to be convinced that the tractor is a profitable investment. The price cuts accomplished what elaborate comparisons showing that implement and tractor prices had not increased as much during the war period as the prices of other commodities, could not accomplish.

The bottom had fallen out of the farmers' market. Until tractor and implement prices had taken a similar drop, the farmer would not exchange any of the few dollars that his products brought for machinery that was priced on the basis of the war dollar.

The pockets of Ohio farmers are not well lined with cash. There is likely to be a decided improvement in this respect this fall if crops come up to present expectations, and if the market for these crops maintains a reasonably high level. Still, the average Ohio farmer is in pretty fair shape despite the shortness of his cash assets. There are some who may not survive financially, but these are the exceptions.

As a result of this shortness of cash, practically all of this spring's buying has been on a credit basis. This is a decided change from last year. It indicates that the farmer's view of the future is much improved. He sees better times ahead, and he is willing to use his credit to buy equipment that will hasten their arrival in any possible way.

Very few tractors have been sold for cash this spring. In some cases the farmer has given notes for the entire purchase price. In others he has paid a quarter or a third down. The notes mature in 6 to 18 months.

Some of the factories assist their dealers in handling the farmers' paper. These factories offer an additional discount for cash, and dealers who are financially able to do so are availing themselves of this additional profit. Of course, before a note is accepted a careful investigation of the reputation among tradesmen of the maker is made.

The local banks are also assisting in financing farm machinery sales. They are not favorable to the 18-month notes, but in a majority of cases will buy six-month paper made by responsible farmers and endorsed by the dealer. In a few cases dealers are using farmers' notes as collateral security for loans from the banks on their own notes. If a note is to be sold to a bank, the dealer invariably determines whether the bank will buy it before accepting the note.

Dealers handling lines that are not factory-financed naturally are at a disadvantage, unless they can finance themselves. Dealers in this class must have capital of their own to carry their sales, or they must have the assistance of a bank. The ability to accommodate the farmer with credit is essential to farm machinery sales in this territory at this time.

Weather conditions favored tractor sales during the past spring. The season was late and unusually wet. Farmers found it difficult to get their crops in with horses. Many of them met these weather conditions by purchasing tractors. The tractors worked so much faster that the farmers were able to get their crops planted in the short dry spells.

In this connection, it is interesting to note a change in viewpoint. At one time the tractor was regarded as a strictly fair weather performer. It was supposed to be a disadvantage as compared with horses when the going was heavy. But the experiences of the past spring indicate the contrary is true. The tractor has proved itself a reliable machine in all sorts of weather.

Practically all the dealers in this territory depend entirely on tips and other chance information for the location of prospects. Very few are making any systematic investigations that produce all the sales possibilities of their territories. Most of them keep some sort of a prospect record, but it is the exceptional dealer that is making any special effort to get names to put on this prospect record.

The average dealer considers himself well acquainted with his territory. He feels that he knows about everybody worth knowing and that he is a pretty good judge of their credit. And he uses this knowledge as the basis of his sales work. There is some reason to question the accuracy of this knowledge. It hardly seems likely that a dealer with a territory embracing an entire county with

THIS story was written by a trained observer after an extended trip through the Ohio tractor territory. In this article he tells tractor manufacturers how their merchandising policies look from an investigation of dealer and farmer conditions.

Insofar as Ohio is typical of other states, this story reviews general conditions. Much of it will apply anywhere in the country. Certain detail phases are concerned only with the particular territory involved.

*Editorial staff, *Motor World.*

approximately 5000 farms in it can know his territory so well that he can realize on all of its sales possibilities without resorting to intensive selling methods.

Under present conditions, when tractors and machinery must be sold on credit, the obvious method of territorial sales analysis would seem to be the determination of what farmers in the territory have good credit. The next step would be to determine the needs of this class and to focus all selling effort on the job of filling these needs.

A few dealers have made farm-to-farm canvasses, and a profitable percentage of the prospects turned up in this way have been sold. One dealer in Southwestern Ohio has two salesmen on the road. They work on a commission basis and are independent of any direction from the home office. This dealer does not think that the commissions they earn during the year will be large enough to balance their drawing accounts. The failure of these salesmen can very likely be traced to the fact that their efforts are of a hit-or-miss variety. They are going where the grass looks greenest, and in so doing are very likely passing over many prospects that could be sold. It is quite probable that, if their efforts were directed and supervised by the home office, they would be more successful.

Now that the farmer is satisfied with tractor prices and is willing to use his credit to buy them, the two principal points of sales resistance have been eliminated. Most of the farmers hereabouts seem to be convinced of the tractor's utility and economy. Despite this condition, demonstrations are still helpful in securing orders. These demonstrations are in the nature of exhibitions for individual farmers rather than public affairs.

The importance of service seems to be pretty generally realized, but not many dealers are equipped to handle it. One dealer interviewed has an inspector whose duty it is to report on the condition of tractors. If repairs are needed, this dealer sends a mechanic from his service station to handle them. The farmer is charged so much for each mile this mechanic has to travel, in addition to the charge for the time spent in making the repair. Another dealer has a handy man who helps the farmer with difficult repair jobs on both tractors and implements. The dealer does not make any charge for his services regardless of the age of the machinery repaired.

Parts stocks carried by dealers are on the whole rather limited. Dealers depend on the complete stocks maintained by branches and distributors for their needs.

It is difficult to say just how far the dealer can afford to go in the matter of service. The average farmer is inclined to do his own tinkering and to call on outside assistance only when the job is too much for him. For this reason the dealer service station is likely to get only the hard jobs. Furthermore, unless the dealer has a large number of tractors in the field, he cannot hope for a profitable volume of service work. These conditions probably account for the fact that so few dealers have made any provision for tractor service. The dealer knows that service is essential to sales, but he can't afford to provide as good service as he should. Of course, if he operates a garage, or a service station for cars and trucks, tractor service can be handled very nicely. But the dealer who handles nothing automotive but the tractor is in a difficult situation from the service standpoint.

What's Wrong with Tractor Sales in South Africa?

HERE is the opinion of tractor selling methods in South Africa recently expressed by a correspondent of the *British and South African Export Gazette*. His views may or may not be entirely sound. In any case, they will be of interest.

THE Union Market for farm tractors has temporarily gone all to pieces. Why? The market itself offers immense possibilities which have hardly yet been touched, but selling enterprise has practically died out after quite a spirited campaign in 1920 and the early part of 1921. It is incomprehensible, when the vast needs of the country are considered, that both British and American makers, with, I believe, only one remaining exception, have withdrawn their agents and representatives and abandoned the field. The solitary exception is an enterprising American firm operating through merchant-agents on the Rand. In 1920 the Union of South Africa imported 736 tractors (148 British and 570 American), valued at £199,626, while last year only 72 (28 British and 38 American), valued at £45,897, entered the country.

Now it is not because the tractor has failed in South Africa; on the contrary, it has never had a thorough try-out, though its immense advantages are readily apparent whenever it gets an occasional reasonable trial. It is the ideal form of power for South African conditions, where the ox, though a very useful animal, is literally preventing the farmer from making similar progress to that of agriculturists in other countries. Imagine farmers in any other part of the world being content to waste four or five hours in the middle of each day because the oxen must be out-spanned during the noon heat. It seems incredible, yet South Africa is to-day not the agricultural country it should be because the majority of its farms are under-cultivated owing to the fact that animal power cannot cope with the work in the limited time available. The real trouble is that the farmer is not educated on the subject.

And whose fault is that? I say without hesitation that the tractor manufacturers are to blame. I have travelled throughout the Union, and have not met more than one or two demonstrators in as many years outside town showrooms and show-grounds. On the contrary, I have almost invariably found tractor agencies in the wrong hands. They have too frequently been given to motor-car agents and garage proprietors, when the proper people would have been agricultural implement dealers. As *The British and South African Export Gazette* truly said recently, "A potentially great trade lamentably mishandled!" Also, most makers fail to supply two or three models of varying horsepower to meet the needs of differently-circumstanced farmers. To market only one model means frequent sales in districts unsuited to it, the result being dissatisfaction and a bad name for tractors as a whole, whereas a machine of higher or lower power would have succeeded and provided a splendid advertisement. Now, to cap all, a spell of trade depression has made practically every maker run away from the market. Let them come back while the tide is turning, place their agencies in the right hands, flood the country with expert demonstrators, and, above all, start educating the farmers and the merchants as to the enormous possibilities of the tractor by every available means, and they will quickly find their field of previous failure the finest market in the world. South Africa has got to have tractors eventually; why not get on with it now by returning to the attack on more business-like lines?

Exports of Passenger Cars,

COUNTRY	GASOLINE PASSENGER CARS						GASOLINE			
	Up to $800		$800 to $2000		$2000 and over		Up to 1 ton incl.		Over 1 to 2½ tons	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
Europe										
Azores and Madeira Islands										
Belgium	666	$215,682	31	$36,690	2	$5,394	340	$84,405		
Bulgaria										
Czechoslovakia	12	4,951					1			
Denmark	40	22,175	47	49,646	3	7,510				
Esthonia			1	994						
Finland	15	3,821	1	945			12	2,905		
France	55	27,978	16	19,694	7	23,837	1	404	1	$800
Germany			2	2,025	1	3,870				
Gibraltar			2	2,092						
Greece	28	15,582	3	3,800	1	3,000	1	404		
Hungary	1	414								
Iceland and Faroe Islands										
Italy	6	2,150	3	2,875	1	2,500	2	808		
Latvia			1	1,000						
Malta, Gozo and Cyprus Islands	9	3,453								
Netherlands	35	22,635	45	49,596	3	9,254	2	891		
Norway	233	73,048	52	51,496			26	6,295	7	7,515
Poland and Danzig					1	3,025				
Portugal	1	735	1	1,000						
Roumania	2	900								
Russia in Europe	131	53,556	101	119,827	7	20,855	62	15,428		
Spain	880	300,996	99	115,222	2	6,692				
Sweden	10	5,160	28	33,496	5	13,646				
Switzerland										
Turkey in Europe			2	2,025						
Ukraine	575	318,310	175	188,161	14	61,288	1	724	34	43,685
England	2	1,100	4	3,573						
Scotland	3	1,040	2	3,298						
Ireland	4	944					1	414		
Yugoslavia, Albania, etc.										
North and South America										
British Honduras			2	2,228						
Canada	878	520,543	795	926,281	134	354,998	41	31,786	69	87,313
Costa Rica	4	2,203					1	404		
Guatemala	4	3,064	3	3,848						
Honduras	3	1,744								
Nicaragua										
Panama	6	3,361	5	5,718			1	404		
Salvador			4	4,960						
Mexico	406	176,821	144	153,663	13	39,047	110	43,629	6	5,125
Miquelon and St. Pierre Islands										
Newfoundland and Labrador	5	2,500	5	6,155						
Barbados			1	829			2	4,600		
Jamaica	33	16,751	3	2,628			3	1,616	2	2,000
Trinidad and Tobago	17	6,834	2	1,920						
Other British West Indies	11	4,314	2	1,957	1	4,000	6	2,270		
Cuba	48	25,522	14	20,743	19	69,579	4	1,437	7	7,298
Dominican Republic	16	6,360	2	2,353			5	2,020		
Dutch West Indies	3	1,373	1	1,087			1	404		
French West Indies	1	415								
Haiti	2	920	1	875						
Virgin Islands of U. S.							1	404		
Argentina	79	41,221	27	33,094	7	21,813				
Bolivia							1	404		
Brazil	32	21,946	54	58,793	4	10,768				
Chile							6	2,698		
Colombia	19	7,739			1	3,450	2	808	2	3,568
Ecuador							2	1,350		
British Guiana										
Dutch Guiana	1	700	1	972						
French Guiana	1	445					1	404		
Peru	1	761	1	2,000			2	808	5	4,472
Uruguay	35	14,600	6	8,413	1	3,570			15	7,500
Venezuela	16	6,629	3	2,808	3	7,784	6	3,186		
Asia										
Aden	1	735								
Armenia and Kurdistan										
Ceylon	13	8,769	6	5,875						
China	42	23,531	42	41,260	2	5,975	13	6,220		
Kwantung										
Chosen	75	48,886	17	16,862					14	16,478
British India										
Straits Settlements										
Other British East Indies			3	3,191						
Other Dutch East Indies			40	42,264						
Java and Madura										
French Indo China										
Hejaz, Arabia and Mesopotamia										
Far Eastern Republic										
Hongkong			1	1,265	2	12,692				
Japan	4	2,276	4	5,945	2	4,957	45	18,200	34	17,110
Palestine and Syria	126	62,508	7	7,714			2	808		
Philippine Islands	36	18,220	1	2,000	4	10,820				
Greece in Asia										
Siam										
Oceania										
Australia	484	296,638	322	338,280	10	23,935			10	11,749
New Zealand	48	34,339	10	13,204	1	2,888			7	10,386
Other British Oceania	1	600								
French Oceania										
Other Oceania	2	1,128								
Africa										
Belgian Kongo	6	1,958			3	8,400	8	2,752		
British West Africa	4	2,416			1	2,904	10	7,016		
British South Africa	89	63,123	113	111,929			4	3,172	3	4,815
British East Africa										
Canary Islands	4	2,101	8	10,878						
Algeria and Tunis										
Other French Africa	2	829								
Egypt			2	1,905						
Morocco	38	18,224	2	1,695					1	650
Other Portuguese Africa	1	513	1	995			54	20,760		
Portuguese East Africa			6	4,824			1	800		
Spanish Africa			1	900						
Bermuda										
Total	5,285	$2,528,098	2,278	$2,539,677	255	$739,451	780	$271,038	217	$230,464

Trucks and Tires for June, 1922.

TRUCKS Over 2½ tons No.	TRUCKS Over 2½ tons Value	PARTS Value	ELECTRIC CARS AND TRUCKS No.	ELECTRIC CARS AND TRUCKS Value	TIRES Casings No.	TIRES Casings Value	TIRES Inner No.	TIRES Inner Value	TIRES Solid No.	TIRES Solid Value	COUNTRY
											Europe
		$49			1	$364					Azores and Madeira Islands
		12,554			1,342	16,705	557	$1,340			.... Belgium
		845									Bulgaria
					206	4,809					Czechoslovakia
		671,178	2	1,546	4,092	61,187	2,386	4,371	59	$2,118	Denmark
					17	500	2	6			Esthonia
		319,807			693	8,906	203	498			Finland
		782			932	10,058	81	160			France
		1,612			140	2,065					Germany
		1,987			30	225					Gibraltar
					1,082	17,015	783	1,586	10	302	Greece
		127									Hungary
		1,944			157	2,265	82	255	4	100	Iceland and Faroe Islands
					792	15,948	4	16			Italy
		1,133									Latvia
		6,319			248	2,592	60	100			Malta, Gozo and Cyprus Islands
		9,495	3	1,730	1,809	30,873	1,047	2,128	16	643	Netherlands
		13			3,801	69,140	4,227	8,810	61	1,975	Norway
		1,194									Poland and Danzig
		833									Portugal
					50	1,262	250	1,467			Roumania
		[illegible]	1	1,900	5,376	74,176	1,324	2,535	358	8,078	Russia in Europe
		15,650	1	3,500	6,793	134,971	2,819	7,068	19	1,089	Spain
		2,773			143	2,838	41	95			Sweden
		897			366	3,903	224	470	12	434	Switzerland
					15	203					Turkey in Europe
		415,108	3	5,025	29,667	279,339	10,687	17,267	790	17,063	.... Ukraine
					311	3,723	125	223			England
		2,287			1,280	10,186	1,483	2,092			.....Scotland
					28	965	6	16			Ireland
											Yugoslavia, Albania, etc.
		$80			8	150					North and South America
46	[illegible]	1,666,566	13	230	6,441	94,995	5,591	11,460	413	14,971	British Honduras
		3,955			194	3,083	118	555	2	107	Canada
		3,002			56	1,605	84	283	12	401	Costa Rica
		3,650			79	1,232	8	70	52	2,705	Guatemala
		266			27	595	32	87	4	61	Honduras
		7,396			434	6,126	757	1,082	92	1,711	Nicaragua
		1,832	1	2,067	70	1,770	71	173			Panama
19	16,792	69,931			9,626	94,365	7,193	12,813	164	4,193	Salvador
		16									Mexico
		2,268									Miquelon and St. Pierre Islands
		1,226			131	1,913	72	132	2	30	Newfoundland and Labrador
		6,274			161	1,850	98	128			Barbados
		6,137	2	1,642	953	14,256	751	1,533	37	1,356	Jamaica
4	23,000	1,725			51	893	373	747			Trinidad and Tobago
		51,959			72	845	87	152	8	493	Other British West Indies
		9,775			10,572	128,461	9,026	16,618	412	15,946	Cuba
		886			1,308	19,270	1,864	4,129	160	3,721	Dominican Republic
		2,892			105	1,320	205	376			Dutch West Indies
		1,534			289	3,478	182	228	12	321	French West Indies
		168			121	1,968	158	315			Haiti
5	9,218	174,799			48	612	64	119			Virgin Islands of U. S.
					3,594	29,551	3,078	5,799	12	449	Argentina
		88,113			81	1,356	80	155			Bolivia
		7,821			1,691	18,389	2,185	3,122	400	22,302	Brazil
6	22,743	8,668			1,122	19,773	699	1,969	80	2,018	Chile
		742			444	7,411	393	1,147	6	125	Colombia
		21	1	.....	210	4,508	136	292	2	41	Ecuador
		658		$80	72	719	36	59			British Guiana
		3,716			3	41					Dutch Guiana
											French Guiana
		11,503			1,218	17,660	827	2,043	10	262	Peru
		5,586			1,434	19,922	418	630	10	159	Uruguay
					978	13,280	699	1,259	8	142	Venezuela
		180									Asia
		826									Aden
	6,675	858									Armenia and Kurdistan
		11,868	2	3,200	4	94	4	10			Ceylon
1	1,400				220	3,477	466	700			China
		980									Kwantung
		28,365			76	800	150	250			Chosen
		5,901			254	3,173	111	286	70	2,319	British India
		571			856	11,690	345	986	20	420	Straits Settlements
		1,418									Other British East Indies
		18,037	1	3,150	282	2,311	307	749	66	2,590	Other Dutch East Indies
		1,532			3,973	46,135	2,699	6,950	133	5,127	.. Java and Madura
		250									French Indo China
					386	5,239	326	928			Hejaz, Arabia and Mesopotamia
		2,614			44	779	50	132			Far Eastern Republic
		24,902	18	31,460	8	134	4	9	1	343	Hongkong
		5,386			524	11,370	28	265	85	1,401	... Japan
		14,211	1	2,714	101	1,681	162	1,040			Palestine and Syria
		1,081			3,067	46,880	3,959	8,176	221	6,017	Philippine Islands
		927			1	27	60	90			Greece in Asia
					74	1,079					Siam
24	51,016	70,118									Oceania
2	2,836	24,054			6,038	103,413	2,987	5,943	605	14,397	Australia
		210			3,983	50,204	842	1,624	39	1,046	New Zealand
		454			14	213	28	51	2	37	Other British Oceania
		8			36	631	26	85	6	352	French Oceania
											Other Oceania
		1,005									Africa
		13,542									Belgian Kongo
2	8,000	23,202			474	7,451	685	1,890			British West Africa
		2,054			3,735	43,507	1,675	2,807	53	1,115	British South Africa
		7,842			280	3,141	32	65			British East Africa
		166			563	6,969	297	538			... Canary Islands
		1,676									Algeria and Tunis
		5,782			8	209					Other French Africa
		3,333			473	5,484	113	259	11	401	Egypt
		10,163							35	717	Morocco
		340			168	4,560	328	746			. Other Portuguese Africa
		70									Portuguese East Africa
		96			76	1,031	10	25	158	3,667	Spanish Africa
											Bermuda
124	$284,777	$1,089,772	49	54,044	125,253	$1,626,861	77,370	$152,642	4,738	$143,265	Total

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The AUTOMOBILE
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Safety Makes Sales

THE announcement of a "Seven Days for Safety" campaign again calls to mind the commercial as well as the humane importance of decreasing motor vehicle accidents. The necessity for reducing human suffering and injury to the minimum is the basic reason for all safety work. For this reason alone, automotive executives, along with others, are vitally interested in the promotion of greater safety on the highways and in the factories.

But the automotive industry has an added selfish interest in actively supporting safety and traffic regulation movements. Many pages of unfavorable comment have been written about motor vehicles because of the toll of human life they have taken during recent years. Traffic conditions in large cities are becoming very bad. Congestion is resulting in increased accidents. All of these things tend to create greater resistance to car and truck sales. They make selling more difficult.

Decreased accidents will indirectly mean decreased sales cost.

The dates set for the "Seven Days for Safety" are Oct. 8 to Oct. 14. The Highway Education Board, in which the automotive industry is actively represented, is backing the campaign. Individual manufacturers can help the work along materially by giving it hearty support in their particular communities and by cooperating with the Highway Education Board in promotion work.

"It's an Ill Wind—"

EXCESSIVE rains worked great hardships upon many American farmers this year. They found it extremely difficult to get their crops planted in proper time, and many were weeks behind with their seeding.

Tractor manufacturers report that this gave the tractor a golden opportunity. Many farmers bought tractors as a sort of "last hope." The tractors are reported to have done the job—in many cases where the owner had not thought it possible.

The result is not only increased sales as a result of the farmer's necessity, but a greatly increased respect for the tractor in many agricultural communities.

The basis of tractor sales will always be found in the answer to the question, "What will the tractor do for the farmer?" Sales will increase and sales cost decrease as manufacturers concentrate their efforts upon answering this single question in as many varied and practical ways as possible.

How Much Does a Dealer Cost?

NEARLY every car manufacturer needs more dealers. Increased distribution depends upon an increased number of retail representatives. In making a drive for new dealers, however, the manufacturer must consider a number of factors outside of his own organization.

Every dealer costs the manufacturer a certain amount of money. Every dealer put on the list and later lost because he couldn't make a living has caused an expense. Therefore, the manufacturer is interested in the total number of dealers in a given territory as compared with the probable sale of cars in that territory and the probable future sales of his particular car. He wants to be sure that the dealer is in a position to make money and he should have some idea of how much the dealer's profits are likely to be.

The cost of getting and keeping a dealer includes such items as:

Expenses of factory traveling representative.
Factory share of local advertising.
Expense of promotion literature and dealer helps.
Advertising for new dealers.

Then there are numerous other items, less tangible in character, which make a dealer an asset or a liability to a factory. A lost dealer means decreased prestige for the car in the territory, a period during which sales are less than they should have been, and

considerable trouble to the factory sales department, which in the end costs more money.

Dealers cost money, as well as make money. Consequently, the manufacturer in selecting dealers should precede his choice with the same careful analysis and knowledge of what he is getting that precedes the buying of valuable materials. Careful studies in certain cases have convinced manufacturers that certain dealers were not worth as much as it cost the factory to get them and keep them. Such possibilities should be considered along with the usual factors in the drive for wider dealer representation.

Safer Steering System Parts

STEERING connections and joints in the steering systems of many cars now in use in this country leave much to be desired. In some cases the design is faulty. In others material is poor, while in other cases careless manufacture is very evident. In some instances all three faults are apparent. In spite of this and the fact many serious accidents unquestionably result from this condition, some manufacturers have continued to turn out, year after year, cars with inadequate parts in the steering system, although a few minutes spent in investigating their service records would quickly prove that changes in the parts in question are imperative from the standpoint of safety and should therefore be of prime concern to the manufacturer.

One case in point is that of the threaded yoke on the cross link of several of the cheaper cars. This yoke is made of soft material and is usually split at the shank and clamped to the tube which forms the link. The thread on the tube as well as that on the yoke are often carelessly cut — perhaps purposely made a rather loose fit to facilitate easy assembly. When new, these parts are drawn up reasonably tight, but vibration soon works them loose and they wear rapidly, sometimes until the thread is nearly stripped. The owner is not apt to discover this fault until some accident occurs, for the joint in question is supposedly made up tight and is therefore presumed to require no attention, as indeed it would not were it properly made.

We know of one case in which the joint in question was found to be loose on a car only three days old. It was promptly tightened by the experienced owner, a man of good mechanical ability, but the next day was found to be quite loose again, although the bolt was still tight. The service station then attempted to tighten the joint without success, until it was finally brazed tight, thereby destroying the adjustable feature! Innumerable cases of a similar nature could be readily cited.

All movable joints in the steering system wear. Lubrication is usually inadequate and seldom properly cared for even when provision is made for furnishing oil or grease. Often wearing parts are not hardened or bushed. Hence, there is no way to make them tight when they are once worn and new parts have to be substituted. The wonder is that more accidents do not occur.

While some of the faults cited cannot be easily prevented, conditions can be readily improved in many cases with little or no increase in cost of manufacture. If slightly increased cost is necessary, is it not well worth while in parts of such vital importance?

American-built cars are often condemned, especially abroad, for inadequate brakes. In some cases the criticism is unquestionably justified. The same may be said also regarding steering connections. Safety is chiefly dependent upon brakes and steering gear, two particulars in which much carelessness is in evidence. Manufacturers certainly owe it to themselves and to their customers to better these conditions.

Painting

CONSIDERABLE trouble has been experienced in getting satisfactory paint jobs. Production men in many instances are concentrating their attention upon this phase of their work in an endeavor to combine speed, economy and quality. This is more difficult than in the case of some other units of the manufacturing process, where careful inspection can more readily determine lack of quality.

A first-class paint job must be durable as well as of good appearance. The usual inspection can easily pass upon the latter quality, but not on the first. Durability depends upon the proper combination of a number of factors.

Proper materials, improperly applied, will not give good results. Sometimes the job is rushed through the drying process too rapidly and the high gloss is somewhat dulled even though the actual durability be unaffected.

The problems of proper painting in the automobile industry are still far from being solved, and more attention is likely to be given these items in the future than has been given in the past.

Getting Better Retailers

THE next few months are likely to show up the strength and weakness of the various dealer organizations throughout the industry. Nearly every manufacturer is trying hard to improve his dealer staff and to increase its numbers. Good dealers are in great demand.

Those companies which took best care of their dealers during the depression of 1921 will now get the benefit of their fair-dealing. Dealers who have not been protected on price cuts and new models will be seeking new connections and will not find them hard to get.

One large distributor claims to have done a gross business of $2,000,000 in 1921 without having made any profit. He was not pleased with the treatment accorded him by the factory.

A long range view is always worth while in handling dealer relationships. The immediate difficulty cannot profitably be solved at the expense of permanent good-will. Many actions can be taken that are legal, but not quite fair. Usually, they do not pay.

August Will Exceed July in Output

Reports Show Better Pace Is Maintained

May Approach June—Coal Shortage Has Not Yet Curtailed Power

NEW YORK, Aug. 28—Anticipating a smart fall business, the automotive industry is not experiencing as much of a seasonal slump in production as is usually the case at this time of the year. Instead there is every indication that the August figures will show more automobiles produced in this month than during July, which was the third greatest month in a production way in the history of the industry. Returns to date from railroads, boats and driveaways show August ahead of July at this time of the month. If the pace is maintained the rest of the month, it is thought August will be within about 10 per cent of June, the record holder, which turned out 288,000.

Manufacturing Difficulties

And this big production is being maintained in the face of manufacturing difficulties out of the ordinary in the way of a scarcity of both fuel and materials. The problem of the manufacturers has been to maintain adequate supplies of some materials and parts which has not been possible in the case of some of the factories, despite the employment of aggressive "parts chasing" methods.

The industry already is feeling somewhat the effects of the coal shortage. There is no accumulation of supplies. Factories generally have been able so far to avoid curtailment because of lack of power.

With the price reduction wave apparently wholly spent, the attention of the industry has been turned to new passenger car models, of which there has been a wealth since Aug. 1. Several old line companies, whose designs have been changed only slightly, if at all, have modernized both their chassis and body construction. Many manufacturers have added more models, particularly in the sport line. The fall season will open with a rich array of automotive merchandise.

LEONARD TRACTOR GETS PLANT

JOLIET, ILL., Aug. 29—At a special meeting here of officers and stockholders of the Leonard Tractor Co., Griffith, Ind., plans were approved by which the plant here of James G. Heggie & Sons is turned over to the Leonard Tractor Co. for $250,000, the owners of the Heggie company to take stock in the Leonard company to the amount of the transaction in payment. It is planned to dispose of stock to the same amount among residents of this city in order to finance the shift of location.

TOTAL JULY OUTPUT AGGREGATED 244,444

WASHINGTON, Aug. 28—Official production figures received by the Department of Commerce give July production as 223,201 passenger cars and 21,243 trucks. With few exceptions the reports each month are from identical firms and include approximately 90 passenger car manufacturers and 80 truck manufacturers.

The production figures for the first seven months of the year with the revisions made from the published figures for May and June are as follows:

	Pass. cars	Trucks
January	81,693	9,344
February	109,170	13,121
March	152,959	19,651
April	197,221	22,227
May	232,431	23,803
June	263,017	25,985
July	223,201	21,243

Durant Awards Contract for Building Flint Plant

NEW YORK, Aug. 29—A $1,500,000 contract has been awarded by Durant Motors, Inc., for its proposed new plant at Flint, Mich., where the Flint car will be manufactured. It is expected the plant, on which construction will start at once, will be ready the first of the year. It will consist of five buildings containing 560,000 sq. ft. of floor space and have a capacity of 550 cars a day.

The main building will be 900 x 80 ft. in area and three stories in height. It will house the main offices and the assembly plant. Three of the other buildings will be of wing design. In one, a three story structure 400 x 80 ft. will be the machine shop, body department, cafe and employment office. A one-story 257 x 400 ft. wing will contain the fender, enameling and inspection departments, and a fourth 550 x 110 ft. and one-story will hold the sewing and trimming departments and the stock room. The power plant will be in the fifth wing of the group.

September Programs Show Big Increase

Some Schedules Will Be 50 Per Cent Greater Than Previously Maintained

DETROIT, Aug. 29—The industry will enter September on a generally increased production basis, some factories declaring an increase as high as 50 per cent over the totals which have been maintained since the early part of the year. The total increased production for the most part is a question of men and material as there seems to be business enough to warrant all the output the factories can summon.

Ford, Dodge Brothers and Maxwell in the lower price lines are building and selling just as many cars as can be built. Studebaker, Buick and Hudson in the middle priced field are increasing their output daily, and Hupp will make an important increase in output as new factory space is completed. Columbia Motor has just taken over the Saxon plant and is speeding up as material becomes available. Chalmers Motor will go into a large increase in production if the financing plans are approved.

Rickenbacker, Paige, Liberty, Reo and Earl are stepping up gradually. Chevrolet is prepared to go in for larger production than ever the first of the month. Oakland and Oldsmobile, with new body models, are increasing operations, and Gray and Durant are pushing factory additions to completion to meet the full demand of the fall season. In the high priced field all factories are at capacity, and this, it is declared, will be maintained throughout the winter.

Parts Business Indicates Continuance of Activity

NEW YORK, Aug. 29—That automobile manufacturers are figuring on maintaining their record breaking production pace well into the fall is indicated by a survey of the parts and accessories field, which is a good barometer of the immediate future.

This survey shows that the parts makers are not only well booked with orders and specifications up to Jan. 1, and some of them beyond that, but that within the last two weeks some twelve or fifteen of the larger concerns have had their orders materially increased, which would indicate that their customers are not expecting reduction of output.

The parts makers' orders indicate that the run right now is largely in closed cars in the medium price class. It is

(*Continued on page* 441)

Coal Shortage Looms Up Seriously

Power Curtailment Possible in Detroit

Edison Company, Chief Factor, Has Enough Supply to Meet Demand for 18 Days

DETROIT, Aug. 28.—Curtailment of power to the automotive plants in this district will be necessary if conditions do not improve within 18 days. The Detroit Edison Co. has sufficient on hand for this length of time, according to Alex. Dow, president, and will have to curtail if coal shipments are not speeded up. All plants in this city with the exception of Ford are furnished with all or the major portion of their power by this concern.

Question of Transportation

According to all authorities, the question of getting coal into the Detroit district is not one of mining the coal, but of moving what has already been mined. Even this condition is not general but is confined to the so-called coal belt railroads which operate south and east of the Ohio River. These are notably the L. & N., C. & O., N. & W. and the branches of the B. & O. operating through West Virginia. The northern roads can handle and are handling the coal turned over to them rapidly.

The coal shortage here is far more serious than the steel situation. While some of the plants complain of cars on the road two and three weeks where formerly three and four days was sufficient, in the main the shipments are coming in fairly well. The slight increase in the price of steel is not regarded as sufficient to affect materially the cost of automobiles. The average car exclusive of Ford has not more than 1,800 lbs. of steel, and consequently a $5 increase per ton would only represent a total of $7.50 per car increase in material cost. It is frequently commented on throughout the trade that in the mind of the public the automotive industry uses a far greater percentage of the steel output of the country than actual statistics prove to be the case.

Plants Have Some Coal

All of the plants have supplies for 30 to 60 days as far as heat and special power requirements such as hammer rooms, etc., are concerned. C. S. Mott of General Motors Corp. stated to-day that the average for the G. M. C. units

(*Continued on page* 444)

Business in Brief

The situation in the business world seems to be decidedly irregular, with prices threatening to climb because of anticipated higher costs of operation through increases in wages made by the steel companies.

The strike situation continues to be the most dominant factor. While there has been a slight lowering of prices of coal and coke, there has been a marked advance in metals like iron and steel. The scarcity of fuel has its effect on general business, which has been relieved slightly by light shipments of newly mined coal or the use of oil as fuel. But even with the fuel oil people there is complaint of insufficient transportation.

Soft coal production is better, the report showing 6,000,000 tons as against 4,300,000 the preceding week, although insufficient car capacity is reported.

Anticipated higher prices are expected to make for more activity in trade and industry, in marked contrast to two years ago, when higher cost of production is said to have been responsible for the collapse of values.

While some textile mills have restored former wages and steel mill workers have had pay increases, yet there seems to be a scarcity of labor, caused, it is thought, by restrictions on immigration.

Money is easy, and this is reflected in the stock market in higher prices for securities, while the glowing crop reports also have had their effect. Low prices for agricultural products, though, will tend to keep the farmer out of the market to a certain extent.

Steel prices, both crude and finished, show increases of from $2 to $10, pig iron from $2 to $3 and steel scrap from 25 cents to $1 per ton. Coke has dropped $2.

Weekly bank clearings show a loss of 8 per cent from last week, the aggregate being $5,871,487,000. Still this is a gain of 18.4 per cent over this period last year.

Car loadings of merchandise and miscellaneous freight decreased 8224, but coal loadings increased 5313. For all freight the total loadings were 852,580 cars as compared with 808,269 for the same week last year.

Ford Orders Plant Shut Down Sept. 16

Says He Will Not Re-open Until Price of Coal Has Been Lowered

DETROIT, Aug. 28—Blaming the coal shortage on Wall Street manipulators, Henry Ford has ordered the closing of his plants on Sept. 16. He states that he will not re-open his factories until he can get coal at a fair price. Telegraphic notices have been sent out to about 2,000 sources of supply to cease shipment until further notice.

A formal notice signed by Edsel Ford states: "On account of coal shortage we will be unable to operate our plant after Saturday, Sept. 16. No material will be received if shipped other than as detailed in the letter following."

It is estimated that the closing of the Ford plants will be responsible for the laying off of over 1,000,000 workmen. There are approximately 50 000 at the Highland Park plant, 20,000 at the River Rouge and other Detroit plants and 30,000 at Ford branches throughout the country. There are 1500 plants scattered throughout the country whose principal business is the supplying of parts and materials for Ford cars.

Can Get Coal for $6 a Ton

Henry Ford reiterated the statement this morning that he will not pay excessive prices for steel or coal. He states that he could get coal if he were willing to pay over the market price, and that he had been offered 60,000 tons at $6 a ton. He refuses to pay more than $4.50.

Ford has sufficient coal on hand to run until Sept. 16 and then to keep his ovens and boilers warm for an indefinite period. Ford production has been running in excess of 5,000 cars per day.

None of the other plants are affected as seriously as Ford. When asked when plants would resume, Ford stated that he had no idea and that the situation seemed to him impossible.

Hoover Disappointed

WASHINGTON, Aug. 29—Announcement of Henry Ford that he will close his plants on Sept. 16 has been a source of disappointment to Secretary Herbert Hoover. The Secretary said he hopes Ford will not feel constrained to take such sweeping action because he thinks the prices of coal are too high.

It is felt that legislation under way will control the price situation sufficiently to assure Ford that coal can be obtained at reasonable figures. It was declared

(*Continued on page* 444)

More Capital Sought by Grant and Walker

Car Maker Wants $750,000—Engine Builder's Amount to Be Determined Later

CLEVELAND, Aug. 24—After President David A. Shaw of the Grant Motor Car Corp. asked stockholders to consent to the issuance of $750,000 of bonds by the company to obtain funds to liquidate indebtedness and to provide additional working capital, it was learned that the H. J. Walker Co., which supplies engines to the Grant company, plans to obtain more funds by a new stock issue

Stockholders of the Walker company will be asked to subscribe to additional stock in an amount to be determined later. The unsold amount after stockholders are through buying will be offered to the public. A syndicate of bankers and investment houses in this city has been working on financing plans for Walker for some time. A letter to stockholders will be mailed shortly. It is said that business prospects of the company, when fully understood, make the new stock a fairly good investment.

Letter Sent Stockholders

Shaw made his appeal for authority to issue bonds in a letter which was mailed to stockholders. If consent is given by the stockholders, the new bonds will be in denominations of $25, $50, $100, $500 and $1,000. The stockholders are asked to subscribe in proportion to their stock holdings.

The bonds would be a first mortgage lien upon the assets of the corporation, to bear interest at 7 per cent and callable at $1.10. The consent of stockholders to the issue is to be obtained on the following conditions:

1. That prior to the issuance and sale of the bonds there be an agreement between the corporation and not less than 85 per cent of its creditors providing an extension to the corporation of indebtedness due the creditors and that the claims shall be paid only so fast as 40 per cent of the net profits of the corporation divided among all of its creditors will pay the same.

2. That $600,000 of the bonds shall be subscribed and purchased prior to their issuance.

Profit-Sharing Feature

Shaws says that back of these bonds would be the following property of the company: land and buildings, $890,500, and machinery and equipment, $159,500, or a total of $1,050,000. There is an indebtedness under a land contract of $214,614, which amount would be paid out of the receipts from the sale of the bond issue so as to make it possible to place a mortgage on the property.

Since a mortgage bond is rarely offered as an investment for an amount greater than one-half of the value of the security behind the issue, a profit sharing feature to the bond has been devised, because it is proposed to exceed the usual ratio of assets in the issue. Under the profit-sharing feature, 20 per cent of the net profits annually will be pro-rated over the total authorized amount of the bond issue, and the amount applicable to each bond will be paid to its owner.

This profit sharing will be continued until the bond has been redeemed or called. Should the bondholders be forced to take over the plant, it is stated that it could be rented until it could be sold without loss and at the rates now being paid for such space the income would be ample to carry the bonds up to $750,000 and show a profit beside.

TRUCKS AND TRACTORS INCREASE IN ALABAMA

MONTGOMERY, ALA., Aug. 24—According to a survey recently made by the markets division of the State Department of Agriculture, in co-operation with county agents and power equipment dealers, there are now approximately 2500 motor trucks in use on Alabama farms, and 1500 tractors, an increase of almost 100 per cent over the census of 1920, in spite of the fact that the farming industry has passed through a period of financial depression since that time. The census included only such vehicles as are actually in agricultural work.

Tractor and truck distributors in Atlanta covering the southeastern territory state that a similar survey in other states of the section would indicate about the same increases as in Alabama.

Reconsiders Purchase of Duty Truck Plant

ELGIN, ILL., Aug. 29—Persuaded to reconsider their offer to absorb the Duty Motor Truck Co. of Elgin, the American Steam Truck Co. of Chicago, it seems likely, will shortly be in possession of the plant. The stockholders of the former company, following a bitter controversy, have voted to sell out to the Chicago concern. The action of the stockholders followed several weeks of argument in which an influential minority sought to prevent it.

The Duty company stockholders elected a new set of officers before adjournment. E. A. Bell being named president; A. J. Force, vice-president and Marshall Newman, secretary-treasurer. These men also serve as directors and were empowered to handle the negotiations with the American company.

LOUIS C. STEGER DIES

FORT WAYNE, IND., Aug. 26—Louis C. Steger, member of the board of directors and director of purchases and stores for S. F. Bowser & Co., died at his home here.

Places Yellow Cabs in London and Paris

Hertz, Back from Europe, Says Company Will Not Locate Plant There

CHICAGO, Aug. 29—Announcement of the organization in London and Paris of taxicab companies to operate cabs manufactured by the Yellow Cab Manufacturing Co. of Chicago was made here by President John Hertz upon his return from a tour of England and Continental Europe.

Hertz said the London and Paris companies placed orders for 25 cabs each to begin their service. Shipments of these cabs is to begin shortly. The prospective manager of the Paris company is on his way to Chicago to become associated for a time with the Yellow Cab Co. of Chicago to learn the principles of operation which have been largely responsible for the growth of Yellow cab service in Chicago and other cities.

Hertz said the Yellow cab service in the two European capitals would be far superior to anything they now have, and he believes the vehicles will become so popular that the service will grow rapidly and provide a constant foreign market for Yellow cab products. He said the Chicago company can manufacture the cars and deliver them in Europe much cheaper than they can be produced there, and that his company has no intention of establishing a European factory.

Holmes at Work on Plans for Refinancing Company

CANTON, OHIO, Aug. 28—Plans for reorganizing and refinancing the Holmes Automobile Co. are being worked out by a committee consisting of Edward Langenbach, chairman; Norman C. Raff, Charles A. Kolp, William T. Kuhns, R. V. Mitchell, I. M. Taggart and Raymond Loichot. A meeting of stockholders and others interested will be held preliminary to the stockholders' meeting on Sept. 6, when final plans will be consummated.

In connection with the refinancing and reorganization plan, another announcement of special interest made during the past week was that the Holmes company has completed a new four-cylinder air-cooled car, which has been developed by the company during the past year under the direction of Thomas M. Kearney. It is expected that the car will sell for approximately $1,200.

MOTORCYCLE RECEIVERSHIP

READING, PA., Aug. 28—A receiver for the Reading Standard Co., manufacturing the Reading Standard motorcycle, has been appointed, the court naming Arthur E. McGavin, president of the concern. Assets are placed at $291,743 and liabilities at $694,240.

Gasoline Data Given in Committee Report

Opinion on Price Changes Reserved Until Hearing Has Been Concluded

WASHINGTON, Aug. 28—Considerable disappointment has been expressed over the preliminary report of Senator McNary from the sub-committee of the Committee on Manufactures relative to the prices in the oil industry. It was expected that the committee would express an opinion as to the price changes in gasoline and other oil products. The report stated that the full significance of the price changes are reserved for further consideration and report after the answers to all questionnaires have been received and considered and the necessary witnesses called and examined.

The report deals with data prepared by governmental agencies and supplemented by reports from various refiners. The committee calls attention to the fact that there is a distinct tendency toward stocks accumulating in a comparatively few hands. As to the future supply of gasoline the sub-committee said, "Any estimate of the length of time an existing supply of gasoline will last is of little use, unless the supply of crude oil at the same period is also taken into consideration."

Gasoline Prices Still High

The committee points out that it has not so far formed any opinion upon the controverted matters submitted to it. He says further:

While the recent cut in crude oil is reflected to some extent in lower gasoline prices, still gasoline prices both f.o.b. refinery and tank-wagon prices, are higher than they were during a considerable portion of the period when crude oil was selling at $2 a barrel. It may be in explanation that gasoline is still being manufactured by the larger concerns from the stocks of high-priced crude on hand at the time the recent cut in the price of crude was made.

If this explanation is correct, and the proper proportion existed between the $2 crude and the price of gasoline and its other products, then it would seem reasonable to expect a further lowering of the price of gasoline as a result of cutting the price of the crude from $2 to $1.25 a barrel.

Cyclone Motors Placed in Hands of Receiver

GREENVILLE, S. C. Aug. 28—The Cyclone Motors Corp., formerly known as the Cyclone Starter & Truck Co., has been placed in the hands of receivers. The court named C. G. Eidson, president of the company, Frank J. Leigh and Ricketts as receivers. The action against the company was taken in behalf of the Hardwood Lumber Co. of St. Louis, the Greenville Mantel and Mfg. Co. and Alvin Barnes of Greenville. The petitioners assert that the company has assets approximating $500,000 with liabilities of $200,000.

The Cyclone company began business about two years ago with an authorized capital stock of $1,000,000, a great deal of which was sold in South Carolina and various other states to a large number of stockholders. No starters ever were manufactured here although the company put out starters produced by other factories. The local plant was devoted principally to the manufacture of Cyclone trucks, a number of which were sold here.

Agricultural Districts Should Offer Greatest Field for Development of Sales

By E. V. RICKENBACKER

Vice-president in charge of sales of the Rickenbacker Motor Car Co.

Detroit, Aug. 28.

Only the most abnormal conditions can prevent the automotive industry from finishing out this year in a flood of business, which will continue through all of the next year and well on into the summer of 1924. When I say abnormal I mean another war or something else equally cataclysmic which it is impossible to foresee. The natural progress of economic cycles indicates prosperity will continue until the market on cars has again been caught up with and this will not occur until 1924.

The industry is now working on a gusher in the form of closed car demand. Practically every owner of an open car at this time is in the market for a closed vehicle, and this, in addition to the regular run of new business and replacement demand, is keeping operations at capacity. It would not surprise me in the least if three years from now the demand for open vehicles had dwindled to ten per cent of all cars in production.

There will be plenty of business for the industry from the farm regions of all parts of the country. The substantial farmer is already out of the financial woods, and his smaller brother's credit is good at the banks again, because even though he cannot meet his obligations in full with this year's crops proceeds, the banker can see the day close at hand when he can. The market for farm produce has been restored to a firm basis and bankers are forgetting their timidity. We have ample evidence of this all the time from our distributors throughout the country.

The industrial section of the country has taken 75 per cent of the cars this year to date, and the metropolitan areas are now pretty well caught up, though there is still steady demand. Business from the farm districts adjacent to the metropolitan centers is now developing largely, but the more remote farming districts are still to be heard from. Normally the industrial section of the country should take 55 per cent of all cars and the rest of the country 45. I am certain that business will resume along this normal basis beginning this fall and continuing through to 1924.

The increase in wages in the steel industry announced last week should have a steadying influence on prices of cars.

Manufacturers of cars will find it more and more important all the time to consider the resale value of their cars. This means both a consideration of price and of changes in model. It is an important selling point in any car to show that it has a high resale value, and this can only be established by maintaining list price levels, and making improvements in the car constantly, without the formality of new models.

Work Started by Doble on First Unit of Plant

SAN FRANCISCO, Aug. 28—Ground has been broken at Atascadero and work started on the first unit of a factory to be built for the Doble Steam Motors Corp., which will be completed in four months. The plant is to be of reinforced concrete construction, with 90 per cent of the wall area of glass incased in steel frames. The ground floor will cover an area of 60,000 sq. ft.

The Doble company is a $10,000,000 organization to build the Doble steam car designed by Abner Doble, who is president of the company. The directors include W. A. Doble, Jr., and Warren Doble, who control the Doble Laboratories; Harold Haven and F. G. Lewis.

One-Man Top Features Ford; Shield Changed

DETROIT, Aug. 28—A one man top, slanting windshield and gypsy side curtains are now regular equipment on Ford cars coming through from the factory and assembling plants. It is understood that the change has been in contemplation for some time and production facilities are now completely worked out.

The slanting windshield, in addition to adding to the appearance of the car, gives increased comfort due to the fact that it can be opened and adjusted to any angle at both top and bottom. In making the change in the windshield, it has been possible slightly to change the cowl lines and the rake of the instrument board. No change in prices is made with the new equipment.

CHANGES IN TEMPLAR

CLEVELAND, Aug. 28—The new Templar coupe, which replaces the present job, is mounted on the standard chassis. It has seating accommodations for four, the seats being staggered, but the doors are in line. The interior is trimmed in plain dark blue broadcloth, and option of dark blue or Brewster green are to be had on the body. The rear deck has an opening covered with a watertight lid, this being secured with three locks.

World Wide Interest Created in Gliders

Hentzen Carries Off Honors on Last Day of Meet at Gersfel

NEW YORK, Aug. 28—The completion of the motorless aviation meeting at Gersfel, Germany, has aroused a world-wide interest in gliders, which, it is expected, will be greatly enhanced on this side of the Atlantic through the announcement that Glenn Curtiss has built a glider and will try it out shortly in Great South Bay, New York. Curtiss, however, will work on the theory that better results can be obtained in over-water gliding than over land, such as the German trials were.

Hentzen, the student aviator, carried off the honors at the meeting at Gersfel, being declared the winner of the grand prize of 50,000 marks, as well as receiving 15,000 marks for the best minimum average in dipping and speed and 12,000 marks for the longest straightaway flight. Hackmack, Botsch and Martens were other prize winners.

Hentzen's greatest achievement was accomplished on the last day of the meet when he established a new record for sustained flight by remaining in the air more than three hours, which betters his own mark of 2 hr. 10 sec. made during this same meet.

Not many details of glider construction have come out of Germany as yet, although it is known that Hentzen's glider has immovable wings, while the Darmstadt plane uses an elevation rudder. Pneumatic cushions are fitted to the bodies of the planes to ease the shocks of landing.

Anderson Output Taken; Company to Enlarge Plant

ROCK HILL, S. C., Aug. 28—Ample evidence of the steady improvement the automotive industry has experienced over the country the past several months was demonstrated at the convention of dealers of the Anderson Motor Co. at the factory here Aug. 24, when dealers contracted for practically the entire output of the factory for the year.

Within ten minutes after the new model Anderson lightweight aluminum six was shown, contracts had been signed for 4225 cars of this model alone. As present capacity is only 5500 cars annually, officials advised the dealers that plans to expand are contemplated.

BUSINESS CONGRESS AT TULSA

TULSA, OKLA., Aug. 28—The automotive industry will be represented at the meeting of the Southwestern Business Congress, which will be held here Oct. 18-19. Twenty-five prominent men in the country, including a member of President Harding's cabinet, have been asked to speak, which will bring together representative business men from Oklahoma, Missouri, Arkansas, Kansas and Texas. The congress will be held under the auspices of the Tulsa Chamber of Commerce, Northwestern Oklahoma Chamber of Commerce and the Oklahoma Chamber of Commerce.

ASKS DYER THEFT LAW TO INCLUDE EXPORTS

NEW YORK, Aug. 28—A movement to interest Congress in adopting an amendment to the Dyer law which now makes it a felony to take a stolen car across a state line has been started by the National Auto Anti-Theft Association.

The proposed amendment would forbid any steamship line issuing its bill of lading for the transport of any car, whether or not boxed, until its engine and factory numbers have been certified by an inspector of customs as intact and recorded, and until it has been certified as not being on the list of stolen cars which will be required to be kept posted in the office of the collector of customs of each port of entry in the United States.

Empire Tire Will Be Sold Sept. 13 as Going Concern

TRENTON, N. J., Aug. 28—By order of United States District Judge Bodine, the real and personal property of the Empire Tire & Rubber Corp. will be offered for public sale by the receivers, Arthur H. Woods and C. E. Murray, Jr., Sept. 13. All bids received then will be reported to the court on Oct. 2. Bids must be accompanied by a certified check for $100,000.

The Empire company has been in a receivership since March 31, 1920, and has been a going concern all this time. The plant has been operating on a 24 hours a day basis for the last ten months. The value of the plant itself approximates $750,000, but it is said the worth of the corporation is around $2,000,000. It is expected that there will be at least two bidders—the creditors' committee and the old organization, which is headed by J. Cornell Murray and William Pepper. No change in business methods or management will be made, it is said.

FORD BRANCH FOR FLORIDA

ATLANTA, Aug. 28—According to an announcement in Atlanta, the Ford Motor Co. expects to start the construction of a branch assembling plant at Jacksonville, Fla., within the next few months, to handle the business of the dealers in South Georgia, Southeastern Alabama and Florida. Plans for the factory have already been drawn, according to Slocum Ball, manager of the Jacksonville branch.

Aeronautical Body Names Uppercu Head

Chamber of Commerce Has Annual Meeting—Aircraft Association Elects Williams

NEW YORK, Aug. 28—I. M. Uppercu of the Aeromarine Plane & Motor Co. has been chosen to head the Aeronautical Chamber of Commerce of America for the next year, succeeding Grover C. Loening, while the new president of the Manufacturers' Aircraft Association, Inc., is G. M. Williams of the Dayton-Wright Co., advanced from the vice-presidency to succeed J. K. Robinson, Jr. Both organizations held their annual meeting here to-day, at which officers for the ensuing year were elected.

The Aeronautical Chamber of Commerce was reported to be in a thriving condition and showing a steady growth. Among the new members added at the meeting were the B. F. Goodrich Co., Akron; Goodyear Tire & Rubber Co., Akron; Wolverine Lubricants Co., New York; Rich Tool Co., Chicago, and Mosler Metal Products Corp., Mount Vernon, N. Y.

Personnel of Board Changed

Several changes were made in the personnel of the new board. Its size was increased from eleven to fifteen directors through the election of I. M. Uppercu, G. M. Williams, W. C. Young and Charles L. Lawrance. This new board, after selecting Uppercu as president, named the rest of the chamber officials as follows:

First vice-president, Charles L. Lawrance, Lawrance Aero-Engine Corp., New York; second vice-president, C. C. Witmer, Airship Manufacturing Co. of America, Hammondsport, N. Y.; third vice-president, Lawrence B. Sperry, Lawrence Sperry Aircraft Co., Farmingdale, L. I.; treasurer, Charles H. Colvin; Pioneer Instrument Co., Brooklyn; general manager and assistant treasurer, S. S. Bradley; secretary, Luther K. Bell, and assistant secretary, Owen A. Shannon.

Aircraft Association Selection

The meeting of the Manufacturers Aircraft Association elected the following directors:

A. H. Flint, L. W. F. Engineering Co., College Point, L. I.; F. L. Morse, Thomas-Morse Aircraft Corp., Ithaca, N. Y.; F. B. Rentschler, Wright Aeronautical Corp., Paterson, N. J.; J. K. Robinson, Jr., Gallaudet Aircraft Corp., East Greenwich, R. I.; F. H. Russell, Curtiss Aeroplane & Motor Corp., Garden City, L. I.; I. M. Uppercu, Aeromarine Plane & Motor Co., Keyport, N. J.; J. G. Vincent, Packard Motor Car Co., Detroit; C. M. Vought, Lewis & Vought Corp., Long Island City; G. M. Williams, Dayton Wright Co., Dayton.

Officers were elected as follows: President, G. M. Williams; vice-president, F. B. Rentschler; secretary, Chance M. Vought; treasurer, F. H. Russell; general manager and assistant treasurer, Samuel S. Bradley.

Milwaukee Recovers From July Let-Down

Gain Is Expected for August—Car Builder Places Big Rush Order

MILWAUKEE, Aug. 28—Operations of passenger car and motor truck factories, engine, frames and parts shops, and manufacturers of automotive equipment at this time average at least equal to the high record achieved earlier in the year. A seasonal let down in July, which affected only a part of the industries, has been overcome in the last two or three weeks, with the result that by Sept. 1 it is figured production will average a substantial gain which will hold at least until the close of the year.

One of the largest malleable iron shops in Milwaukee, it is understood, has received in the past week rush specifications from a large passenger car builder in the Middle West which require day and night operations for at least three months, with prospects of a continuation until past midwinter. This shop has been busy at capacity with a full day shift on overtime schedules for eight months or longer and has not experienced any slackening within that period.

Parts Force Increased

A large manufacturer of automotive parts has added 500 men during the past thirty days. While a few shops have made no appreciable gains in number employed, there have not been any perceptible losses through decline in orders.

Manufacturers of machine tools, principally milling machine, in this district report that the automotive industries continue to be their main source of new business, and demands show a well sustained increase from week to week.

The passing of the coal strike trouble and resumption of shipments from lower Great Lakes ports to Milwaukee has created more optimism regarding the future, although the serious situation in the railroad labor circle remains a source of apprehension and worry. However, confidence is generally expressed that freight traffic conditions probably will not grow much worse, and even if they do, the industries will be fairly well fortified in falling back upon motor transport, which by the same token is very liable to experience a decided boom through such a contingency.

Expect Results from Fair

With the annual Wisconsin State Fair opening here to-day, distributors as well as dealers look for a definite increase in wholesale and retail sales, perhaps not so much in Milwaukee, but throughout the state. This event, due to the peculiar conditions obtaining at present, is expected to bring about a genuine revival in farmer demand, which has been slowly but surely developing after an extended period of slackness.

Locally retail sales are increasing as prospective buyers are being acquainted more and more with the true effect of price reductions recently established and a better consciousness aroused by merchandisers.

Pressure of railroad strike conditions and the consequent struggle to obtain cars, as well as slow movement to destination is causing more and more interest in motor trucks, especially for short haul transit. Motor truck plants here report sales in the last 30 days again considerably higher than in the previous similar period, with heavy gains over corresponding periods in 1920 and 1921.

SALES BY M. A. M. A. MEMBERS FOR JULY REACH TOTAL OF $41,001,670

NEW YORK, Aug. 29—No apparent seasonal slump has been experienced by members of the Motor and Accessory Manufacturers Association, reports of sales for the month of July showing a decrease of only 2.42 per cent over June. The total sales for July aggregate $41,001,670, as against $42,000,000 for June. Comparing July of this year with the same month in 1921, it is noted that this year's July business is roughly 77 per cent better.

Collections are slower, the past due column showing $3,423,850 on the books, as against $2,840,000 for June, a sharp increase of 20.42 per cent. Notes outstanding aggregate $2,217,670, a decrease of 4.49 per cent, which shows liquidation activity.

Total sales for the first seven months of 1922 reach a total of $228,501,670, as compared with $136,096,214 for the same period of 1921.

The following table shows the sales by members of the association, the total of past due accounts, and the total of notes held for all the months of 1921 and the first seven months of 1922:

1921	Total Sales	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	$6,264,587	.. ..	$8,099,727	.....	$4,359,871	
February	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,069,118	39.08 Inc
March	20,120,386	93.30 Inc.	5,603,992	16.57 Dec.	5,069,877	16.38 Dec
April	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc
May	26,781,350	.13 Inc.	4,505,176	15.64 Dec.	4,460,355	16.77 Dec.
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec.
July	23,096,214	1.68 Inc.	5,242,046	10.79 Inc.	3,690,154	7.90 Dec.
August	23,397,640	1.31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec.
September	23,141,891	1.09 Inc.	4,358,545	.22 Inc.	3,677,500	5.24 Inc
October	22,053,327	4.70 Dec.	4,512,680	3.54 Inc.	3,463,500	5.82 Dec.
November	18,998,490	13.85 Dec.	4,352,000	3.56 Dec.	3,661,900	5.73 Inc.
December	14,349,750	24.47 Dec.	4,220,450	3.02 Dec.	3,384,250	7.58 Dec.
1922						
January	17,320,000	20.61 Inc.	4,450,000	5.45 Inc.	3,146,000	7.02 Dec.
February	22,720,000	31.17 Inc.	4,070,000	8.57 Dec.	3,483,000	10.74 Inc.
March	28,670,000	26.14 Inc.	2,890,000	28.86 Dec.	2,657,000	23.69 Dec.
April	33,830,000	18.07 Inc.	3,000,000	2.00 Inc.	2,500,000	1.5 Dec.
May	43,700,000	28.06 Inc.	2,900,000	2.75 Dec.	2,450,000	6.5 Dec.
June	42,000,000	3.85 Dec.	2,840,000	1.25 Dec.	2,320,000	5. Dec.
July	41,001,670	2.42 Dec.	3,423,850	20.42 Inc.	2,217,670	4.49 Dec.

Lafayette Starts Work on Milwaukee Factory

MILWAUKEE, Aug. 28—Actual construction work on the new plant of the Lafayette Motor Car Corp., Indianapolis, adjoining the four-cylinder car division of the Nash Motors Co. at Milwaukee, was started during the past week. It is hoped to have the first buildings ready to receive the equipment of the present plant by Dec. 1 and the entire new works in running order by Jan. 1.

An investment of $500,000 is represented by the present construction and equipment program, with other units projected for 1923 and 1924 involving more than $1,000,000. The Lafayette plant will be located at Clement and Oklahoma Avenues, and the initial building will cover an area of 200 x 650 ft., one, two and three stories high.

Steel to Be Used First in New Martin $250 Car

SPRINGFIELD, MASS., Aug. 29—Preparations are complete for the manufacture of the Martin two-passenger car to sell for $250. Revised plans call for steel instead of aluminum construction at first, though it is hoped conditions will make it practicable to bring out the lighter car later within the desired cost limits.

C. H. Martin, president of the Martin Motor & Trailer Corp., says that the car has met all preliminary tests, and it is purposed to put it in production this fall. An issue of $250,000 in 10 year, 7 per cent debenture gold bonds has been authorized.

Parts Business Indicates Continuance of Activity

(*Continued from page 436*)

surmised, however, that the car makers, figuring on strike complications, are stocking their parts bins now as heavily as possible. Parts makers are feeling the crimp of the rail strike. Shipments have been hampered and steel is hard to get because the mills are not producing much material. Still most of the parts makers are running their plants to capacity and are feeling jubilant.

There have been few cancellations of orders and business conditions generally are good.

Men of the Industry and What They Are Doing

Sloan, Raskob, Swayne Return

Alfred P. Sloan, Jr., vice-president of the General Motors Corp. in charge of operations, J. J. Raskob, vice-president and chairman of the finance committee and Alfred H. Swayne, vice-president in charge of banking relations, who have been abroad for the last seven weeks returned last Wednesday on the Majestic.

Clarke Goes to Exposition

Louis S. Clarke, founder of the Autocar Co., Ardmore Pa., accompanied by Mrs. Clarke, has sailed for Rio de Janeiro, Brazil, to visit the Brazilian Centennial Exposition and travel through the country. He goes to the exposition as the official representative of Governor Sproul of Pennsylvania.

Rabb Sails for Rio

W. Y. W. Rabb sailed on the Pan America last week for Rio de Janeiro, Brazil, where he will reside, as general agent for South America for the Autocar Co., Ardmore, Pa., during the period of the Brazilian Centennial Exposition. This move marks the entry of the Autocar Co. into this export field. Rabb has arranged an exhibit of 380 sq. ft. which will display a 1½-2-ton four-cylinder truck and two working exhibits, a complete cutaway rear axle and a crankcase with the oiling system operating electrically. Rabb was organizer and president of the Buffalo Foreign Trade Club, formed two years ago, and in addition to representing this body officially at the exposition, he goes as the representative of the Buffalo Chamber of Commerce. For several years he was export manager for Pierce-Arrow.

Aguirre Back From Caribbean

J. V. Aguirre, manager of the export department of the Mason Tire & Rubber Co., Kent, O., recently returned from a five months trip through Mexico, West Indies and all countries bordering on the Caribbean Sea. Aguirre reports improvement in the automotive business in all countries visited, owing to the higher value of local currencies and recent increase in the price of leading agricultural products, such as sugar, coffee, cocoa and tobacco.

White, USL Vice-President

John A. White has been appointed a vice-president of the U. S. Light & Heat Corp., manufacturer of USL storage batteries. White has been engaged in storage battery sales work continuously for more than 23 years. In December, 1908, he went with the National Battery Co. as manager of its Boston office, continuing as manager of this office when the National Battery Co. was absorbed by the United States Light & Heating Co. He remained at Boston until 1916 and was then made manager of the Chicago office. On Jan. 1, 1917, he was appointed sales manager of the battery department, with headquarters at the USL factory in Niagara Falls, where he will continue to be located as vice-president in charge of sales to manufacturers.

Mason is Works Manager

George W. Mason has been named as works manager of the Maxwell Motor Corp. He has had a wide range of experience in manufacturing with the Studebaker Corp. and Dodge Brothers prior to his last year with the Maxwell organization, and during this period he also was one of the principal executives in the American Auto Trimming Co. He developed rapidly also in the Dodge Brothers leather business, later becoming general superintendent of that factory as operated by the Central Leather Co.

Changes in International Nickel

Thomas H. Wickenden and Charles McKnight, Jr., have recently joined the development and research department of the International Nickel Co., New York City, to undertake development work in connection with alloy steels. Wickenden was for many years associated with the Studebaker Corp. as engineer in charge at their South Bend plant, and more recently associated with the Zeder-Skelton-Breer Engineering Co., in a consulting capacity. McKnight was formerly works manager of the Carbon Steel Co. and engaged for many years in the production of alloy steels.

Hundt With Globe Machine

J. F. Hundt, formerly district manager for the Wainwright Engineering Co., has joined the staff of the Globe Machine & Stamping Co. of Cleveland and will represent it in a sales way in the West, while W. F. Edwards, the company's national sales representative, will look after the East.

Tracy Directs Paul Sales

R. B. Tracy, for many years with Michelin, has been appointed director of sales for the Paul Rubber Co., Salisbury, N. C., which recently opened a new plant, equipped with modern machinery for the manufacture of casings and tubes. In addition, the Paul company has taken over a factory at Charleston, W. Va., where the Tirometer valve will be made.

Hunt Joins Rayfield

George H. Hunt, formerly manager of Stromberg Motor Devices Co., and for the past three years sales manager of the Disteel Wheel Corp. is now in charge of Rayfield carbureter sales to manufacturers of passenger cars and trucks. Hunt has offices in the David Whitney Building, Detroit.

Shirley With "X" Laboratories

John S. Shirley has been appointed advertising manager of the "X" Laboratories, manufacturer of "X" Liquid. He has been in the advertising field for the last 15 years, twelve of which were spent with the Percival K. Frowert Co. of New York and Philadelphia as copy-writer, rate and plan executive, special account representative and general manager.

Pederson Joins Franklin

Harold G. Pederson, for two years factory superintendent of the Kelsey Wheel Co., Windsor plant, has resigned to join the factory staff of the Franklin Automobile Co., as assistant to the master mechanic.

Hawk Goes with Baker

A. T. Baker & Co., Inc., announces the appointment of Homer V. Hawk as exclusive representative in charge of the sales of the company's products for the automobile trade. Hawk for eight years served as purchasing agent of the Willys-Overland Co. and prior to that was associated with the Kinsey Manufacturing Co. and the old Stoddard-Dayton Co. in Toledo. A. T. Baker & Co., Inc., established in 1888, has catered almost exclusively to the upholstered furniture trade until the last few years. The company has for several years been experimenting in the manufacture of a fabric suitable for the automobile trade.

Stockholder Brings Suit Against Majestic Tire

INDIANAPOLIS, Aug. 26—Appointment of a receiver for the Majestic Tire & Rubber Co. of this city was asked in a friendly suit filed in Superior Court here by George O. Wildhack, president of the Wildhack Co., Reo distributor, who holds 252 shares of the Majestic stock. Wildhack bases his claim on a debt of $600 said to be salary owed him as secretary-treasurer of the tire company.

The suit alleges that, while the tire company is not insolvent, its working capital is not sufficient to produce the tires and other rubber goods for which it has orders. The assets of the concern are said to be considerably greater than the liabilities. It is claimed that there is an aggregate indebtedness of $235,595 due to conversion of the company's capital into plant and equipment and materials.

The value of the plant including equipment is estimated at $362,884. Serious depreciation, the suit says, threatens the property, and a receiver should be appointed to conserve the assets. The suit recommends that the company continue production.

Rufus H. Syfers is president of the company; Edgar B. Oscars, vice-president, and Doris Hopps, assistant secretary-treasurer.

Five Tariff Items Interest Industry

One of Them Refers to American Made Trucks Intended for Reimportation

NEW YORK, Aug. 29—Members of the National Automobile Chamber of Commerce are asked by General Manager Alfred Reeves, in a bulletin just issued, to study those sections of the tariff bill that pertain to the automotive industry and to express their views to the Senate and House conferees, who are whipping the measure into shape for final consideration by the two houses. It is expected that the bill will be ready for President Harding's signature about the middle of October.

Bargaining Feature

The bulletin draws attention to the five clauses in the bill that have a direct bearing on the industry. Two of these contain the bargaining features which will enable the American manufacturers to stand the lowering of the duty on foreign cars. One of these, called clause C in the bulletin, as passed by the House, provides a bargaining duty ranging from 25 per cent to as much as 50 per cent on motor vehicles from manufacturing nations that impose more than 25 per cent duty on American cars. The Senate, however, struck out this clause so that it now is subject to debate on the part of the conferees.

The other, clause B, into which the Senate has written general administrative provisions which would broaden the powers of the tariff commission and give the president power to increase duties to a maximum of 50 per cent or prohibit importations wherever findings of fact or discriminations against the United States foreign trade warrant, contains provisions not found in the House bill.

If passed, both of these clauses, the bulletin states, would benefit the automotive industry. The power of clause C could be invoked only in the case of other nations which manufacture cars. If any of these should charge a higher tariff than the American, it would be possible to raise the American rate to the same level.

Gives President Power

Clause D is broader in its scope in that it gives the President power to prevent tariff discrimination on the part of countries which do not manufacture automobiles. Such countries can be reached through raising duties on other articles.

Another important section is the one proposing a duty of 90 per cent ad valorem on re-imported passenger cars and trucks. This pertains to motor vehicles exported from the United States prior to Feb. 11, 1919, for the American Expeditionary Forces or the government with which America was associated in the war. There are more than 30,000 such motor trucks in from fair to bad condition in the hands of concessionaires in France alone and it is to prevent the re-importation of these that this high duty of 90 per cent is desired. Such a re-importation duty was accepted in principle by the House in the Graham resolution. It was not included in the tariff bill passed by the house and therefore is subject to debate in conference.

The other two items which hold the attention of N. A. C. C. members are the house provisions of 5 cents per pound for aluminum scrap and 9 cents for sheets, plates, etc., which are unchanged in the Senate bill and therefore not subject to further debate; and the House provisions on anti-friction balls and rollers, metal balls and rollers commonly used in ball or roller bearings, etc. These provisions have been retained at 10 cents per pound but the added 35 per cent ad valorem duty has been increased to 55 per cent, so that the difference in the ad valorem duty is subject to debate in the conference.

Receiver Is Appointed for Burton Engineering

CINCINNATI, Aug. 28—Edward J. Harth has been appointed receiver for the Burton Engineering & Machinery Co. as the result of a suit filed by William C. Armstrong, owner of the plant and machinery used by the company.

The suit charges that the company has not held a stockholders' meeting for some time, and that, due to the business depression, a large part of its capital has been exhausted. Since conditions improved, it is asserted, the company has been hindered by lack of funds.

According to Armstrong, the company has other creditors who are threatening to bring suit, and its assets are in danger of being sold to pay court judgments. If the firm is permitted to continue its business so that its assets can be disposed of in the proper manner, he says, it will be able to meet all its obligations.

Armstrong states that the company has an authorized capital stock of $500,000, divided equally into preferred and common stock, of which $340,000 has been issued. The company is engaged in the manufacture of gasoline engines for tractors.

CEYLON MAY RAISE DUTY

WASHINGTON, Aug. 29—A cablegram received to-day by the Department of Commerce from Consul M. M. Vance, Colombo, Ceylon, states that a bill has been presented to the legislative council proposing an increase of from 7½ per cent to 20 per cent ad valorem in duties on automobiles and motorcycles.

HAYES GETS DURANT ORDER

DETROIT, Aug. 29—Hayes Wheel Co., of Jackson, Mich., has secured the contract for supplying wheels to the Durant Motors Corp. This order takes in the complete line, including the Durant fours and sixes, the Flint and Star. It is said to be the largest order for wheels ever secured by one wheel manufacturer.

Employment Gained 1.6 Per Cent in July

Amount of Pay Roll for Month, However, Showed Decrease from June

WASHINGTON, Aug. 25—Comparison of employment in 40 identical automobile establishments during June and July showed an increase of 1.6 per cent in the number on the payroll, but a decrease of 1.1 per cent in the amount of the payroll. The survey was taken on the basis of one week. The 40 establishments in June employed 104,889 men and in July 106,619. The payroll in June was $3,405,112 as against $3,366,115 in July.

The figures of July, 1922, compared with July of last year show that a number of persons employed in the automobile industry increased 21.5 per cent and the amount of the payroll increased 18.2 per cent during the year.

Forty-two establishments reported in July, 1921 and July, 1922. The number on the payroll in July, 1921, was 89,714. The amount of the payroll in July, 1921, was $2,898,614.

Earnings Are Smaller

Comparison of per capita earnings in July, 1922, and June, 1922, shows a decrease of 2.7 per cent in the automobile industry.

These figures, which were compiled by the Bureau of Labor Statistics, will be expanded from time to time. The plan for the expansion is not yet fully under way, but returns for July have been received from approximately 1000 of the newly added establishments.

Shipments Show August Gain to Exceed 20,000

NEW YORK, Aug. 31—Estimates based on shipping reports for the first three weeks of this month received by the National Automobile Chamber of Commerce show that the July production of 244,444 will be exceeded by more than 20,000 by the month of August. Last year August production exceeded July by 4,445, the figures being 176,340 in July and 180,785 in August, 1921. Thus July, 1922, exceeded the same month a year ago by 38 per cent, while August apparently will increase over August, 1921, by something like 50 per cent.

Production of cars and trucks for the entire industry during the first seven months of 1922 reached 1,395,066 compared with 1,668,550 for the entire year of 1921.

The export situation continues to show improvement. Passenger car exports in May exceeded April by 6 per cent and June exceeded May by 15 per cent. The revival of the truck business abroad continues to be affected by the disturbed industrial conditions in Europe. Exports in May, however, exceeded April by 36 per cent; June exports of trucks decreased 7 per cent under May.

Cleveland Purchased Supply for All Year

Had Fuel Delivered, Too, Before Transportation Became a Problem—No Closing

CLEVELAND, Aug. 29 — Cleveland automobile manufacturers and parts makers regard the coal situation at the present time as most serious to the industry of the city, but none interviewed is in immediate danger of shutting down on account of lack of fuel.

In many instances purchasing agents took their cues last spring and went into the market and purchased supplies for the entire year and had it delivered before transportation became a problem.

Others have purchased electric power from the Cleveland Electric Illuminating Co. as a means for evading trouble that comes periodically through labor troubles in the coal mining industry and in transportation. The illuminating company says only a most serious situation would cause it to curtail the amount of power for plants. Still others laid in big supplies of fuel oil and have burners installed ready for use, should coal give out.

Small Plants May Close

In the plants that have electric power and fuel oil burners, the only trouble possible to come from the coal situation is failure to obtain sufficient coal to heat plants, but that is considered generally a remote possibility.

The situation thus outlined applies to those manufacturers who are big and strong financially and were able to buy coal early and to change over to other sources of fuel. There are smaller concerns that have limited supplies of coal, from two weeks to a month, on hand that will be forced to shut down unless relief comes.

The automobile manufacturers say parts makers appear to be in good shape generally, because they have not received any reports of inability to furnish parts ordered. Should the Ford plants remain closed for any length of time, several large accessory manufacturing establishments in this city that do business with the Detroit manufacturer would be affected seriously.

Say Prices Are Excessive

Automobile makers here are up in arms against the prices that are being asked for coal at the mines. They say they are too high. Under most favorable conditions that may come, they expect coal to be scarce until lake navigation closes, the middle of November. Until then, water shipments for northwest states will have preference. They expect the situation to begin to clear up around Dec. 1. Here is what some of the largest car manufacturers here say:

Peerless: Not worried about coal; have enough to last till first of the year.

Winton: Have a 30 days' supply of coal, but have a good supply of fuel oil and burners installed, so that the company has no fear of shut-down soon on account of lack of fuel. Company can get coal by paying a premium, but is not inclined to do so.

Jordan: Not bothered by the coal situation as the company buys electric power from the Cleveland Electric Illuminating Co. Uses small amount comparatively for heating and is able to supply that need.

Chandler: Company uses coal only for heating plant and has used electric power since the plant was started. Can get coal for heating by paying $6 at mines, but has enough to sit tight for a time.

Stearns: Bought a big supply of coal last spring. Has enough on hand not to cause much trouble immediately. Also has good supply of fuel oil. No immediate danger of shut-down or curtailing force.

Templar: Bought coal last spring at $1.90 a ton and has enough of it to last until first of year, when it figures coal will be cheaper. Would shut down plant before it would pay $7 and $8 a ton at mines, present quotations.

Ford Orders Plant Shut Down Sept. 16

(*Continued from page* 437)

that Ford uses 3800 tons of coal daily and produces approximately 5200 cars in that period. Even if he pays $2 a ton more for coal than the $4.50 price, it was stated, that added production cost of a Ford would be not more than $1.50.

One reason for the view taken of Ford's action is not this single move itself as applied to the Ford plant, important as it is, but that it might be accepted as a symbol of far-reaching and serious consequences. Thought was given to its establishing a precedent for other big industrial employers and consumers that would slacken production in the iron and steel and many allied lines, develop much unemployment during the winter and cause general distress throughout the country.

On the other hand, the administration plainly is hoping that the coal and rail strikes, inevitable causes of rising costs and prices, will not develop a period of wild inflation, such as occurred in 1920 followed by sharp and demoralizing liquidation.

Studebaker Not Affected

SOUTH BEND, IND., Aug. 29—President A. R. Erskine expects to operate all of the Studebaker plants to full capacity for an indefinite period. He reports enough coal on hand to operate for 10 weeks and believes he can get more fuel when the present supply is exhausted. The parts makers from whom he buys are not seriously threatened, either.

"There is no reason and can be no reason for curtailment of our operations at any of our plants," Erskine says.

Power Curtailment Possible in Detroit

Edison Company, Chief Factor, Has Enough Supply to Meet Demands for 18 Days

(*Continued from page* 437)

in this district was better than 30 days for coal on hand. All of these concerns in the Detroit zone, however, are directly affected by what happens to the Detroit Edison Company, however, as they are not equipped to manufacture all of their own power, but simply to take care of their heating, compressed air and similar needs.

When asked to comment on Henry Ford's move in announcing a closing of the Ford plants on Sept. 16, no one was anxious to be quoted. The opinion generally expressed, however, is that the move was designed to focus, rather dramatically, popular and perhaps legislative attention on the effects of the coal and rail strikes even if closing proved eventually to be unnecessary. Not a few scented a political angle to the announcement.

H. H. Rice, president of the Cadillac Motor Car Co., summed up the situation which applies generally to the Detroit plants when he said, "When we erected our new plant, we put up a large power house which is sufficient to take care of all our heating, pumping, compressed air and similar requirements. It is not designed to be large enough to run our shops. Power for this purpose is drawn from the Detroit Edison Co. If they are forced to curtail, we will have to do likewise."

There is no thought of changing over to the use of fuel oil in Detroit, although the Ford Motor Co. has some temporary installations in their power plant in Highland Park which are working out very well. As pointed out by Dow, of the Detroit Edison Co. this would be some relief if it were a case of actual shortage of coal and not a shortage or rather a slowness in transportation. The same problems which affect the movement of coal also affect the movement of fuel oil as the oil would have to come in by rail, since Detroit has no pipe line.

May Close in Canada

WINDSOR, ONT., Aug. 28—Ford Motor Co. of Canada may have to shut down Sept. 30, according to officials of that company. While the fuel supply of the Canadian concern is fairly satisfactory, it is pointed out that the supply of a great many of the suppliers is low, and this would force a closing.

Not to Curtail Output

SPRINGFIELD, MASS., Aug. 28—The Moore Drop Forging Co., extensive manufacturer of drop forgings for the Ford Motor Co., will not curtail its operations at present because of the order to close the Ford plants, Secretary J. M. Williams said today.

Indianapolis Relies on Mines, Close By

Manufacturers, However, Have Good Supply of Fuel—Power Will Continue

INDIANAPOLIS, Aug. 28—Automotive manufacturers of Indianapolis have coal and power supplies that will last at least ninety days with coal on the way to factories and the power companies which supply most of the manufacturers with electric power.

One concern, the Indianapolis Drop Forging Co., equipped its plant with fuel burners about six weeks ago that take care of 75 per cent of the fuel requirements of the concern. Beside this its fuel supply is in such shape that no trouble of this sort is expected provided the rail facilities continue as they are. This concern has the Ford Motor Co. as one of its principal customers and it will feel the Ford shut-down but other work will keep the plant busy for some time.

Position of Factories

Nordyke & Marmon Co. uses both electric power obtained from one of the public utilities, and also uses considerable coal for power and other purposes. At present the company's supply will last about sixty days and other shipments of coal already contracted for are expected in a reasonable time if the rail facilities do not fail.

Stutz Motor Car Co. is well protected with fuel bought some time ago and there is sufficient of this to carry the concern along for more than sixty days. Power is obtained from one of the local power companies.

National Motor Car & Vehicle Co. has plenty of coal for more than two months and is well protected on power obtained from one of the local companies. No apprehension is felt regarding the fuel condition unless some unexpected turn in the rail conditions makes it impossible to obtain future coal deliveries.

Duesenberg Automobile & Motors Co. is dependent on the power companies but has so far had no intimation that there are any contemplated shortages of power from that source.

Robt. H. Hassler, Inc., does not use coal for power purposes but has connections with two of the local power companies so that there is no fear of a shortage of power.

Light Companies Have Supply

Both the Merchants Heat & Light Co. and the Indianapolis Light & Heat Co. have adequate supplies of coal on hand and on the way to run the plants at normal for nearly three months. The Merchants Heat & Light Co. has a sixty day supply on hand. It owns a coal mine and has other shipments on the way to the city. The Indianapolis company has a ninety day supply and sees no reason to fear a fuel shortage that will necessitate any curtailment of power for manufacturing purposes. Both of these concerns apprehend no shortages unless some turn of the rail situation brings about unexpected conditions that will stop delivery of coal now on the way or soon to be en route to the city.

One of these companies felt so sure of its position a week ago that it loaned one of the automotive manufacturing companies of the city a supply of coal to tide it over a temporary shortage, which has since been turned into a surplus. The fact that Indianapolis is within sixty miles of coal mines seems to give assurance that there will be supplies for public utilities and power companies that even now have surplus stock. These have the preference for shipments from the mines which are now working.

No Curtailment Warning

It is understood that the G. & J. Tire Co. one of the largest automotive employers of the city has a reserve of coal and obtains power from one of the local companies. The Prest-O-Lite Co. plant which has not been on full production is said to be well protected for power from one of the power companies and it is expected that increased production will be started when the executive offices of the concern are moved back to this city shortly after an absence of some years.

As far as can be learned no manufacturer of the city who uses power from public utility companies has been advised of any curtailment, and no warnings have been sent out by the companies. Conditions of fuel supplies as they concern the public power companies are increasingly better every day, and even during the shut down of Indiana mines, coal was moving to these concerns from Eastern points, some of it bought at very high prices, it is understood.

Every automotive manufacturer of the city who could be reached to-day as well as the public utility power companies was optimistic as to present and future conditions.

Mines Working in Illinois

CHICAGO, Aug. 25—Coal mining in Illinois has been resumed, following the settlement Tuesday of the strike which had been in effect since April 1, and which was settled in other fields by an agreement reached at Cleveland last week.

Many factories connected with the automotive industry in Chicago and Illinois will feel the effect of the settlement, as many of them were beginning to run short of fuel. Although lack of coal had not necessitated the closing of any automotive factories of consequence here, many had seen their fuel reserves dwindle and others had kept in operation only at the expense of higher prices and additional freight charges on coal brought from other states.

The shortage of coal and the unsettled business condition incident to the strike had resulted in a considerable depression in the sales of automotive accessory manufacturers located in Chicago.

Suggestions Offered in Safety Campaign

Proposed Observance Meets General Approval—Oct. 8 to 14 May Be Dates

WASHINGTON, Aug. 29—Invitations to 50 representatives from each of seven groups concerned in highway safety are bringing a deluge of suggestions to the Highway Education Board for incorporation in a national safety campaign planned to retard the accident and death toll of the country due to traffic mishaps.

Almost without exception, replies indicate an eagerness for such a campaign, stressing the timeliness and need for a national movement of this nature. Groups requested to offer suggestions include automobile dealers associations, automobile clubs, pupils, teachers, superintendents of schools, chamber of commerce and police officials.

Outstanding suggestions received to date, it is said, include a national essay contest among all pupils doing class room work in the fifth to eighth grades, a national safety lesson contest among teachers, the observance of "Seven Days of Safety," and the distribution of "Pledges of Carefulness" among pedestrians and drivers alike. Oct. 8 to 14 seems the date most favorably agreed upon for the observance of "Seven Days of Safety," according to the general tenor of the letters received.

Frost Gear at Jackson Equipped to Burn Oil

JACKSON, MICH., Aug. 29—Oil instead of coal is now being burned at the Frost Gear plant here. No coal is available, and in order to fill current orders, it has been necessary to install temporary oil burners under the boilers. The installation has been made in the forge plant where steam power is used. The other departments use electric power and so far have not been curtailed.

The Jaxon Steel Products Co. has a supply of coal sufficient to last at least a month. At the Hayes Wheel plant, coal is used only for heating, the source of power being the municipal electric plant which has sufficient coal on hand for a few weeks. A contract has been let by the Hayes company for the erection within 90 days of a powerplant sufficient to furnish the current necessary to operate the wood wheel plant.

HAS TWO MONTHS' SUPPLY

SPRINGFIELD, O., Aug. 28—The local works of the International Harvester Co. has two months' supply of coal, according to Superintendent Charles H. Smart. "I do not know what we will do after that," Smart says. "It all depends on how conditions are. We buy our coal in the open market." Material is being received at the plant without interruption.

Cleveland Tractor Will Produce Truck

Sees Expansion of General Business—Plans for Zeder Manufacture Changed

CLEVELAND, Aug. 30—The Cleveland Tractor Co. will manufacture a ton and a quarter truck; the Zeder passenger car that was scheduled to be made in the plant will be manufactured elsewhere, and Fred W. Ramsey, former president of the Cleveland Metal Products Co., one of the best known business men of the city and a power in local financial circles, has become chairman of the board of directors of the tractor company.

These important announcements were made to-day at the plant of the Cleveland Tractor Co. in this city.

The price of the new truck has not been fixed. Plans provide for the production of the truck in October and its distribution shortly after. An expansion of industry and a general revival in all lines of trade next fall and winter are regarded as certain by backers of the company, and this was a factor that induced the company to get into truck manufacture.

Will Continue Tractor

The tractor that has been marketed by the company will be produced also.

Executives of the company state that the same engine which has been used in the tractor is adaptable to a truck, and it will be used in the new product. This will enable the company to make greater use of the engine division of the plant. The outlook for the tractor business is better, with the farmer's purchasing power increasing.

The engine is the design of Rollin H. White, president of the company.

After taking an active part in building up the Cleveland Metal Products Co. into one of the strongest industrial institutions in the city, Ramsey a few months ago resigned as president of the corporation to devote the major portion of his time to philanthropic and religious activities. He has been chairman of several community chest campaign committees. His connection with the tractor company will not interfere with this work.

Models of 1923 Oakland Have Many Body Changes

DETROIT, Aug. 30—Oakland 1923 models are now out with many body changes and some minor mechanical alterations, including new Marvel carburetor, new exhaust heated manifold with temperature control by throttle, and new Remy distributor with semi-automatic advance inclosed in breaker box instead of moving distributor head. The gearshift levers are longer, and levers for spark and throttle control, instead of the usual quadrant, are mounted on the steering column.

The bodies are deeper, with crowned fenders wider and heavier than formerly. The running board has been lowered an inch and a half. All models now are fitted with drum type headlamps. The sedans and coupes are fitted with heaters and rear view mirrors. The sport model is now more completely equipped and better upholstered.

Prices range from $975 to $1,545, no change being made from the 1922 list.

Jordan Builds New Sport Model Called "Blue Boy"

CLEVELAND, Aug. 29—The Jordan Motor Car Co. is now in production with a new four-passenger sport type known as the "Blue Boy." It is quite different from previous models although it bears some resemblance in the front to the Play Boy that was brought out some time ago. The price of the new model is $2,150.

The wheelbase has been lengthened on this model to 124½ inches, the car is low hung and the cushions hug the floor. The finish is "Blue Devil Blue" and upholstery in dark blue morocco leather without pleats and with a roll at the front to support the knees. A change is made in the steering wheel. The spokes are walnut and the spark and throttle levers are mounted in a small space at the center of the wheel without the conventional sectors.

New 5-Passenger Sedan, $2,040, Is Made by Nash

KENOSHA, WIS., Aug. 30—Nash Motors Co. announces a five-passenger six-cylinder sedan which will list at $2,040. It is built on the 121-in. wheelbase chassis and is a miniature of the seven-passenger sedan. Its interior furnishing and upholstery are mohair and it has four doors. Several years ago Nash built a five-passenger six sedan with a staggered door, but this was discontinued. This most recent addition gives Nash a line of 13 models.

Prices Are Announced for New Peerless Line

CLEVELAND, Aug. 28—Prices for the new Peerless line show an increase of about $200 over the retired series, although there can be no comparison in the prices for the reason that the new line has many changes and refinements not found in the old.

The prices of the new models are as follows:

4-pass. phaeton	$2,990
7-pass. phaeton	2 990
2-pass. town coupe	3,300
4-pass. suburban coupe	3,400
5-pass. town sedan	3,900
7-pass. suburban sedan	4,090
7-pass. berline limousine	4 390
4-pass. opera brougham	4 900

The scheduled production of the new models has been sold for one year ending Aug. 1, 1923, according to the factory.

Maxwell Cuts Prices on Its Closed Models

Reductions on Sedan and Coupe Amount to $150—No Change Made with Open Cars

DETROIT, Aug. 28—Prices on the Maxwell sedan and coupe have been reduced $150 effective immediately, while no change has been made in the open models, which remain at $885.

President William Robert Wilson states that the preference shown by the public for closed models has led to the decision to increase production on the sedan and coupe. The revised list is:

	Old Price	New Price
2-pass	$885	$885
5-pass. phaeton	885	885
Coupe	1,385	1,235
Sedan	1,485	1,335

American Lowers Lists; Guarantees 25,000 Miles

PLAINFIELD, N. J., Aug. 28—A new series is announced by President Carl H. Page of the American Motors Corp., which is accompanied by a guarantee on each car against defects and materials for 25,000 miles.

The new series on which deliveries already are being made include both open and closed models equipped with a larger engine (3½ x 5 in.) in addition to such special equipment as dash clock, cowl lights and ventilators, tonneau lights, windshield wiper and inside mirror.

List prices have been reduced from $65 on open models and $210 on closed types, including extra equipment. The revised list is as follows:

	Old Price	New Price
4-pass. roadster	$1,995	$1,885
5-pass. phaeton	1,850	1,785
7-pass. phaeton	1,925	1,850
Sedan	2,695	2,485

Stutz Expects August Gain to Be 75 Per Cent

INDIANAPOLIS, Aug. 26 — Present shipments from the factory of the Stutz Motor Car Co. are expected to raise August deliveries at least 75 per cent over July and about 100 per cent over the same month a year ago. The response from the dealers to the price cut, the dealer protection and the new outlook for the company has been prompt and will permit the record month shipment to be made despite the fact that the great activity of the period has come in the latter part of the month.

Present indications point to a brisk September trade and fall records that will continue to surpass previous marks. Drive-aways are increasingly popular with the dealers intent on getting the quickest possible action. Telegrams and letters from dealer organizations from all points of the compass with hearty congratulations tell of redoubled sales efforts now being made in the territory.

Assembling Plants In West Are Urged

Gordon Lee Says They Would Result in Enormous Saving in Freights

WASHINGTON, Aug. 30—A close study of the problems affecting manufacturers' distribution methods has convinced Gordon Lee, chief of the automotive division of the Department of Commerce, that it would be an advantage to establish partial assembling plants in the West. He believes that these plants could be operated at low maintenance cost and that savings in freights would be enormous.

Lee spent several weeks touring the far West talking with dealers and distributors. Many jobbers express the opinion that through partial assembling and packing in box cars, automobiles and trucks could be laid down for $30, whereas the present freight in many instances approximates $200. Lee believes that it will facilitate the export business with the Orient and allow brisk competition with European automobile manufacturers now cultivating the eastern markets. Lee was very emphatic in the declaration that the point of saturation has not been reached.

Made Study of Coast

Lee made a study of the automotive industries through the west coast states by journeying by way of automobile from San Diego to Seattle, with the exception of one short train journey. On this trip through the Yosemite Valley, he was accompanied by George Haberfield, president, and Robert W. Martland, secretary of the California Automotive Trades Association, and Byron L. Graves, manager of the Los Angeles branch of the Ford Motor Car Co. He addressed practically every dealers' association in three states concluding his work before the Spokane Automobile Chamber of Commerce.

Lee called the attention of manufacturers to the fact that western jobbers and manufacturers of automotive equipment as the result of educational work being carried on in behalf of jobber and dealer by the Automotive Equipment Association, are now making an earnest attempt to follow out better business practices and eliminate waste from methods pursued in the past.

Would Use Panama Canal

PORTLAND, ORE., Aug. 25—As a step to cut down the heavy freight rate charged by the railroads on automobiles into the Pacific Northwest, a rate which naturally brings the retail price on an automobile sold in Portland and elsewhere in this section to a higher figure than perhaps any other point in the United States, automobile dealers are considering securing automobiles by water through the Panama Canal. This practice may be put into execution this fall by a considerable number of the dealers.

The Automobile Dealers Association of Portland, through its secretary, Ralph J. Staehli, has for the past month been securing data relative to water shipments of automobiles and has reached the conclusion that a substantial saving can be made in this manner, which can be passed on to the ultimate purchaser.

He says:

Owing to the fact that the railroads coming into Oregon charge a higher carload minimum than for California the Pacific Northwest bears freight rates on automobiles in many instances considerably higher than California, and in fact the highest in the country. There being no prospect of freight reduction, and the railroad situation being altogether unfavorable on account of strikes, the Portland dealers have been investigating water shipment and many of them are on the point of trying it out.

Under the railway freight schedules the cost of cars, particularly closed models, has been increased sometimes as much as 20 per cent. By shipping by water we believe that this can be considerably reduced. A saving of one-third of the freight charge would be possible, our investigations have disclosed.

The cars could be handled from the eastern and middle western factories to the Atlantic seaboard by rail or canal, it is stated, and then brought through the Panama Canal to the Pacific Coast. While such shipments would take a considerably longer time than by rail, this delay would not be such an undesirable factor during the fall, winter and early spring months, although dealers would no doubt resort to rail shipments during the spring and early summer rush of buying.

Driveaways Will Rule in Making Deliveries

NEW YORK, Aug. 28—The National Automobile Chamber of Commerce is closely watching the coal priority rulings to see that the industry is placed at no undue disadvantage compared with other manufacturers.

James S. Marvin, assistant general manager of the N. A. C. C., says:

Even if the rail strike is settled soon, the automobile industry is going to be affected in the matter of deliveries this fall. Already driveaways are becoming more and more necessary because of the increasing difficulty in getting the necessary freight cars. This may get worse before it gets better and adds to the difficulty of keeping automobile cars in this service.

Despite the strikes, general business is improving to an extent that the demand for freight cars is increasing. On top of this comes the crop movements which need still more freight cars. With the automobile industry in heavy production right now difficulty is found in getting enough transportation to carry its product, despite the fact the railroads now have more automobile freight cars than ever before.

Fortunately this scarcity of transportation is not going to make us shut up shop. We have learned how to deliver cars over the road and this fall will see driveaways utilized to get the new cars into the hands of the dealers.

$57,000,000 Added to Ford's Surplus

Statement for Year Shows $61,000,000 Gain in Cash and Debts Receivable

BOSTON, Aug. 29—Ford Motor Co., incorporated under the laws of Delaware, has filed with the Massachusetts commissioner of corporations its financial statement covering the year ended April 30, 1922, showing $57,000,000 added to the Ford surplus and a gain of $61,000,000 in cash and debts receivable.

The statement shows a profit and loss surplus of $240,478,736 on that date against $182,877,696 on April 30, 1921. Cash on hand and debts receivable totaled $148,615,334 against $86,995,165 last year, while inventories were valued at $45,208,094 against $63,848,157.

Accounts and notes payable were reduced from $48,886,141 at the close of the fiscal year ended April 30, 1921, to $33,089,894 on the same date this year.

The detailed balance sheet as of April 30, 1922, with comparisons for two years, follows:

ASSETS	Apr. 30, 1922	Apr. 30, 1921
Real Estate	$81,026,633	$71,329,719
Machinery and Equipment	49,401,132	46,459,046
Inventories	45,208,094	63,848,157
Cash and debts receivable	148,615,334	86,995,165
Patent rights	110,740	81,397
Securities	15,749,953	10,361,964
Furn. fixtures, autos.	39,221,960	44,779,634
Miscellaneous invest.	500,815	501,815
Good will	20,517,986	20,517,986
Deferred charges	196,399	265,674
Stock in subsid'y cos		
Total	$4 0 548 946	$345,140,557
LIABILITIES		
Capital stock	$17,264,500	$17,264,500
Accts. and Notes pay.	33,098,894	48,896,141
Dept. reserve, etc	*50,829,307	*43,493,394
Accrued expenses		
Deferred charges	853,950	3,027,120
Res. for Fed. and Local taxes	58,032,559	49,591,706
P. & L. surplus	240,478,736	182 877,696
Total	$400,548,946	$345,140,557

*Includes amortization reserve.

Electric Convention Has Big Attendance

OLD ORCHARD, ME., Aug. 31—All except two of the members of the Automotive Electric Association, representing the manufacturers of starting, lighting and ignition apparatus and batteries, are in attendance at the four day summer meeting here. Sixty-five are present, which makes the meeting the largest in the history of the association. The members with their families are combining business and recreation. Motor trips along the Maine coast, clam bakes, deep sea fishing and golf are the recreational features.

FINANCIAL NOTES

Gray & Davis, inc., has filed a certificate with the Commissioner of Corporations at Boston showing an increase in common stock from 138,904 shares without par value to 254,404 shares no par; also the creation of $750,000 preferred stock $100 par. Of the new common 20,000 shares are to be issued for cash to net the company $250,000; 30,000 shares to Arthur T. Murray at $20 a share under the option contract which expires Feb. 1, 1925; 87,500 shares previously authorized to be reserved to provide for conversion into common of the $1,000,000 first mortgage 7 per cent convertible sinking fund gold bonds and the 7,500 shares of 8 per cent preferred, and 3,000 shares to be issued to bankers underwriting the $1,000,000 bonds.

Republic Rubber Co.'s receiver reports that for the six months period ended June 30 there was a deficit of $21,664 after charges amounting to $232,731. Gross earnings aggregated $2,467,109. Current gross business is reported to be running at the rate of about $650,000 a month. The balance sheet gives net current assets at $3,687,271, not including disputed claims of $3,250,000, which have been reduced $500,000 in six months.

Chandler Motor Car Co. is expected to declare the regular quarterly dividend of $1.50 a share at the meeting of the directors next month. It is reported that the earnings for July were more than sufficient to cover the regular quarterly dividend requirements.

Moon Motor Car Co., St. Louis, reports for the six months ended June 30, 1922, net income of $236,655 after costs and expenses. For the year ended Dec. 31, 1921, the net income was $99,373 after cost, expenses and taxes.

Reo Motor Car Co. has declared an extra dividend of 1 per cent in addition to the regular quarterly dividend of 1½ per cent. Both dividends are payable Oct. 2 to stock of record Sept. 15.

Timken Roller Bearing Co. directors have declared an initial dividend of 75 cents a share payable Sept. 20 to stockholders of record Sept. 11.

Italy Is Making Ready for Its Grand Prix Race

MILAN, ITALY, Aug. 20 (*By Mail*)—Felice Nazzaro, driving the 122 cubic inch Fiat with which he won the recent French Grand Prix at Strasbourg, to-day opened Italy's first automobile speedway at Monza, six miles from Milan.

Grand stands, garages, etc., yet remain to be built, but these will be completed in time for the first race, announced to be held on Sept. 3. This event is for cars having a piston displacement limited to 91 cu. in. One week later, on Sept. 10 the Italian 500-mile Grand Prix race will be held for cars of 122 cu. in. piston displacement. This race has united 38 competitors from France, Italy, Germany, Austria and England.

FAVORS GASOLINE TAX

CHICAGO, Aug. 30—A state gasoline tax is proposed by Governor Small to finance further good roads construction in Illinois. The State is now expending the proceeds of a $60,000,000 bond issue to build hard roads, and the Governor favors an additional bond issue with interest and sinking fund to be provided by a gasoline tax. The Governor said:

"I expect to recommend the law to the next session of the Legislature. The people want roads. I believe that the entire bond issue would be paid by automobiles. I believe that a truck should pay its proportion in relation to its earning capacity. A gasoline tax is the surest and fairest way of getting at a basis."

Coast Officials to Meet on Uniform Vehicle Law

PORTLAND, ORE., Aug. 25—Discussion of appropriate legislation dealing with regulation of motor vehicle traffic on the highways, with a particular view to uniformity throughout the Pacific coast, is the subject of a proposed conference of officials of the seven western states and British Columbia which probably will be held in Portland late in September.

Letters suggesting the conference were sent out this week by Sam A. Kozer, secretary of State of Oregon and in charge of motor vehicle control, following an exchange of ideas with L. D. McArdle, director of efficiency, and Fred J. Dibble, director of the bureau of licenses, of the State of Washington.

Officials to whom invitations have been sent by Kozer and who probably will be in attendance at the conference are:

Charles J. Chenu, superintendent of the motor vehicle department of California; Robert O. Jones, secretary of state of Idaho; Charles T. Stewart, secretary of state of Montana; George Brodigan, secretary of state of Nevada; H. E. Crockett, secretary of state of Utah; L. D. McArdle, director of efficiency of Washington, and the director of the motor vehicle department of British Columbia.

Kelly-Springfield Truck Gets Railway Order

SPRINGFIELD, OHIO, Aug. 28—An order for motor railway equipment has been received by the Kelly-Springfield Motor Truck Co. from the Edwards Motor Railway Co. This equipment will be used on a southern railroad for local traffic. Shipment will be made within the next two or three weeks. The Springfield company has filled a number of orders from the Edwards company for motor equipment for steam lines. The question of motorizing the Delaware division of the Big Four Railroad was taken up with the railroad officials several months ago and is still pending.

President Charles W. Young of the Springfield company has called a meeting of the directors for next Wednesday at Hotel Shawnee, which will be in the nature of a business conference.

While there has been a slight falling off in orders in August, he company reports that the outlook is good for the fall and winter, unless the strikes seriously affect business.

Indications are that production will be steadily increased at the plant of the Westcott Motor Car Co.

BANK CREDITS
Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Last week a slight tendency toward hardening was shown in money rates. Call loans covered a range of 3¼ per cent to 4½ per cent as compared with 3 per cent to 4 per cent the previous week. In time money the demand was fair but the volume of business transacted was moderate. The rates quoted were 4 per cent for 60 and 90 days' maturities against 3¾ per cent to 4 per cent in the previous week; 4¼ per cent for four and five months, against 4 per cent and 4¼ per cent; 4½ per cent for six months, against 4¼ per cent to 4½ per cent. The prime commercial rate remained unchanged at 3¾ per cent to 4 per cent.

For the week ending August 12 car loadings of merchandise and miscellaneous freight decreased 8,224 while coal loadings increased 5,313. Total coal loadings for the week aggregated 84,559 against 156,891 cars for the corresponding week last year, and 221,884 cars two years ago. The total loadings of all freight were 852,580 cars, as compared with 808,269 last year and 971,269 two years ago.

Last week an announcement of special significance was that of the 20 per cent increase in the wages of day labor in the plants of the United States Steel Corporation to take effect Sept. 1. The present increase will affect approximately 156,000 laborers.

The Federal Reserve statement as of August 23 showed a decrease of $4,672,000 in gold reserves and $5,194,000 in total reserves. Total bills on hand increased $24,330,000 and total earning assets $20,485,000. Deposits increased $4,886,000 and Federal Reserve notes in circulation $4,386,000. As a result of these changes the reserve ratio decreased from 80.2 per cent to 79.8 per cent.

Reliance Plant Is Sold To Stockholders' Agent

APPLETON, WIS., Aug. 28—Dr. D. S. Runnels of Appleton, who is understood to be representing stockholders working on reorganization plans, bid in the entire property of the Reliance Motor Truck Co. of this city at trustee's sale. The bid amounted to $1, and the assumption of incumbrances totaled about $120,000.

This was the only bid submitted for the entire property and probably will be accepted. Four other bids for parcels of the assets were entered. These ranged from $5,000 to $8,000 and were for the personal property, inventoried at $35,000.

Stockholders of the defunct concern have made good headway in reorganizion plans and believe they will be able to rehabilitate the industry quickly. The Reliance company manufactures motor trucks as well as motor truck axles for the truck trade. John Hackworthy is serving as trustee.

Canadian Exports Gained 21 Per Cent

Makes Up Decrease Experienced in June—Figures Rise and Fall Monthly

WASHINGTON, Aug. 29—Exports of automotive products from Canada during July reached the total value of $1,818,359, an increase of about 21 per cent over the exports during June, which more than makes up for the decrease of 13 per cent during the latter month as compared with May. This was announced to-day by the Automotive Division of the Department of Commerce.

The markets of Canadian automotive manufacturers have not increased steadily as have those of American producers, nor have they been stable in their demands. Since the first of the year, each increase in the value of Canadian exports has been followed by a decrease and each decrease by an increase, with the exception of March and April, when two consecutive decreases were recorded.

The number of passenger cars shipped monthly has fluctuated from 1534 in January to the high point of 2983 in March, July shipments of 2812 cars valued at $1,566,194 coming close to the March record and marking an increase of 24 per cent in number and 10 per cent in value over passenger car shipments during June. There were 211 trucks exported at a value of $99,052, an increase of 24 per cent in number and 33 per cent in value, while parts shipped reached the value of $153,113, a gain of 51 per cent in value.

Greatest Gain in British India

The most notable increase in passenger car shipments during July took place in British India, where, in place of the average monthly shipments of 80 cars during the past months, 309 were imported during July, valued at $130,062. This increased demand is due partly to the increased Indian import tariff.

New Zealand imported 380 passenger cars from Canada during July as compared with 169 in June, and Australia took 824 against 805. The United Kingdom increased its imports of passenger cars from Canada to 512 in July from 368 during June, while South Africa maintained its quota of the previous month with 206 passenger cars. Argentina imported 74 as compared with 34.

Australia was again the largest importer of automotive products from Canada, having taken 112 motor trucks and $61 240 worth of parts, as well as the largest number of passenger cars. New Zealand with 42 trucks reached second place in truck shipments.

"BUSINESS IN FARMING"

CHICAGO, Aug. 28—The Power Farming Bureau, which was recently incorporated by George E. Fuller and others, has commenced publication, in co-operation with the Gas Engine and Farm Power Association, of a monthly bulletin called "Business in Farming." The first number just issued from the office of the Bureau in the Monadnock Building contains the tentative by-laws of the Bureau which declare its purpose "to promote the use of mechanical power in agriculture."

INDUSTRIAL NOTES

Monkey Grip Tire Co., Fort Worth, Texas, expects to have its cotton mill and tire factory running within four months. One of the old buildings, formerly used by the Texas Motor Car Association and recently purchased by the Monkey Grip concern, will be converted into the combination cotton and tire plant. The West Texas Chamber of Commerce, representing a tier of Texas counties, will aid in purchasing and shipping the cotton to the mill here. Part of the latter's product will be consumed by the tire factory. R. Copeland, vice-president, will be in charge of the cotton mill.

Robert Bosch Magneto Co., Inc., 122 West 64th Street, New York, has established a direct branch office at 1302 South Wabash Avenue, Chicago, with Lee C. Carlton as the executive head. This branch will take care of the business of the middle western section. It will carry a complete stock of Robert Bosch magnetos, spark plugs, spot lights, horns, etc., as is done in the New York office.

Manhattan Electrical Supply Co., Inc. has moved its executive offices to 125 Church Street, New York City. J. J. Raferty, formerly of the Western Electric Co. has been appointed manager of the New York branch, of which Howard N. Croop is sales manager and C. H. Boehler is city sales manager.

Hardwood Manufacturers' Institute, whose membership comprises various hardwood manufacturers, has moved its offices from Memphis, Tenn., to 1020 South Wabash Avenue, Chicago.

Morse Chain Co. has moved its Philadelphia office to 612 Franklin Trust Building. J. A. Meaney is district manager.

Demand Taxes Cadillac Production Facilities

DETROIT, Aug. 29—In a statement issued by H. H. Rice, president of Cadillac Motor Car Co., the rate of production and sales at the present time is declared to be considerably in excess of all previous schedules. A majority of distributors, he reports, find business by far the best that they have ever enjoyed.

Foreign business has picked up remarkably, Rice said, and production facilities at the plant have been taxed to meet the increased business from this field as well as the domestic. There is every indication, he said, that the record business in all fields will continue during the fall months. Cadillac distribution has been increased until it now includes a majority of communities which formerly were considered too small for an independent Cadillac agency.

Manufacturing and engineering improvements are being made constantly upon the car, Rice declared, to make it give the utmost in owner satisfaction.

METAL MARKETS

Perhaps never before in the steel market's history has there been a time when price advances, liberally advertised on the front pages of the newspapers as those of the last few weeks have been, were accompanied by so marked a lack of interest in the market as purchasing agents have shown ever since the leading interest announced higher sheet prices. The barrage of publicity that attended the raising of the wage scales in the steel industry caused many consumers to interpret this move as one that was prompted by ulterior motives, and because of this impression there are still many steel consumers oblivious of the fact that this 20 per cent wage advance has added at least $4 to the cost of every ton of steel products.

The wage advance had been in the air for several months, and has been repeatedly foretold in these market reports. It was only the psychological moment and the spectacular manner chosen for announcing it that caused astonishment. Even astute steel buyers forgot for the moment to figure out how much had been added to the cost of every ton of steel bought by them, and sought to interpret the meaning of this move with reference to the outstanding labor troubles. Some concluded that the object of the advance was to head off a strike in the steel industry, while others interpreted it to be chiefly aimed at a restoration of normal producing conditions in the coal mines which the leading steel interest owns and operates in the Connellsville region and which are considered of pivotal importance by the unionists. For a long time the steel industry has suffered from a lack of labor, and obviously the higher wage scale was forced upon it by the natural working of the law of supply and demand.

It will be well to bear in mind at this time, however, that production costs and the nominal asking prices of steel producers do not make the steel market. They are important factors in its making, but not nearly as important as is—the demand. So far there has been no sign of fresh demand for those steel products chiefly consumed by the automotive industries. As was demonstrated earlier this year, the steel industry must at times endure protracted periods in which, because of a sharp contraction in the demand, it can keep mills in operation only by assuming losses. The wage advances of 20 per cent go into effect Sept. 1, and as practically all mills are committed for their September and at least for part of their October output at the prices that ruled previous to the recent advances the increased cost in production over the next six weeks will come out of producers' pockets.

Pig Iron.—Foundry and malleable irons are becoming scarcer and, while no automotive foundry has so far been compelled to curtail operations, it is becoming more and more difficult to locate stop-gap tonnages.

Steel.—Automotive alloy steel makers have announced a $5 per ton advance throughout the entire list. Special chromium steels are subject to special arrangements for delivery and analysis.

Aluminum.—Advices from Germany state that rolling mills have sufficient orders on hand to keep them fully employed over the year's remainder. New export orders are booked only for delivery in six months. The market here is unchanged.

Copper.—While the market is easier, consumers recognize that lack of fuel this winter may make a big dent in output, especially in the Lake region.

Calendar

SHOWS

Sept. 4-9—Indianapolis, Automobile and Accessory Show in conjunction with the Indiana State Fair, Auto Show Building, under the auspices of the Indianapolis Automobile Trade Association, J. B. Orman, manager.

Sept. 23-30—New York, Closed Car Show, Grand Central Palace.

Oct. 7-14—New York, Electrical and Industrial Exposition, Grand Central Palace.

Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8-13—Body Builders Show, Twelfth Regiment Amory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27-Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Sept. 1922 — Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Associação Automobilista Brazileria.

Sept. 15-20—The Hague, Automobile Show.

September — Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.

Oct. 4-15 — Paris, Automobile Show, Grand Palais.

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

CONVENTIONS

Oct. 7-14—Detroit, Second National Aero Congress and National Airplane Races.

Sept. 13, 14, 15—Buffalo, Lafayette Hotel, Annual credit meeting, Motor and Accessory Manufacturers Ass'n.

Sept. 14-15—Chicago National Used Car Conference, National Association of Automobile Show and Association Managers, Congress Hotel.

Sept. 18-23, 1922 — Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

Oct. 2-7—Detroit, Fourth International Steel Exposition and Convention of the American Society for Steel Treating and the American Drop Forging Institute, General Motors Building.

Oct 18-20—Chicago, National Association of Farm Equipment Manufacturers, Congress Hotel.

Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

RACES

Sept. 16—Monza, Italy, Italian 500-mile Grand Prix Race.

Sept. 16—Kansas City Speedway, 300 mi. International Speed Race.

S. A. E. MEETINGS

Sept. 16—Metropolitan Section, Annual Outing, West Point; Sept. 21—Automobile Club of America, George A. Round, Lubrication.

Sept. 22—New England Section, Engineers Club, Boston, Starting and Lighting Equipment, Louis Ehrlich.

Sept. 29—Detroit Section, Lubrication, A. A. Bull.

Federal Bank Finds Good Fall Prospects

WASHINGTON, Aug. 29—Reviewing general business and financial conditions throughout the several Federal reserve districts for the month of August, the Federal Reserve Board has found that manufacturing activity in the automobile industry is one of the bright spots of the industrial situation. The fact that the activity is still far in excess of a year ago, despite seasonal recession, is taken as an encouraging sign.

The board says:

The outstanding feature of the month has been the inherent soundness which the general business situation has manifested in the face of the difficulties which have been encountered. This has been shown by the continuance of activity at a relatively high level despite labor disturbances, in particular, those in the coal and transportation industries, and despite the fact that some recession of activity is normally to be expected at this season of the year.

Prices of important commodities continued their upward tendency during July, the index number of the Federal reserve board for that month being 165, or four points greater than the June figure. During August, however, conflicting tendencies in price movements were apparent. The excellent agricultural prospects provide an encouraging outlook for the fall trade.

AIR MEET POSTPONED

CHICAGO, Aug. 30—The Chicago Aeronautical Bureau announces that the aviation meet and air program which was originally scheduled to be held in Grant Park, on the Chicago lake front, from Aug. 4 to 13, has been postponed until the first two weeks in August next year, because preparations were not complete. It is announced that preparations will be commenced early in 1923 for the affair. C. S. Rieman, president of the Elgin Motor Car Corp., is head of the Aeronautical Bureau.

Show Managers to Hold Used Car Conference

NEW YORK, Aug. 29—A National Used Car Conference will be held at the Congress Hotel, Chicago, Sept. 14-15, under the auspices of the National Association of Automobile Show and Association Managers.

The speakers include L. B. Sanders, secretary of the Boston Used Car Statistical Bureau, Ginder Abbott, member of the Automobile Dealers Association of New Orleans, a Saginaw dealer who will explain the workings of the Saginaw plan, B. B. Burns, a successful used car dealer of Decatur, Ill., and president of the Illinois Automotive Trade Association, and S. E. Comstock, vice-president of Williams & Hastings, Detroit distributor.

There will also be addresses by representatives of the Detroit, St. Louis and Kansas City dealer associations. A round table discussion will close each day's session. The afternoon of the second day will be devoted to the subject, "How Can We Make the Automobile Shows Sell More Cars?"

All automobile trade association secretaries and dealers throughout the country are invited to attend.

KISSEL SEES BIG 1923

CHICAGO, Aug. 30—The Kissel Motor Car Corp., according to G. A. Kissel, president of the company, is preparing for the biggest year in its history when the work for 1923 swings under way. At present, the Kissel is going strong in the sale of both open and closed cars.

Tax from Industry Fell Off $11,000,000

WASHINGTON, Aug. 27—Preliminary statements by the Collector of Internal Revenue show that the payment of excise taxes for the automobile industry fell off by approximately $11,000,000 during the last fiscal year. The report shows that the excise taxes on automobiles for the fiscal year of 1922 amounted to $104,430,163 as compared with $115,546,249 for the fiscal year of 1921.

A detailed account of the Internal Revenue receipts for the fiscal year of 1921 and 1922 by objects of taxation show that the manufacturers' excise tax on automobiles, trucks and automobile wagons decreased $3,236,153 as the total collections on this item for 1922 were $8,403,902 as against $11,640,055 for 1921. The manufacturers excise taxes on other automobiles and motorcycles fell off $7,703,749, making collections for 1922 on this item $56,684,434, as compared with $64,388,184 for 1921.

The manufacturers' excise tax on tires, parts, or accessories for automobiles, etc., decreased $176,182. The total collection on these items amounted to $39,341,826 for 1922.

GAIN FOR INTERNATIONAL

MILWAUKEE, Aug. 28—The Milwaukee works of the International Harvester Co. are operating at approximately 62 per cent of capacity, and prospects seem to be for a material increase in this rate, due to the brilliant crop outlook. The Milwaukee plant is the largest tractor works of the I. H. C. group, also making farm gas engines, cream separators, etc. The showing as August draws to a close is the best the Milwaukee works have made in more than two and a half years.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XLVII NEW YORK—THURSDAY, SEPTEMBER 7, 1922 NO. 10

71 Per Cent of Cars Sell for Less Than $1,000

Value of "Under $1,000" cars will run to $650,000,000 in 1922. Thirteen companies making cars in this class comprise 15 per cent of total number of manufacturers. Five builders produce 96 per cent of cars in group. Share of business shifts from year to year.

By Norman G. Shidle
Charts and Statistics by Raymond B. Prescott

SEVENTY-ONE per cent of the cars built since 1912 have sold for less than $1,000. Seventy per cent of the cars produced during the first six months of 1922 were in this price group. At the beginning of this year AUTOMOTIVE INDUSTRIES predicted that 78 per cent of the cars built in 1922 would be in the "Under $1,000" price class. Thus the error of the prediction was 8 per cent so far as the half year figures represented the proportion for the entire year.

The probable production in 1922 of cars selling for less than $1,000 is about 1,326,000. This constitutes something like 70 per cent of the total production, as just noted. Ford will produce about 43 per cent of the total production, while twelve other companies in the "under $1,000" class will produce about 27 per cent. The production capacity of this group of car makers is about 2,000,000.

This lowest price class is a very large part of total production. Fig. 1 shows the relationship between the class and the total over a period of years. As might be expected, the "Under $1,000" production curve follows very closely the outline of the total production curve.

It is interesting to note that the "Under $1,000" curve goes above the nor-

THIS is article No. 6. It completes the price class series, which was begun some time ago. These articles comprise an accurate and thorough analytical study of production and sales possibilities in the passenger car field, and form the basis for future market studies.

For your convenience, the entire series is again listed:

No. 1—"*The Industry As a Whole*"—*Nov.* 17, 1921.
No. 2—"*94 per cent of Sales Will Be of Cars Selling Under* $2,000"—*Dec.* 22, 1921.
No. 3—"*Keen Sales Competition in Medium Priced* ($1,000-$2,000) *Field*"—*March* 23, 1922.
No. 4—"$2,000-$3,000 *Car Production Probably Less in* 1922"—*May* 11, 1922.
No. 5—"$90,000,000 *Business in High Priced Cars During* 1922" ($3,000 *and over) July* 13, 1922.
No. 6—"*71 per cent of Cars Sell for Less Than* $1,000."

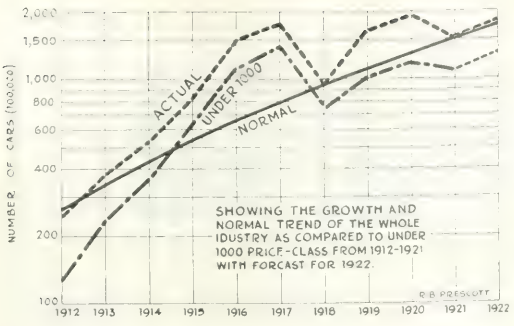


Fig. 1

mal line for the years 1915, 1916 and 1917. War wages brought into the market many buyers who would not have owned a car otherwise. This indicates that more cars were sold in this one price class during these years than would have been sold in all price classes under normal economic conditions.

The 1921 deflation brought the entire industry back to the normal production line, while the "Under $1,000" curve follows the general trend rather accurately.

Some of the figures concerning this lowest price group are so large that comprehension of them is difficult. They must be used, however, in making market plans and policies.

There are 13 companies making cars which sell for less than $1,000. This group comprises about 15 per cent of the total number of manufacturers. Between this 15 per cent of manufacturers is divided:

1. 70 per cent of the total business, considered on a production basis.
2. 50 per cent of the total business, considered on a value basis.

The probable gross sales value of 1922 business in this price class is $650,000,000, of which Ford will probably do something like $300,000,000.

Considering only the production of this price class, Ford produces about 62 per cent of the total, while four other companies produce about 34 per cent. The remaining 7 companies get 4 per cent.

On a value basis, however, the record is as follows:

1. Ford has about 45 per cent of the price class business, on a gross value basis.
2. 4 other companies have about 46 per cent of the price class business, on a gross value basis.
3. 7 other companies get the remaining 9 per cent.

These figures bring out some interesting points. Ford has a far larger production than these four other companies combined, but the gross value of his business is not quite so large as the combined total of the others.

This value comparison is an important one, since progress and success is too often gaged purely on a production basis. Ford's stupendous production figures for the last few years have been so startling and overwhelming that they have tended to blot out some of the other factors of equal importance in any thorough market study of this price group.

The relative progress of various important companies is shown in Fig. 2. This chart shows the percentage of total car sales obtained by each of five important companies over a period of years. It indicates the share of total business done by the individual companies.

Company "A," Ford, may be mentioned by name because this organization makes public its production figures.

Ford has always had a larger share of the total business from a production standpoint than any other company, either in its price class or in the industry. Ever since 1912 Ford has maintained approximately the same percentage with comparatively small variations. While Ford's share of the total business is less this year, his share increased last year, while the others were materially declining.

In general, it will be noted that the Ford percentage curve tends to rise when automobile prices in general are rising, while the Ford curve tends to fall when automobile prices falling, although this process was modified in 1921 by reason of maintained prices during the first six months of the year. An opposite trend appears in the case of the other cars.

This tendency is specially noticeable at the present time. The Ford percentage of total production is lower this year than in any year since 1916. The other four companies are all obtaining an increasing share of the total business, company B showing particularly sharp rise.

The percentage of total business obtained by the other four companies, however, has fluctuated during past years far more widely than has Ford's. First one and then the other has had a larger share, the past indicating that similar fluctuations may be expected in the future. New designs, financial abilities or disabilities, and many other factors will continue to affect the leadership.

Company "B" has apparently turned a corner, and is making progress after a steady, though slight decline, during the last three years. The same thing is true of Company "E," although the decline in this latter case

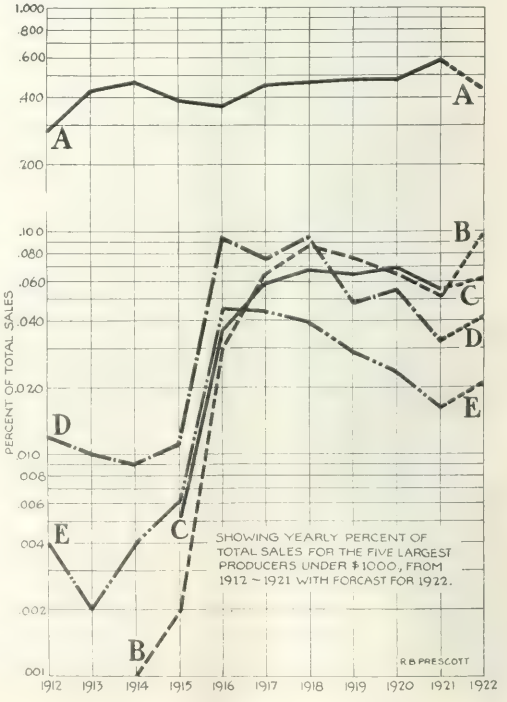


Fig. 2

extended over a period of five years. Past buying habits affect immediate sales materially. Radical changes in a brief time are difficult. Consequently, it is not surprising to see "B's" curve take a sharper upward trend than "E's" because of the relative length of the periods of depression.

Many interesting speculations might be made as regards the Ford percentage decrease and the increase of the other four companies. Since these would be merely speculations, however, they have no place in this particular analysis. The facts presented, however, will give a more sound basis for speculation than a mere consideration of general ideas.

Fig. 3 shows the actual production of several important companies in the "Under $1,000" price group. Much the same relationships are shown as in the percentage of total business chart in Fig. 2.

Fig. 4 shows the relation between the number of manufacturers operating and the percentage of total production put out in this price class. Fig. 5 presents the same material in tabular form. The trend of the two curves is very similar, but analysis of the various factors indicates that this similarity is probably a mere coincidence. There was no sign of such similarity in any of the other price groups, and there is no logical explanation for the similarity here.

It will be noted that the ratio of production in the "Under $1,000" class to total production rises steadily as prices decrease, and decreases to a marked degree during periods of rising prices.

The probable production possibilities of this price group have been outlined in a general way. This group presents a bit different problem, however, than the higher price classes. In a sense this low price group

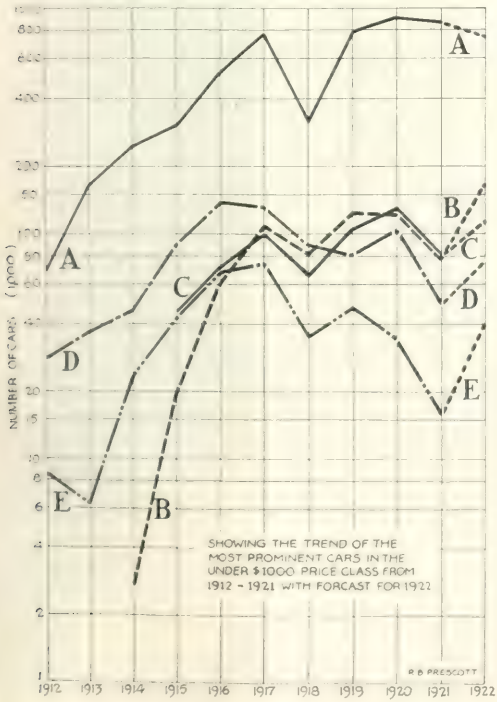


Fig. 3

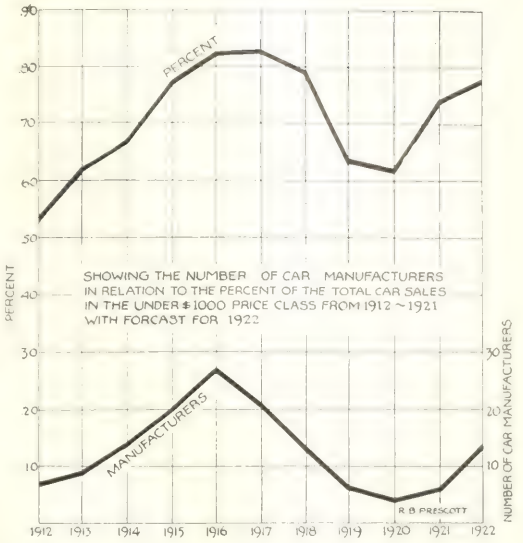


Fig. 4

Companies Manufacturing Cars in the "Under $1,000" Price Class

	1912	1913	1914	1915	1916	1917	1918	1919	1920	1921	1922
Total number...	7	9	14	20	27	21	13	6	4	6	13
New	0	1	5	5	2	0	0	0	0	1	1
To higher price class	0	1	2	0	0	5	6	7	2	0	0
From higher price class....	0	1	2	2	7	0	0	0	0	1	7
Out of business	0	0	0	1	0	1	2	1	0	0	0

Fig. 5

may be said to be the basis upon which all price group sales possibilities are determined.

The ultimate limit of sales in this group is the limit of transportation needs in this country. Design, production and sales methods are all tending toward a general lowering of both original and upkeep cost. It is difficult to predict what the next ten years will bring forth. Certainly the low priced car will be the one which will pioneer the wider transport opportunities.

Twelve million two hundred and forty thousand cars have been produced since 1912, including the first six months of 1922. Of this number 8,657,000 have sold for less than $1,000; 71 per cent of all the automobiles made. The gross value of all cars made in this price group since 1912 is $4,842,130,000 of which Ford's comprise $2,681,410,000. It seems incredible that anyone could rate as a luxury a unit costing less than $1,000, which has the transportation usefulness of the automobile. Out of this 8,657,000, Ford has made 5,473,000. The luxury discussion ought soon to become a thing of the past.

There are important additions to the competition in this lowest price class which are just getting under way. Just how far these new cars will operate to actually widen the market possibilities of the field cannot be determined immediately. They will undoubtedly have this effect to some extent. Whatever business is done by the newcomers will be largely taken away from those already in the field.

Consequently, the trend of events in this price class will be particularly interesting during the next few years. In no other price group does dollar for dollar service value influence buying to so great an extent as in "Under $1,000" class.

Southern Dealers Want Greater Cooperation from Factories

Sales campaigns adapted for Northern use do not always fit Southern conditions. Factories lack intimate knowledge of territories. Dealer education in business and selling methods needed. Financing and credits constitute major problem for Southern dealer.

By James Dalton

IT is not difficult to find automobile dealers in the South who feel that they get little co-operation from their factories. This feeling is not the result of a grouch or inability to make sales. It is shared by some of the most successful automotive merchants.

The plaint is based on the contention that factory sales departments map out some kind of sales campaign which sounds good to them and then try to apply it to the country as a whole instead of making it elastic enough to fit the different sections. Some sales managers, it is asserted, can see no reason why a plan that works well in the Dakotas should not work equally well in Alabama.

This grievance applies to some factories, but there are others which seem to regard the South as a foreign country and try to do business there much as they would in Argentina. Their dealers get even less assistance than do those whose sales departments work out blanket ideas which they seem to think will apply equally well everywhere.

Ignorance of conditions in the South is one of the charges laid most often at the door of Northern houses trying to do business in that section. Southerners are proud of the South and they believe it has the greatest future of any section of the country, but they feel far less prejudice against the North than is generally believed. They will patronize home industry as far as they can, naturally, but they have not the slightest objection to doing business with the North. They do feel, however, that Northern houses which expect to get Southern trade should give greater consideration to a study of the market.

It is only fair to say that a half dozen or so companies which manufacture the passenger cars most popular in the South do make some effort to study market possibilities and make allotments on a more or less scientific basis. They listen somewhat sympathetically to the recommendations of their dealers and profit as a result. If there is any shortage of cars, however, and the supply fails to equal the demand it is the Southern dealer who is most likely to suffer. New models generally are sent south after the rest of the country is supplied.

When sales are at their peak successful dealers in the South spend a good share of their time trying to figure out schemes likely to wring shipments out of factories. The path of the branch manager in that section is not one of roses and he must be a diplomat par excellence to keep his dealer organization satisfied. When dealers are called in conference they are likely to wrangle interminably because they feel that the other fellow is getting the best of the deal in supplies of cars.

One man who is now a branch sales manager declared factory sales departments seem unable to understand why it is that a dealer in one county can sell cars and a dealer in the next county can't. The population may be the same and on the surface the prospects may be equally good, but no consideration seems to be given to the fact that the cotton crop in the successful dealer's county has been good and an utter failure in the county of the dealer who is making no sales.

The North and the South are coming closer together year by year and there is little sectional antagonism. So far as the great mass of Southerners is concerned the war is over and they are glad it ended as it did. Generally speaking, they know much more about the North than Northerners know about the South. Most of the younger generation have been North and they know what it looks like. There are still a great many people in the North, however, who think all of Alabama, Georgia and Mississippi are covered with tropical vegetation and that they are a land of perpetual summer.

Sectional pride is strong and the pride in the South has been hurt because such a large section of the North thinks of it as an almost exclusively agricultural section almost devoid of industrial interests. Up to the time of the Civil War the South had few factories because it didn't want them. For a good many years after the war it had few because there was no capital to build them. The South was ruined financially by the conflict and it had to depend largely upon Northern capital for its industrial development. This capital increased steadily in volume and then Southerners began to accumulate money of their own. They did not hesitate to invest this money in home enterprises. The result has been an almost unbelievable industrial development in the last decade. This progress has been as nothing, however, compared with that which the next ten years will bring.

WISE automotive manufacturers will be the ones who devote real energy and study to the building up of high-class distributive organizations which will take advantage of the business to come.

The surface of the automotive market in the South scarcely has been scratched and its potentialities are tremendous. Taking the section as a whole it has fewer motor vehicles per capita than any other in the country.

Alabama, for example, has a population of 2,348,000 with a total motor vehicle registration of 87,129, while Iowa, with a population of 2,404,000, has 460,000 motor vehicles. It is true that Alabama has a white population of only 1,447,000, with 900,000 negroes, while the white population of Iowa is 2,384,000, but even on that basis Alabama should have at least twice as many motor vehicles as it has.

Georgia has a white population of 1,689,000, while the total population of Nabraska is only 1,296,000, and yet Georgia has 126,500 motor vehicles, while Nebraska has 216,902.

THESE illustrations are fairly typical of the South as a whole, and they disclose something of the future sales possibilities. It is not the contention that each Southern State should have as many motor vehicles as the states with approximately the same population, but the time is coming and coming soon when the differential will be by no means as great. The number of potential first buyers in the South is vastly greater than in the North and Middle West and dealers down there will be doing a lot of fresh business without trade-ins while other sections will be depending largely on replacements.

The South to-day is not the most prosperous section of the country, but it is not by any means in a pitiful plight. Conditions are so much better than they were a year ago that the people down there feel quite contented. Many merchants say they have much difficulty in making collections, but they consider most of the bills good and are not disturbed over the outlook. The South never was as close to a cash basis, even in the cities, as the North and West. If you don't have charge accounts at some of the stores it is assumed something must be wrong with your credit.

Deflation and depression didn't hit the South any harder than other sections of the country, contrary to the general belief. The difficulty was that farmers, big and little, had been prosperous so long they had come to believe there never would be a turn. They had built up no substantial reserves of cash. Cotton growers were badly advised and held on to their crops for higher prices long after the bottom dropped out of the market.

Lacking reserves, the blow hit Southern farmers harder than those in some other sections, but at that bankers have been surprised at the amount of cash dribbling out of the rural districts. It is stated that a large proportion of the fertilizer used for this year's crops was paid for in cash. Country banks believe their small creditors haven't wanted them to know they had any real money.

When times are good the majority of Southern farmers don't stop to consider whether they can afford something they want, but merely whether they can get it. When prosperity was at its height, large planters felt that there was nothing too good for them in the way of a motor car. Even the negro tenant farmers went as far as they could in the same direction. A great many of them had motor cars and there were more than a few of them who drove automobiles in the $3,000 price class.

With the coming of the slump, however, many of those in both classes had to get rid of their cars for whatever they would bring. A very large number had been sold on time and they were taken over by dealers, bankers and finance companies. The consequence was that used cars were literally a drug on the market. They couldn't be sold and many dealers went into bankruptcy. The leading truck dealer in Chattanooga, for example, declares the banks and warehouses are his worst competitors even now.

The percentage of cars sold on time in the South probably is larger than in any other section of the country. Cash sales are the exception. It must be admitted that many of the dealers are not good business men. A car in the $2,000 class recently changed dealers in a good-sized city. The son of one of the wealthiest men in the city asked one of the salesmen for the new dealer to take in his old car, of the same make, purchased from the original dealer, in exchange for a new model. The sales manager made a quiet investigation and found the "prospect" still owed $500 on the old car. This incident may not be typical, but it is illuminating.

Dealer financing is a troublesome problem. Those who are strongest do it through their banks and banks in the larger cities probably carry more automobile paper than do those in cities of similar size in other sections. Dealers whose line of credit is limited do their financing through finance companies and the operations of these institutions are steadily expanding in the South.

Trading still is a serious problem, but it is not as serious as it was. With returning prosperity the market has become stronger and it is easier to dispose of used cars. Then, too, dealers have learned that there is no profit in paying more for a used car than they can get when they sell it.

THERE are many live wires among the dealers in the South, but there are not enough good business men among them to go around and as a consequence some companies are poorly represented in a good many places. That undoubtedly is the reason why certain lines of cars are found in large numbers in some places and scarcely at all in other places of similar size. With the building up of dealer organizations sales will become more nearly uniform. Naturally, the best dealers are found handling the lines most universally popular.

In some cities dealer organizations are strong and in some they are decidedly weak. For instance, the secretary of the dealers' association in one of the largest cities in the South is a combination lawyer and real estate dealer. He has no direct personal interest in the sale of cars and never did have.

Competition for dealers is keen, just as it is every-

HERE is the suggestion to car and truck manufacturers made in three or four Southern cities:

"Why wouldn't it be a wonderful idea for the factories to send down here men who are real experts in financial methods and have them install systems for the dealers? A good many of our fellows can't tell the difference between a balance sheet and a menu card.

"They don't know how to keep track of overhead or depreciation or much of anything else. They don't know how to plug up leaks or find out where they are losing money.

"Some of them think they are losing money on their service work, when as a matter of fact they aren't returning a profit because of the big allowances they make for used cars."

where, but when successful automotive merchants are asked why their neighbors, who handle good cars, fail to make sales, they will tell you that it is partly the factory's fault. They say the dealer who is not a trained business man has had little assistance and few helpful suggestions from his factory. It seems to be taken for granted that he knows his business. Here is one suggestion made in three or four cities:

"Why wouldn't it be a wonderful idea for the factories to send down here men who are real experts in financial methods and systems and have them install such systems for the dealers? A good many of our fellows can't tell the difference between a balance sheet and a menu card. They don't know how to keep track of overhead or depreciation or much of anything else. They don't know how to plug up leaks or find out where they are losing money. Some of them think they're losing money on their service work when as a matter of fact they aren't returning a profit because of the big allowances they make for used cars. They can't distinguish between essentials and non-essentials."

There seems to be considerable merit in this suggestion and there is no apparent reason why it couldn't be applied profitably to all sections of the country. These men would be giving the dealer real, practical help, making him a better business man, returning greater profits not only to himself but to his factory.

ANOTHER subject which needs to be taught the Southern dealers is service. They aren't quite keeping up with the procession in this respect, generally speaking. Charges are too high and they make the owner discontented. Getting any kind of service in the smaller towns on the less widely used makes of cars is a difficult matter. This does not tend to make motor vehicles popular and factories might well jump into the breach, even without a profit, in preparation for the splendid market in prospect in the near future for those in the best position to take advantage of it.

Dealers in the cities and larger towns who handle popular lines are doing a good business and have been ever since May. They have had no sharp seasonal decline and expect none. They believe that good crops will stimulate sales the rest of the year. Some of them have experienced considerable difficulty in getting enough cars to meet the demand. Some distributors report that for the first time in two years they are sending carload shipments to their dealers in agricultural districts and that they expect brisk sales to begin next month in the farm sections.

Up to this time few sales have been made to farmers and the business in the smaller places is chiefly with professional men and merchants who are collecting some of the money on their books and investing it in low and medium priced cars. The sale of parts and accessories is brisk and dealers who handle them are "asking 'em to buy." No large stocks of accessories are carried, however.

THE rail strike has hit dealers in the South harder than in almost any other section and few of them have more than one or two cars on hand. Several dealers for a factory which has brought out a new line have not yet received demonstration cars and all they can do is to take orders. The factories are so far away that driveaways are impractical.

Southern railroads have been nearer collapse than those in the east, north and middle west and some of them have handled practically no freight. All the available rolling stock in the Birmingham district has been confined closely to the movement of coal from the non-union mines in that territory and there has been nothing left for other kinds of freight except foodstuffs. If the freight congestion continues it will result, inevitably, in a falling off in sales, for if dealers can't get goods they can't sell them.

There has been a big reorganization of the dealers' corps in the South in the last two years and the mortality has been heavy. Hundreds of the weaker ones financially and in a business way have fallen by the wayside. Most of those who have survived are on a fairly substantial basis but a good many of them have much to learn about merchandising methods.

Factories can well afford to spend considerable time, thought and money in building up dealer organizations in the South in preparation for the period of prosperity.

American Manufacturers Dominate Chinese Automotive Market

THE United States is easily first in the trade of China of the past six months, and there is no question whatsoever that for the time being American cars completely dominate the Shanghai market. The factor of price is one of the chief reasons for this, according to the London *Times*.

"Price is not the only factor. Chinese show a decided preference for American cars. They like the style of the American car. They like its clear cut body as opposed to the more massive body of the British car. The American car suits them also better than the British car as regards gear and lighting. In Shanghai there is no necessity for high-geared cars. What is wanted is a car that will pick up quickly on "top" gear. As regards lighting, the post-war cars which came to China from Great Britain were equipped with electric lighting and starting as an afterthought, and lighting was belt-driven. As there are no long runs in Shanghai, it was impossible to keep the accumulators charged with the English dynamos, and consequently they got a bad name among the Chinese. Further, the starting batteries on English cars are considered poor compared with the American type. Again, the majority of British cars are equipped with the modern artillery type of wheel, while the Chinese prefer wire wheels.

"The Americans are also very proficient in the packing of cars and contrive to reduce packing space to a minimum. American manufacturers, too, back their agents. When American manufacturers cut their prices after the war they gave their agents a certain time in which to sell their stocks. If unable to do so, the manufacturer gave a rebate in the nature of a credit. The British manufacturer, on the other hand, left his agent to do what he could with high priced cars.

"All these factors have combined to put the American car in the forefront in the Shanghai market. Americans, in fact, do not fear the competition of British cars, but of German, French, and Italian cars, all of which are as much as 50 per cent below the cost of cars of British make. Of German cars there are already six makes on the market—the Adler, Opel, Mercedes. Dixi, Benz and Austro-Daimler. One is sorry to have to state these facts, but they are facts, and it is for British manufacturers to consider whether there is any way of getting away from them."

New Vauxhall Four Has Lanchester Harmonic Balancer

British passenger car engine with overhead valves is designed to compete with six-cylinder jobs in smooth running qualities. It develops much higher power than engines of same make and displacement fitted with an L head and valves of larger diameter.

By M. W. Bourdon

EXCEPT for one year prior to the war the Vauxhall Motor Co. has always specialized in high grade four-cylinder cars, and this policy is continued in the recent introduction of a new model. The latter is termed 23-60 hp., has overhead valves, and supersedes the 25-hp. side valve type with the same bore and stroke. To provide the smooth-running qualities of a six-cylinder engine, and render it equal to the latter in all except continuity of torque, the Lanchester harmonic balancer has been adopted, this being the first standardized production to embody the refinement.

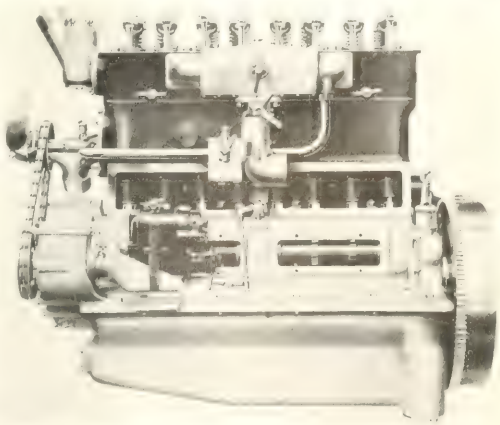
Other features of the engine include the camshaft design, referred to later, and the use of duralumin tubing for the push-rods. The latter material, in conjunction with the cylinder design and valve gear arrangement, insures the maintenance of valve clearance settings irrespective of engine temperature. As a result of the foregoing and other more conventional features of design and manufacture the new engine is certainly one of the quietest—if not actually the quietest—of overhead valve engines the writer has known.

The Lanchester Balancer

Underlying the adoption of the Lanchester balancer is the idea that the majority of users of high grade cars, and more especially those who have closed bodywork, buy six-cylinder chassis not so much because of the better torque of the six, but because of the inherently imperfect balance of the four. The torque of the latter is good enough for all practical purposes, it is considered, but normally the four gives rise to a vibration, increasing in magnitude with the crankshaft speed, which may be, and often is, distinctly unpleasant in its direct effects upon the bodywork and in its reaction from the latter upon the passengers. The Lanchester device, it is claimed, damps out that vibration and enables a four-cylinder engine to meet requirements at considerably less cost and with other advantages as compared to the provision of two additional cylinders.

The balancer consists of a helical gear ring attached near to the center of the crankshaft and driving at twice crankshaft speed a small drum or cylinder with gear teeth cut at the center of its outer surface; this small geared cylinder meshes with a duplicate alongside and both are suspended below the crankshaft center line by a bracket attached to the bolts of the center bearing of the shaft. The geared cylinders run on plain white metal bearings with pressure lubrication and each has six holes drilled from end to end equally spaced around its axis. Three of these holes are filled with lead, the required amount of the latter being determined for the individual engine when the weight of the pistons and small end of the connecting rods is known. These intergeared and counterweighted cylinders are timed in relation to one another and to the crankshaft so that, while in any position they act against each other by rotating in opposite directions, they also in combination set up a force which counteracts and cancels the vertically acting force arising from the differing angularity of the pairs of connecting rods and the resultant divergence in piston speeds.

To avoid the necessity for a large flange integral with the shaft the inner web of one of the central pair of cranks is slotted on its upper and lower faces and at one end; the separate flange is roughly of horse-shoe shape with a pilot shoulder to receive the gear ring, its jaw being dimensioned so as to slide into the web groove until it beds home with its outer surface concentric with the crankshaft axis. The gear ring is threaded over the shaft and bolted to the flange extension and it then registers the position of the flange and of itself by the inner surface of its hub making contact with the ungrooved end of the crank web, while the groove prevents axial movement of the two units.



Inlet side of new four-cylinder Vauxhall engine

Careful balancing of the crankshaft is obviously needed after the mounting of this gear ring and flange.

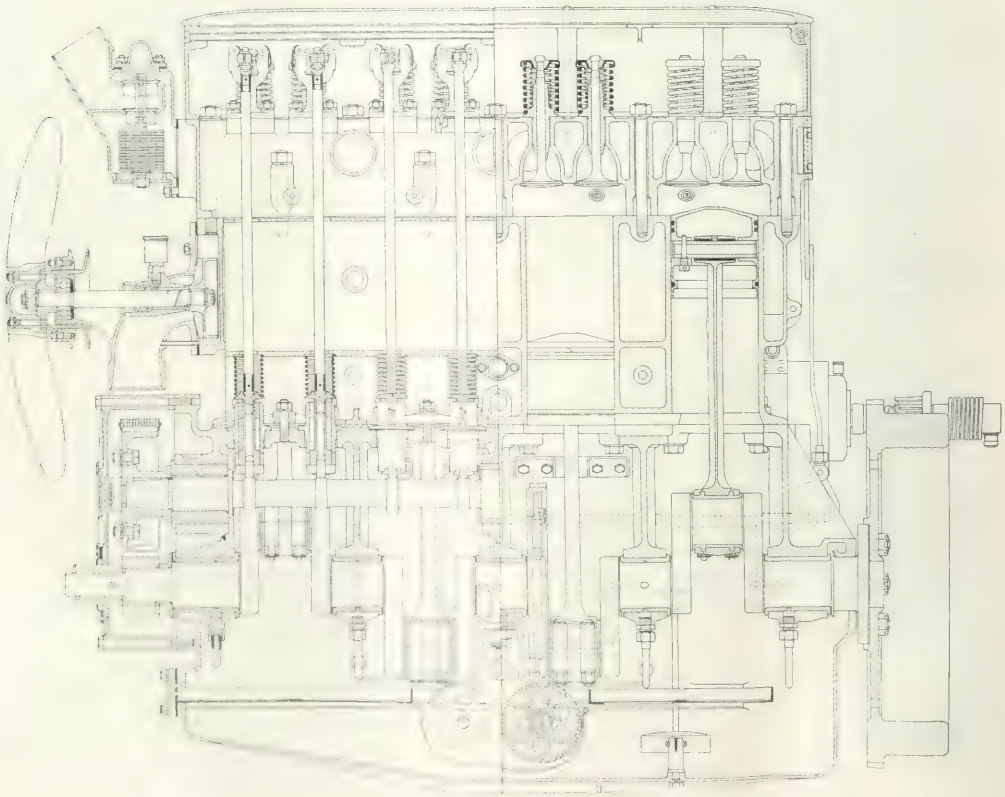
Engine Details

The engine has a bore and stroke of 95 x 140 mm. (approximately 3¾ x 5½ in., or 242 cu. in. capacity). The block of cylinders is cast separate from the crankcase, the latter of aluminum and the former of cast iron. The detachable head, like the cylinder block, is extended on one side to enclose the push-rods, but there is no direct water joint between head and block, exterior water connections —flanged "dishes" of aluminum with an interior web— being used. The gasket, which is therefore needed only to hold cylinder pressure, is of aluminum, the faces of head and block being ground but not to anything approaching a glass-like finish.

Of the four exhaust passages, with outlet ports on the right of the cylinder head, the two at the center are also extended to the left side where they lead into an internally ribbed chamber at the center of the inlet manifold. In the neck of the connecting passage is a valve which enables the exhaust heat to be regulated or cut off entirely. There is no through outlet from the heating chamber; it is a cul-de-sac from which the pressure of the exhaust gas occurring during the valve opening periods is released over the heads of the valves while they are closed. This means of assisting vaporization is not intended for all-the-year-round use, but constantly in service is a hot-water jacket on the inlet manifold. This jacket is coupled to the circulating system by pipes of unusually large bore for this purpose, viz., ⅝-in. internal diameter, and they are arranged in the circuit so that, when the thermostatic valve (which is fitted by Vauxhall for the first time in this new model) is closed, the water circulates through the manifold jacket; thus, in starting the engine from cold, heat for assisting vaporization is provided quickly even when the exhaust hot-spot valve is closed.

The standard carbureter, by the way, is of the Zenith triple venturi type, which has a rich mixture supply valve for starting. In addition, the Vauxhall Co. fits a hand-operated extra air-valve controlled by a third lever over the steering wheel.

The valves—two per cylinder—are vertical and in line-ahead in the center of the combustion chambers. They are of 2 in. overall diameter (¼ in. less than the side valves of the superseded model), and of normal mushroom pattern. Each has two concentric springs with the seat secured by a split cone fixing. This arrangement of the valves necessitates the combustion chamber being oval, and it extends for approximately 9/16 in. beyond the cylinder bore at front and back. The step which thus occurs may not be commendable from one standpoint, but it has an incidental merit in that in the somewhat unlikely event of a valve breaking near the end of the stem, the head



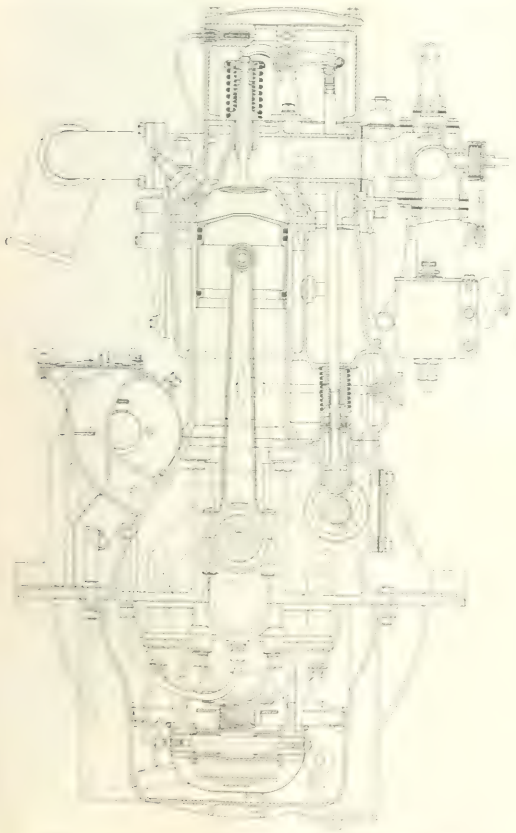
Lateral vertical sections of the new Vauxhall engine showing location and arrangement of the Lanchester harmonic balancing device

would find a resting place on the step and therefore no piston damage would result. While this departure from the approach to a hemispherical combustion chamber necessarily increases the exposed area, the fact that larger diameter valves can be used than would otherwise be the case probably compensates for the increased heat loss thus represented. In any event, the power curve is commendable, as mentioned hereafter, and, in comparison with the old L-head engine, the heat losses to the water jacket are shown by test to be approximately 40 per cent less.

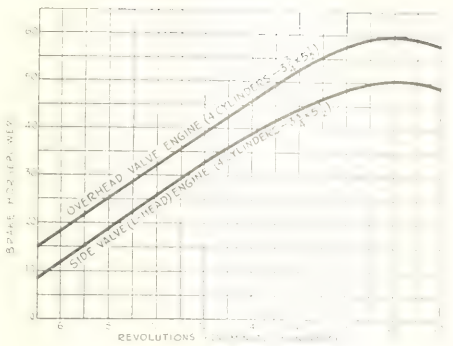
Valve Operation

Valve operation from the silent chain driven camshaft in the crankcase is through roller-ended followers of 5/16 in. diameter with separate and hardened cupped heads; each of the latter not only forms the lower abutment for the push-rod but also the bottom seating for a return spring which assists the valve springs proper in keeping follower and cam in contact. This third spring is also a factor in the quiet operation of the valve gear as will be seen later. It bears at its top end against a false bottom to the push-rod chamber formed in the cylinder block and is accessible through a handhole with an aluminum cover plate.

The push-rods of duralumin tubing of 7/16 in. diameter have hardened steel ends pinned to them. They bear upon rockers pivoted centrally on hollow spindles secured by pinch-bolts in the split forked ends of the rocker brackets.



Transverse section of the Vauxhall overhead valve engine



Comparative power-speed curves of the new Vauxhall overhead and the older side valve engine of the same make and displacement

The inner ends of each pair of rockers are closer together than the outer ends; therefore, a continuous shaft for all of them cannot be used, and each has its own short spindle. Lubrication is effected by drip from a pipe secured overhead in the aluminum top cover and fed by pressure from the main oil system. Clearance adjustment is by means of hardened spherical-ended set-screws locked by pinch-bolts in the outer ends of the rockers.

A peculiar feature lies in the design of the exhaust manifold. Instead of being cast as usual in one piece with four flanges bolted up to the outlet ports in the cylinder head, it consists of three parts, two flanged elbow pipes for the end cylinders with gland couplings into each side of a central unit. The latter has an inner but integral Y-branch for the central pair of ports, so that, while the latter discharge directly into the exhaust pipe, the outer pair discharge around the outer surface of the Y-branch, the gases issuing into the main pipe through an annular space around the stem of the "Y." Two ideas underlie this arrangement. The gland joints allow for the expansion and contraction of the manifold as a whole in relation to the head casting, while the concentric discharge tends to prevent back pressure upon the exhaust of individual cylinders and even to set up a slight ejector effect at the terminations of successive exhaust periods.

Cam Design

The fundamental feature of the cam design is that the base circle of the cam is eccentric to the shaft axis instead of concentric, the extent of the eccentricity being approximately 1/16 in. Inlet and exhaust cams are identical and of the constant acceleration type with concave flanks. This form of cam has been in use by the Vauxhall company for some years on its side valve engines. It results in a very gradual—one might also say gentle—opening, a quick lift to the maximum, followed by a similarly quick closing until the valve is about to reach its seat but on to which it is gently lowered. A secondary result of this design—which appears to be particularly suitable for overhead valve engines—is that remarkably large valve rocker clearances can be used without noisy operation ensuing; the settings can in fact vary from 0.025 to 0.06 in. clearance without causing noise. Consequently the usual need for frequent and precise valve clearance adjustments does not arise and therefore one of the main criticisms of the owner-driver against overhead valves is removed.

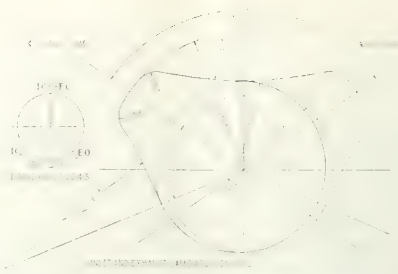
At first it might be thought that the cam design would detract from power development and that the advantage in this direction of the overhead valves would be lost or reduced. But the accompanying power curves showing the

b.hp. of the new and the old (overhead and side valve) engines disproves this idea. In fact, it cannot be held as otherwise than an excellent showing when, as is the case, the new engine with standard settings of carbureter, valves and every other detail develops at 500 r.p.m. approximately 15 hp. as against 8½ hp. in the case of the old one, and this too, with the same standard compression ratio of 4.25 to 1 and valves of ¼ in. smaller diameter. At high engine speeds—at 2000 r.p.m., for example—the new type shows a greater actual, though lower percentage, increase in developing 60 b.hp. as against 50.

No doubt the somewhat surprising increase of power at 500 r.p.m. and thereabouts is due in some measure to the very large reduction in the area of the combustion chamber surface; for, of course, the factors of time and surface exposed to the heat of the explosion are then very important indeed. But it need hardly be said that alteration in valve position does not usually account for 76 per cent increase of power at any speed, high or low, and that no such increase is usually to be expected we have evidence in the comparative power curves which have been made available at one time and another by other makers. Possibly the reduction in inlet valve diameter in the case of the Vauxhall may partially account for the big increase, by having considerable effect in increasing the turbulence of the new charges at the lower part of the speed range—even though the benefit in this way may be ruled out at high speeds and the smaller valves actually cause a smaller percentage increase in power.

In view of the fact that this new engine with its Lanchester balancer sets out to compete with six-cylinder engines, it would surely be only natural for the makers to adopt a compromise such as that suggested in order to enhance the quality of acceleration by gaining as big an increase of power as possible at the lower speeds. Other makers desiring a high maximum power would select a different compromise to accord with their policy, fitting valves of as large a diameter as possible.

The hollow-crank system of lubrication is used in this engine, but unlike the usual practice in the majority of

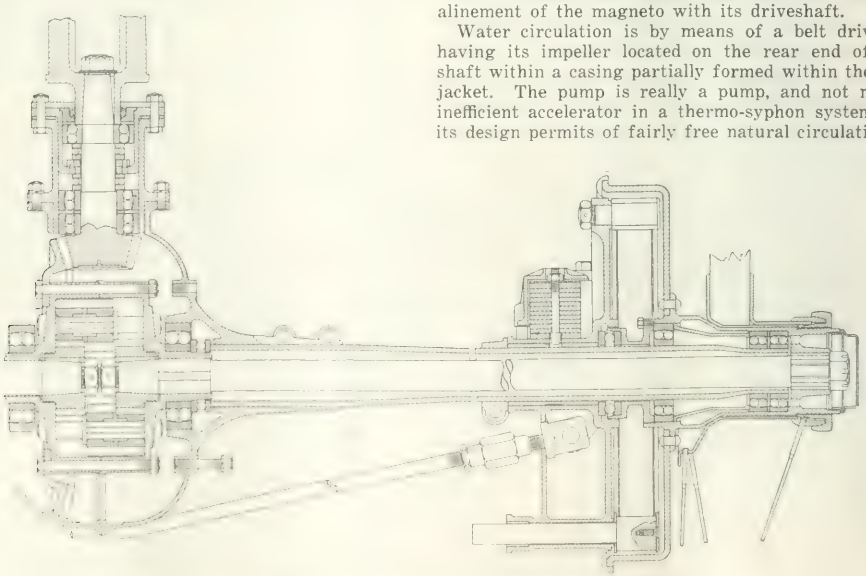


Type of inlet and exhaust cams used on new Vauxhall engine

British cars a plunger type pump is employed. It is driven by an eccentric pin at the rear end of the camshaft, a ball bearing being used for the coupling rod. Only one ball valve is provided, that at the inlet port at the bottom of the pump cylinder, the inertia of the column of oil discharged upward through a series of holes in the foot of the plunger and thence through an inlet hole in the cylinder below the plunger head into the pipe-line, serving to prevent the oil from being drawn back on the upward stroke. An upper extension of the eccentric strap operates the piston of the air pump for the pressure fed fuel tank.

Magneto ignition is used, and a special feature lies in the mounting of the magneto, for it is supported by an aluminum bracket integral with the rear cover plate of the side extension of the timing case. The combined cover plate and bracket serves also as the housing for the rear bearing of the shaft of the magneto drive sprocket, the bearing being eccentrically located. The combined front cover and bearing housing corresponds as regards eccentricity and is linked by an exterior bolt to the rear cover. When the stud nuts locating the two covers are loosened the latter can be partially and simultaneously rotated in order to adjust the timing chain without affecting the alinement of the magneto with its driveshaft.

Water circulation is by means of a belt driven pump having its impeller located on the rear end of the fan shaft within a casing partially formed within the cylinder jacket. The pump is really a pump, and not merely an inefficient accelerator in a thermo-syphon system, though its design permits of fairly free natural circulation if the



Sectional view of the full-floating rear axle

driving rotor should be stationary. As already mentioned, thermostatic control is provided, the device being located in the water outlet from the cylindric block. The water circulates continuously through the induction manifold jacket whatever the position of the thermostat valve; the latter is set to be fully open at 180 deg. Fahr. Adjustment of the fan and pump belt is accomplished by the axial movement of the front flange of the driven pulley, the hub being threaded; to lock the flange it is pinched toward a threaded ring alongside by means of two studs and nuts. Vauxhall was the first maker to use a belt-driven pump, a practice since followed in modified form by many other British car and truck makers.

The crankshaft runs on five white-metal bearings; the diameter of journals and crank pins is 2 in., the end journals are 3 in. in length, the other three and the big-end bushes 2 3/16 in. long. The H-section connecting rods are 11 7/8 in. between centers which, with the piston stroke of 5½ in., gives a ratio of 2.16 to 1 and enables the cast-iron straight-sided pistons to be comparatively short. They are but 90 mm. in length of sides in a 95 mm. bore. The pistons are domed, have two rings in the head and a scraper in the skirt and the hollow wrist pin is fixed in their bosses by a tapered set-screw.

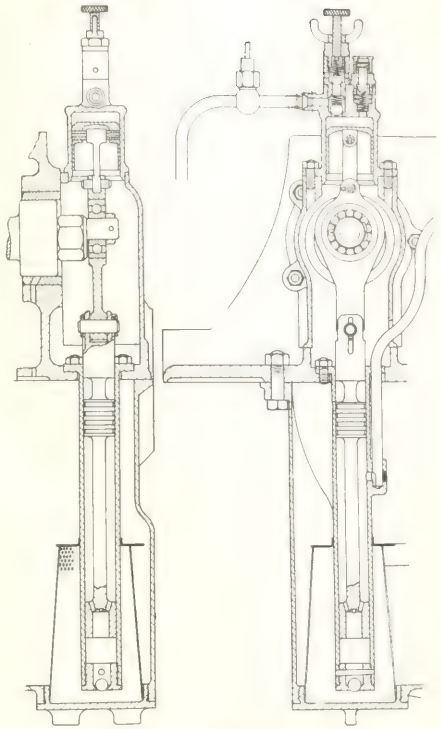
Gearset Details

Apart from the engine, this new model has no outstanding or novel features of design; in fact, it varies but slightly in transmission, brakes and suspension from the model it supersedes.

The clutch is of the multiple-disk pattern, unusual in that its alternate steel and bronze disks (13 driving and 12 driven of 9 in. and 8 in. overall diameter respectively) run dry without fabric facings. Powdered graphite in quite small quantities is made to serve as a lubricant. It is replenished every six months or so, and, as shown by experience with this same clutch in past years, it suffices to prevent the tearing of the metallic surfaces even when the clutch is slipped unduly. No adjustment is provided for the central enclosed spring.

Engine and four-speed gearset are mounted separately each at four points on a four-point suspended sub-frame. Between the units is one fabric disk joint. At all points excepting the pilot bearing the gear shafts run on ball journals. An internal shoe brake is fitted to the flange of the casing of the front universal joint of the open propeller shaft, this joint being of the cross-pin type, while the rear joint is of the pot or sliding block pattern.

Helical bevels are used for the final drive, the integral shaft of the bevel pinion having an exceptional support due to the use of three double-row ball journals in addition to ball thrusts. Double-row ball bearings are also used for the differential and road wheels, the latter having two of these at the outer ends and one inside, as well as being provided with a single row ball thrust.



Piston type oil and air pressure pumps fitted to Vauxhall engine

The rear axle is of the full floating type with a cast steel center, weldless tubular extensions and a truss-rod below. The rear brakes are of the expanding pattern with drums of 16 in. internal diameter and friction surfaces 2 in. wide. Both wood and triple spoked wire wheels are standardized. The suspension is by half elliptic springs fore and aft, but these do not take torque, there being a separate pressed steel torque member.

The wheelbase is 129 in. and the track 56 in. The bare chassis weighs 2900 lb. and it is priced at £1,150.

British Possessions Take Large Car Shipments

THE most notable increase in passenger car shipments during July took place in British India, where in place of the average monthly shipments of 80 cars during the past months, 309 were imported during July valued at $130,062. This increased demand is partly due to the increased Indian import tariff which is more detrimental to high-priced European cars than to the lower-priced cars of Canadian and American factories.

New Zealand imported 380 passenger cars from Canada during July as compared with 169 in June, and Australia took 824 against 805. The United Kingdom imports of passenger cars from Canada increased from 368 during June, to 512 in July, while South Africa maintained its quota of the previous month with 266 passenger cars. Argentina imported 74 as compared with 34.

Australia was again the largest importer of automotive products from Canada, having taken 112 motor trucks and $61,240 worth of parts as well as the largest number of passenger cars. New Zealand with 42 trucks reached second place in truck shipments.

Air Flow in Relation to Water Cooling

Radiator design is well advanced, but factors which control effectiveness are either disregarded or not well understood. Much saving in weight and cost is possible by improving air flow conditions. Radiator types are compared. Baffles increase efficiency.

By A. Ludlow Clayden

IN a previous article the writer discussed some aspects of cooling, mainly from the viewpoint of water circulation. The problem there dealt with was the transfer of heat *from* the engine *into* the radiator; and it was shown that the overall efficiency of the whole cooling system was susceptible to wide variation due to water conditions alone. Variations at least as great are found in a study of air flow; and for automobile work, at least, it is far more difficult to provide best conditions for air than for water.

THIS is the second of a series of four articles on cooling. It should be the subject of careful study by all automotive designers who are not thoroughly conversant with the factors governing the effectiveness of various types of radiators.

The subject is one which has not, apparently, been well understood. Many cars and trucks could probably be fitted with smaller and less expensive radiators, without any sacrifice of cooling efficiency, if the radiator were better located and suitable air outlets allowed.

In this consideration the existence of the engine can be forgotten. Assume a radiator being supplied with heat at a certain rate. The problem is to apply air to the radiator so as to remove heat at the same rate. The rise in temperature of the air for removal of a stated amount of heat will, of course, vary directly with the mass of air; but the rate of transfer decreases as the difference in temperature; which means that the rate of transfer from radiator to air is greatest at the front or entering edge, and least at the back. This leads directly to the conclusion that the greater the total quantity of air which can be put through a radiator, the smaller is the size of the radiator necessary for a given heat dissipation.

Suppose air for cooling purposes is available at a pressure of one inch of water, which pressure is maintained by the speed of travel of either air or radiator. Then the mass of air that will flow through a given size of radiator depends upon the resistance of the radiator. Suppose, further, the conditions are such that the air is heated ten degrees during its passage. If, then, the radiator is doubled in depth from front to back, which could be done without sensibly increasing its resistance, we should get the same mass flow of air; but it would not be heated 20 degrees, because the back half of the radiator would be working on air averaging 10 degrees hotter than the front half. Consequently, from this viewpoint a large radiator of small depth will be lighter for a given heat dissipation than a smaller one of greater depth.

On the other hand, the head resistance is proportional to the frontal area, and usually increases much less rapidly than the depth, so for conditions of minimum weight of radiator with a given air pressure *and* minimum absorption of power in propelling the radiator through the air a compromise is necessary.

The total quantity or mass of air which will pass through any given radiator is directly proportional to the velocity of movement of the radiator through the air only at extremely low speeds. It is easily possible, by wind tunnel experiments, to establish the air flow characteristics for any particular design of radiator; but there is no very direct relationship between the air flow-velocity curve and the rate of heat transfer, because in all radiators some of the air passes through unheated, and in many designs a large proportion of it does so.

Referring again to Lanchester's work, we find that he examined the case of honeycomb radiators assembled from round or square tubes with expanded ends, and deduced the best ratios of length of passage to diameter thereof for different air velocities. For some reason, probably the indeterminate nature of turbulence, the deductions he gave do not agree with recent results obtained in laboratory testing. The latter shows advantage in using a much greater length of air passage in proportion to bore, especially at high air speed. To quote an example, Lanchester concluded that a developed area of 1 sq. ft. per b.hp. of the engine would be necessary for high speed airplanes using honeycomb constructions of 180 mm. depth. On pursuit planes for the U. S. Army as little as 0.4 sq. ft. per hp. has been employed, using tubes 9 in. deep by ¼ in. bore, practically the same bore as considered by Lanchester.

Now, this is due to the effect of water turbulence as well as to air turbulence, so it is far from easy to apply any correction to former figures. The particular case is merely cited as showing the extreme difficulty of calculating radiator characteristics except from closely similar empirical data.

Still more striking, however, is the fact that by so altering the air passage that turbulence is provoked, a much higher rate of heat transfer is obtainable. The case seems to be analogous to the flow of liquids through orifices or through small pipes, but the experimental data thus far collected is not yet sufficient to be of much value. In the case of the honeycomb radiator, placing a number of small dents in the walls of the tubes composing the assembly has practically no measurable restricting action on low air flows, while it increases the rate of heat transfer very much.

Again, to cite a single example, a 4-in. depth of "baffled" core made of the dented tubes will dispose of practically the same amount of heat as a 6-in., or even deeper, core of smooth bore tubes; and it is only at air velocities sensibly above 70 m.p.h. that the resistance of the baffled tube core begins to mount disproportionately. At speeds up to 50 m.p.h. there is practically no difference in the total mass of air passed by a 4-in. baffled core and a 4-in. plain tube; but the former will dispose of at least 25 per cent more heat.

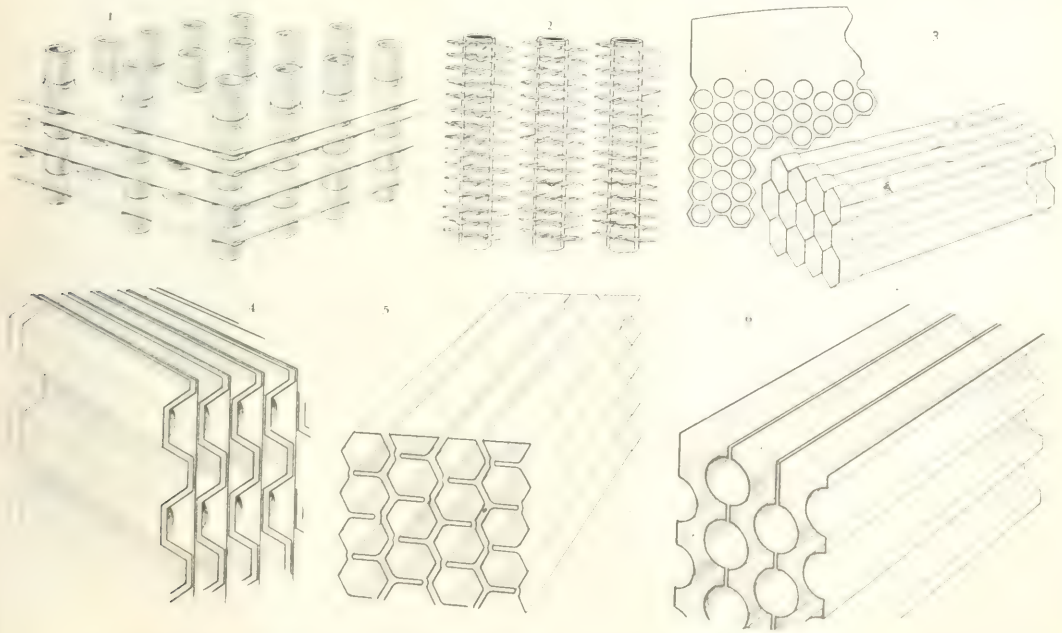
THE function of the baffles is so to disturb the air that the portion near the axis of the tube will not flow through unheated. It cannot be heated by conduction or by connection from the air which actually touches the metal of the radiator, because there is entirely too little time for any such action to take place, hence the desire in designing the baffles is so to direct the air that any imaginary particle will flow through along a wave course, bumping against first one point on the tube, being bounced off into the main stream, thrown against another point, and so on. It is obvious that with any system of baffling having this function as its object, a speed of air flow will exist at which cavitation behind the baffles will begin; from that speed onward the resistance will commence to be serious and the rate of increase of heat transfer will drop.

It may be remarked that up to the present no system of baffling has been successfully applied to aircraft radiators, the air velocities being adequate, apparently, to insure turbulence, and the resistance caused by the baffles being enough to lower the figure of merit for the radiator. On the other hand, for automobile work baffling systems have proved highly advantageous.

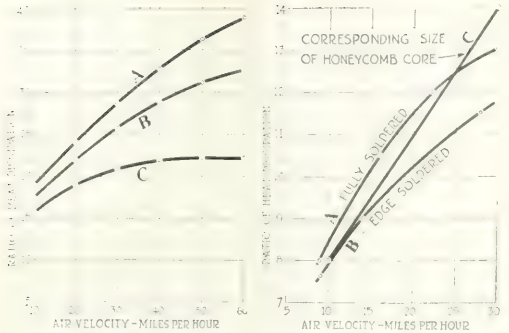
WHILE on the subject of baffling it should be added that the idea is comparatively new, the records of the patent office showing that it has received hardly any attention from inventors. As applied to tubular honeycomb radiators, the U. S. Cartridge Co. provides the only example with which the writer is acquainted; and in application to the ribbon type of core, the "air shredder" recently introduced by the Fedders Mfg. Co. is also the only case in the author's experience in which the provoking of air turbulence has been a deliberately sought feature.

There are three general types of radiator core in use. The earliest radiator used for automotive work consisted of a length of plain, coiled tube. In this the ratio of surface to volume was very low and the efficiency correspondingly poor. The natural idea was to provide closely spaced gills to increase the surface, and from this has grown up the most widely used form of automobile radiator, an assemblage of vertical tubes of small bore threaded through closely spaced plates of thin material known as the fin and tube type.

The second oldest type, probably, is the honeycomb made up of blocks of round or square tubes separated, so as to make water passages, either by expanding the ends of the tubes or by laying wires between them grid fashion. This is the type used most extensively for aircraft, and used



Illustrations of various types of radiator cores. Shaded portions indicate the water passages. 1 and 2 are examples of the finned tube core. 3 is a true cellular type made with horizontal expanded end tubes through which the air passes. Spaces between tubes is filled with water. 4, 5 and 6 are examples of various forms of the ribbon type core. Note the variation in direct and indirect cooling surface



At left, diagram showing the general form of curves for different characteristic forms of radiator. A. Core with all direct surface such as the true honeycomb and a few ribbon type designs. B. Core of good ribbon type with 50 per cent direct surface. C. Fin and tube core of average type. At right, relative efficiency of various types of core. Full soldering fin and tube core increases the efficiency considerably

to a great extent for European automobiles and to some extent in America.

The third type, ranking either equal to or a close second to the fin and tube type, according to the basis of comparison, for passenger cars is the ribbon radiator, in which cells are formed by bending very thin sheet metal. In this type the greatest variety of design exists, and also the greatest variations in efficiency.

It must be observed that in these constructions there are two types of surface used. Direct surface, meaning radiator surface exposed to water on one side and air on the other; and indirect surface, meaning surface exposed to air but only indirectly connected with water. The wall of the tube in a fin and tube radiator is direct surface, the fin indirect.

It follows that in the fin and tube type the bulk of the surface is indirect; in the honeycomb it is all direct, and in the ribbon type the proportion of direct and indirect may bear almost any relationship.

Heat Transfer

Now, it is axiomatic that direct surface is more efficient in heat transfer than indirect. All indirect surface partakes of the nature of a fin on a tube, heat being applied to the root of the fin and thence conducted outward. Since heat is being abstracted by the air continuously, it follows that the further away from the water any point on the fin may be, the lower will be its temperature. The rate of transfer of heat from radiator to air is, other things being equal, directly proportional to the difference in temperature between radiator and air.

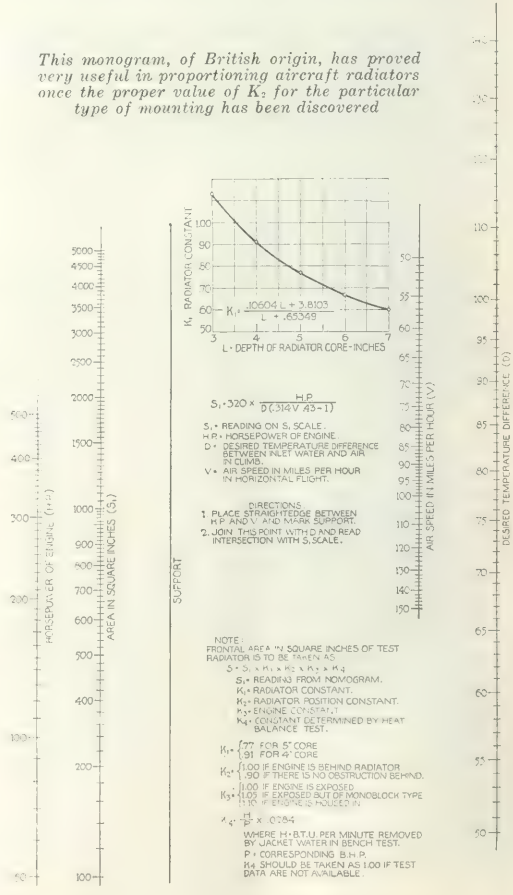
In radiators of the fin and tube type the mean temperature of the fin portion is in proportion to that of the tube walls. It is highly variable with the details of the construction. It is affected by the thickness of the fins and by the security of their attachment to the tubes; for instance, the efficiency is substantially greater after the fins have been soldered to the tubes than it is when they are simply pressed on. Perhaps the most interesting characteristic of this type, however, is the rapidity with which it reaches a maximum of heat disposal as air speed increases. Considering a single tube provided with gills, it is obvious that the maximum amount of heat which any air velocity can remove from the gills is equal to the maximum amount that can flow into the gills from the water tube. For gills of conventional thickness this maximum will be reached at a comparatively low air speed. When built with staggered tubes, which is probably the most efficient form, as it exposes a maximum of direct surface to the entering air, this type is usually characterized by a fairly high air resistance and considerable air turbulence. Consequently, its efficiency on a weight basis as compared with other types is greatest at low speeds, so rendering it peculiarly applicable to motor trucks.

Effects of Water Velocity

Effects of water velocity on this type are peculiar owing to violent turbulence occurring at critical velocities depending upon the bore and height of the tubes. The subject has never been fully investigated so far as the writer is aware, but in general the efficiency of this type is less susceptible to changes in water speed than types in which the water passage is much thinner.

The true honeycomb type, in which all surface is direct surface, possesses, at automobile speeds, an almost flat efficiency curve, the heat transfer being directly proportional to the air velocity, or nearly so.* Decrease in efficiency with increasing speed is due to rising resistance, which is partly offset by increasing turbulence. For aircraft work, the depth of core employed is usually between

This monogram, of British origin, has proved very useful in proportioning aircraft radiators once the proper value of K_2 for the particular type of mounting has been discovered



*Actually in proportion to the mass flow of air.

5 and 9 in., and for automobile and truck work from 2 to 4 in. The bore of tube used for aviation was fixed during the war at 7 mm., and remains substantially unchanged to-day. Owing to the expense of producing tubes of many different bores, experiment with this variable has been very slight.

It is probable that an equation connecting, bore, depth and air velocity could be discovered by adequate experiment; but varying the size and number of baffles probably has much the same effect as varying the bore. That is to say, the heat capable of being transferred by a 4-in. deep plain tube element in an air velocity of thirty m.p.h. when the tube is $\frac{1}{4}$-in. bore may be x B.t.u. per second, and of a similar but baffled tube, $x + y$. Probably if the same amount of material could be made up into more than one tube of a smaller bore, we could discover a caliber which would give the same $x + y$ with plain tubes.

THE third type of core made from ribbon is in some instances so constructed that all its surface is direct, but usually half or more is indirect. However, the efficiency of the indirect portion is commonly fairly high. In this form the principal element almost always consists of a tube made by joining at the edges two strips of brass ribbon. The thickness of the water passage is commonly about 0.02 in. In some cases tubes of this sort are arranged parallel and vertical, their interspaces being $\frac{1}{4}$ to 5-16 in. wide and containing strips of ribbon bent zig-zag. The whole assembly being clamped together and dipped in solder provides a construction about 33 per cent direct and 66 per cent indirect surface. In this case each zig-zag of the spacer is a fin attached to direct surface at each of its extremities, which means that the "tip" of the fin, so to speak, is only $\frac{1}{8}$ in or so away from the water. Such a construction thoroughly well soldered has a surface efficiency of heat transfer but little inferior to that of direct surface.

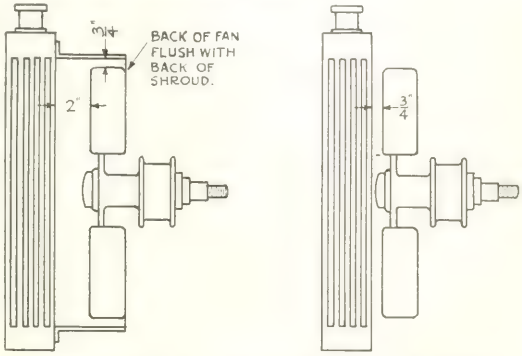
Most of the inventive ingenuity put into ribbon radiators has been directed toward facilitating the process of making them and of obtaining accurately sized cells of a variety of forms designed to please the eye. When of the best standard of workmanship, the efficiency is high, but considerable care is necessary in manufacture to insure maintenance of dimensions owing to the delicate nature of copper or brass strip 0.005 in. thick.

Efficiency of Ribbon Radiators

The efficiency of ribbon radiators with varying air speed depends upon the proportion of direct surface, as they may partake of the characteristics of either the fin and tube or of the honeycomb types. It is also considerably affected by the baffling, which is often accidental. In order to enable the machines to handle the ribbon, and also in order to stiffen it, it is necessary to introduce ribs, corrugations, or similar deformations from the original flat form. These are almost always bound to act as a drawback for aircraft work, except for slow speed ships; but they are of assistance for automobile work, provided they are not large enough to restrict air flow at operating speeds.

Mounting of radiators on aircraft is a large factor in their efficiency. An aviation radiator is chosen for its figure of merit, which is a factor derived from the weight of the radiator plus its water content, and from the resistance it offers. The higher the air speed the smaller the radiator necessary and the higher its resistance. Placed on the nose of the fuselage behind the propeller, the air velocity effective over the whole surface is roughly half that of the speed of flight, owing to the centrifugal action of the propeller. Placed on the side of the fuselage, in the slip stream, the available air velocity may be 1.25 times the mean speed of flight, for here the radiator obtains the benefit of the air leaving the tip of the propeller. It is obvious that other positions could be chosen such that the radiator would be subjected to precisely the speed of flight.

Present tendencies are favoring the slip stream position but for several reasons, not the least of which is that the small, deep radiator thus made possible is structurally very strong, and its small weight renders its secure support easy. Also this position, as already pointed out, facilitates the obtaining of high rates of water flow, the engine being well above the radiator. Finally there is nothing behind a radiator so placed, consequently the outlet for the heated air is perfectly free; shuttering is easy and streamline shuttering possible.



Recommendation of one fan manufacturer (the Oakes Co.) regarding (at left) the position of a large fan when a shroud is employed and (at right) when no shroud is employed and the fan is arranged either to blow or draw the air through the radiator

Mounting of radiators on automobiles is a very different matter, and from the point of view of cooling strictly it is much to be regretted that the front end of the hood ever became the conventional position.

Air in passing through a radiator is, of course, expanded, consequently it ought to be given a larger outlet than it has an intake. Actually there is hardly a car in existence in which any provision is made for the escape of air other than what accidental space exists under the sloping foot board and the louvres in the bonnet. With respect to the latter also, their size and placing is generally dictated by conventional ideas of looks rather than by any thermo-dynamic considerations.

BUT this, bad though it is, is hardly the worst of the absurdities found in motor car cooling systems. It may be remarked, however, that one of the principal reasons why Vee engines have the reputation of being hard to cool is the great extent to which an engine of this type fills up the space under the bonnet. It is particularly effective in choking the outlet under the toe board. When vertical engines are used and there are filling strips between the crankcase and the frame side members, louvres cut in these strips often are very valuable. Apparently, especially with a fan running, eddies can be set up which seriously damp air flow. It is a common experience to find when a car or truck is standing with the engine running, that air actually comes *out* through the edges of the radiator. Eddies can apparently be broken up by providing even quite small outlets at points which trial alone will discover and the addition of 10 per cent to the outlet available can make a difference twice as great in the effective air flow.

Mention of fans leads to the much discussed point of whether or not there is advantage in cowling a fan by a sheet metal cover joining the fan circle to the edges of the radiator. Usually the fan cannot be placed sufficiently far behind the radiator for the cowl to have much effect and, though this may not apply to trucks, there is the additional drawback for passenger car work that the fan at high speeds detracts from the natural draft.

Taking all in all, however, it appears to the writer that it should not surpass designers' ingenuity to provide better outlets for the air which, having passed through the radiator, has done its work. The reward obtainable would be a decrease in the weight and cost of the radiator. At least a third smaller radiator would suffice if anything approaching free atmosphere were behind the radiator as in front of it. It is especially surprising that the lesson of slip stream radiators has not been observed by racing car builders, for, by mounting radiators on the side of the cowl and providing a streamlined nose, the resistance could without question be reduced quite sensibly.

The design of radiators appears to be in a fairly advanced state, for automobile work and probably a much less developed condition for aircraft. Conversely, in the application of radiators the state of the art is highly advanced in aircraft and very much the opposite in automobile practice.

How Much Should a Truck Be Taxed?

EVEN within the automotive industry there are some who do not believe in economic usefulness of the truck and the bus. Some people in the industry, and many outside of it, feel that the truck and bus are a menace to traffic and that they fail to pay taxes in proportion to the damage to roads and traffic which they inflict.

The case of the electric railways and the railroads is often cited, the point being made that these units have to pay for their right of way and that the truck and bus run over a right of way paid for almost entirely by public funds.

A closer analysis than these critics are wont to give shows certain fallacies in their argument.

In the first place, those who really visualize the future of the truck and bus firmly believe that these vehicles should justly be called upon to pay their way. At the present time they do pay heavy taxes in certain states and a considerable tax in every state. It is impossible for anyone to say whether or not a truck is paying a fair tax in any given case, because data is not yet available to determine accurately either the damage the truck does to the road and to traffic, or the economic benefit that it brings to the public as a transportation medium.

STUDIES are being carried on by various research agencies which will go far toward determining the relation between the various factors involved.

To say that the truck destroys certain highways is not sufficient cause to say that the truck is a menace. The horse could not operate efficiently on the cow path, nor could the automobile operate efficiently on the roads constructed for only horse travel.

Enough data is already at hand to prove that under certain given conditions the truck is an efficient transportation medium; that is, it performs a service better than any other medium with a resulting benefit to the public as well as to the operator.

To build roads suitable for truck traffic may or may not cost more in actual outlay than to build roads suitable merely for car traffic. In any case, the actual outlay must be correlated with data showing the transportation saving to the community made by truck haulage before the actual net cost of the roads to the public can be determined.

AS regards the railways paying for their right of way, it may be pointed out that whatever expenses are incurred by the railroads must eventually be paid by those who ride on them or by those who ship freight on them. The use of railroads is widespread enough to make the statement true that in the end the right of way for which the railroads pay is paid by the public.

The question of bus and truck economy and efficiency from a public standpoint is a large one. It will not be entirely and satisfactorily answered for some years. The accumulation and analysis of considerable data is necessary before adequate conclusions can be reached. As noted before, however, enough has already been found out to determine the usefulness of the truck and bus under certain circumstances and to indicate a wide field of future usefulness for both of these new transportation mediums.

French Exports Increase

FRENCH automobile manufacturers have made considerable progress in their export business. The reports received from Vice-Consul Levis, at Bordeaux, show that the French passenger car exports for the first five months of the present year have increased considerably, with a total of 5295 having been exported at a total value of 263,979,000 francs. Thirty per cent of the above number were exported during the month of May. The rapid extension of the manufacture of low-priced cars with economical cost of operation has been responsible for the increase in exports. Great Britain received 1895 of the passenger cars, Belgium took 1496, Switzerland 246, the United States 130, Germany 86, and Japan 62.

The French colonial possessions imported 919 cars from France during the five months and the remaining 463 were exported to other countries. Motor truck exports (including tractors) for the five months totaled 2496 valued at 135,590,000 francs, the leading markets for these exported trucks being England, with 1299, and, secondly, Belgium taking 426.

Protecting Wood Against Moisture by Suitable Coatings

For best results the moisture content of wood once dried should remain constant. The factors which cause expansion and contraction are here outlined, various protective coatings are compared and the need for moisture-proof coatings is emphasized.

By Cornelius T. Myers*

ABOUT two years ago the author, in carrying on some research work on wood wheels, had occasion to make inquiry among paint manufacturers as to the value of various kinds of paints and primers for the protection of wood against moisture. This inquiry brought out so many differences and variations in opinion as to paint materials and mixture proportions that a more extensive inquiry among paint men was started. It revealed that:

(1) There was comparatively little technical information to be gained from the paint industry on the relative protective values of different coatings for wood

(2) The paint industry did not generally recognize the moisture-proofing of wood as a problem, but was concentrating so far as the more reputable manufacturers were concerned on producing paints that would last as long as possible on the surface to which they were applied. In other words, such improvements as have been made have contributed to the life of the coating rather than the life and usefulness of the article which received the coat.

Wood is said to be oven-dry when continued oven drying causes no further loss of weight. In their green state the woods used structurally have a moisture content of 60 to 120 per cent of their oven-dry weight, and weigh roughly from 60 to 120 per cent more than when they are in an oven-dry state. In other words, 35 to 55 per cent of the weight of a green log is water. In the green log this water exists in two conditions:

(1) Minute particles of water in each tiny wood cell cavity, known as "free water"

(2) The moisture absorbed by the fibrous material which forms the walls of the cells, known as "hygroscopic moisture."

Felled wood exposed to average atmospheric conditions gradually dries, the air taking up its moisture. First the cell cavities slowly give up their moisture. The evaporation goes on until the cell cavities are emptied of the minute particles of "free water" they contain. All that remains is the moisture actually absorbed by the fibres of the cell walls, which are still saturated with the "hygroscopic moisture." Wood in this state is said to be at its "fibre-saturation point." Up to this time the wood does not appreciably change in size or in physical characteristics except as to weight, which of course decreases considerably as it will now contain but 25 to 30 per cent of moisture instead of 60 to 120 per cent.

Further drying of the wood is necessary in order to increase its strength, hardness and durability to enable it to take and hold paint, and in general to improve its condition for the purpose intended. As this drying progresses beyond the fibre-saturation point, the cell walls give up the moisture they have absorbed, and in so doing they shrink and harden. Under natural conditions this drying process will continue until the amount of moisture in the wood bears a quite definite relation to the average humidity condition in the particular locality. In the eastern and north central states, for instance, the moisture content of wood will become stabilized somewhere in the neighborhood of 14 per cent for what is known as thoroughly air-dried stock. Of course unpainted wood that is exposed to rain and snow will absorb considerably more than 14 per cent, depending upon the dimensions of the piece and the extent of the exposure.

Forest Products Laboratory Data

Data secured from the Forest Products Laboratory of the United States Department of Agriculture show that

(1) Many woods should be dried to about 8 per cent moisture content to give the best results as to strength, durability, hardness and finish (See Table 1)

(2) It is also true that if after being dried, and shrinking in the process, wood reabsorbs moisture, it will swell again according to the amount absorbed

(3) The shrinking and swelling along the grain, perpendicular to the grain and tangential to the grain all differ, and very materially, for a given change in moisture content. (See Table 2.)

From the two following tables it will be seen that it is quite desirable to have wood thoroughly dried, and that steps should be taken to keep it so. But although it is easy to reduce the moisture to 8 per cent in dry kilns, it is difficult to maintain the wood at this point; because of unsuitable protective coatings, or processes, and because of the lack of knowledge as to relative ability of various coatings to stabilize moisture content within a small range.

While we know that several coats of good paint may give adequate protection for floors, truck bodies, wheels or other wooden parts, we by no means know what paints give the best protection or what paints will give fairly

*Condensed from a paper in *Mechanical Engineering*, Aug. 1922.

TABLE 1. APPROXIMATE PERCENTAGE OF INCREASE IN STRENGTH OVER GREEN [1]

	Dried to 14 Per Cent Moisture	Dried to 8 Per Cent Moisture
Bending strength, modulus of rupture	40 to 60	80 to 100
Compression parallel to grain	80 to 90	100 to 150
Compression perpendicular to grain	65 to 75	
Stiffness, modulus of elasticity	20 to 30	25 to 35[2]
Hardness	30 to 35	40 to 50[2]
Shearing strength, parallel to grain	40 to 50	60 to 70[2]

[1] Compiled from data given in Timber, Its Strength, Seasoning and Grading, by H. S. Betts. [2] Estimated.

TABLE 2. SHRINKAGE AND MOISTURE CONTENT OF HARDWOOD [1]

	Specific Gravity of Dry Wood	Shrinkage[2] in Per Cent of Green from Green to Oven-Dry		Green Moist in Per Cent of Dry Wood Wt.
		Radial	Tangential	
Ash, white[4]	0.57	4.8	7.0	39
Birch, yellow[3]	0.55	7.4	8.9	68
Elm, cork	0.57	4.8	8.1	53
Hickory[4]	0.64	7.2	10.9	60
Maple[5]	0.51	4.2	8.5	63
Oak, red[5]	0.56	3.9	8.3	83
Oak, white[5]	0.60	5.3	8.8	66
Average	0.57	5.4	8.6	62

[1] Compiled from data given in Kiln Drying of Lumber, by H. D. Tiemann. [2] Average shrinkage along the grain, up and down as the tree grows, is only about ⅛ per cent. [3] Average of 2 species. [4] Average of 9 species. [5] Average of 3 species.

satisfactory protection for the least money. The test fences, where many different paints were exposed to the same atmospheric conditions, have given some data on the durability of paints, but very little data on the durability of the painted article or its dimensional stability. *In durability and dimensional stabilization we are greatly interested;* in the first for very obvious reasons, in the second because wooden structures are more durable, serviceable, and can be made more simply if their various component parts do not expand and contract with changing weather conditions. The cost of drying could be reduced in many cases, if when dried to a certain point the moisture content could be stabilized. Wood, on account of its very valuable characteristics, could be used in places where metal now seems necessary. A dozen or more prominent concerns in the paint industry have been co-operating commendably in research work, realizing that the dimensional stabilization of wood by moisture-proofing is a proper function of paint and of world-wide importance. There is, however, quite a difference of opinion among these manufacturers as to what materials should be used, and how they should be mixed and applied. During the war the Forest Products Laboratory investigated the moisture-proofing effects of linseed oil and various paints, varnishes and leaf-metal coatings as applied to airplane-propellers and other airplane parts made of wood, but this work has not been broadened because of lack of funds.

IN order to get some comparative data on the paints and primers now on the market, tests have been made on small hickory, oak, birch and maple by paint concerns.

In general, the results of the tests showed that paints of the ordinary brands and formulas were not very effective as moisture-proofing agents, even when three coats were applied. One paint concern after testing its standard brands did a little experimenting, and without much difficulty was able to produce a special primer that was several times as effective. There was great variation in effectiveness of paints used. Averaging the results for hickory, oak, maple and birch, it took about six times as long for these test pieces to absorb an extra 6 per cent of moisture when coated with the "special" as when coated with the standard "A." There is every reason to believe that much better results can be secured and with less than three coats. Preliminary tests with a casein solution indicate that it has water-proofing qualities, which, for some classes of protection, may be very valuable. The same is true of some of the pyroxalin compounds. Varnishes are in general more effective than paints, but in the protection of wheels their application was unsuitable for primary coats.

Flooring, decking, paneling, etc., would be greatly benefited if it did not "work." Many wooden structures would be simpler and more permanent if so protected, and with thoroughly dried timber they would either have a greater factor of safety or could be built with less lumber. Many other advantages will develop as thought is given to the dimensional stabilization of wood by rendering it moisture-proof to some substantial degree.

It is well known that shingles and weather boards fastened with old-fashioned wrought-iron nails stay tight much longer than those in which the modern steel nail is used. The reason for this is that the steel nail rusts and is flaked off by the movement, or "working," of the piece through which it is driven. A nail tightly driven is practically sealed against external moisture by its head and the paint around it; but if moisture reaches the nail by the capillary action of the wood fibers, it will rust in spite of end sealing. Then too the moisture and capillarity of the wood cause the "working" that rubs off the layer of rust and exposes the nail to continuous corrosion. The working also abrades the wood and leaves the familiar large, rust-stained hole around an attenuated nail. The same conditions apply to the bolts and other steel fastenings in farm machinery, wagons, motor-truck bodies, and a long list of other articles. It is of vast importance in wood construction, therefore, that we have paints to protect the wood from absorbing moisture. Ordinary paint does not effectively do this except when a large number of coats is applied, and so far as the writer has been able to find out, there has been little or no attempt to produce a paint that will do it. There seems to be a great possibility for economies, either by the use of cheaper paints which give protection, or paints which will last longer.

Need for Research

Paint literature of a technical nature is quite inadequate to explain the why and wherefore of much present practice. Great differences of opinion and some vague reasoning appear. Many contentions seem to be based on a desire to use certain materials or formulas, rather than on comparative service data of a reliable sort. Such men as Dr. Sabin of the National Lead Co., and Dr. Holly of Acme White Lead and Color Works, made frank acknowledgment of the shortcomings of paint technology and totally disavow any detail information concerning the effect of paints on moisture-proofing the cell structure of woods of various kinds. The Engineering Foundation has approved the desirability of research on this subject and has appointed a committee to report ways and means of furthering it. This is a most substantial endorsement. The Society of Automotive Engineers and the American Institute of Architects have also approved and will lend their support.

The Forest Products Laboratory is by all odds our most authoritative source of information on woods and their structure. The director and his staff have been interviewed and fully agree that this research would be productive of important results, some of which could be expected in the course of 8 to 12 months; also that it can be handled there if funds in a very modest amount, between $10,000 and $20,000 per year, were made available for, say, from five to ten years. The Bureau of Standards has a paint division and has funds to work on the paint end of the research. Doubtless a co-operative arrangement could be made between these two of the most capable and helpful arms of our governmental service.

There is a crying need for such information, and inside of a year after the work is started a considerable amount of usable data should be forthcoming.

Advantages and Limitations of Cold Drawn Steel in Automotive Work

Cold drawn work produces excellent finish and the operations are for the most part simple and fool-proof. Necessity for high ductility, however, limits such work to softer grades of material. Other phases of this problem are illuminated by research.

By Dr. Walter Rosenhain

BOTH ferrous and non-ferrous materials are frequently supplied and used in a cold-worked condition, while cold working is sometimes used in the final shaping of various articles, such as cold pressings or stampings, or even in simple cold bending. It cannot be denied that such processes and the articles produced by them offer certain very attractive advantages. From the pure production point of view they are excellent in many ways—for reasons which we shall consider in detail.

This very attractiveness, however, makes it all the more important to consider the real nature of the processes and their products and to ascertain whether there are any limitations or objections to their use. As we shall see, such objections and limitations do exist and it is eminently advisable for the automotive engineer to consider them carefully before deciding to utilize cold-worked material in his construction.

However attractive a process of production may be, it cannot in the end fail to defeat its own object if the quality of the product is not adequate for the purpose for which it is desired. There are many purposes where the use of cold-worked materials or products is entirely satisfactory, while in other cases their introduction is a matter of doubtful wisdom.

Taking first the advantages of "cold work," it is obvious that the first and foremost of them may be expressed in the one word, "finish." Cold-drawn steel rod, for example, can be produced with a smooth and if desired a bright finish such as is not attainable by any process of hot working. Similarly, stampings and pressings can be produced with an excellent surface finish and of very great accuracy of shape and dimensions. The use of furnaces for heating the metal is entirely eliminated and with it the damage to the surface of the metal by oxidation or scaling. It is true that more power is required to bring about a given change of shape in the cold than when heat is applied, but power is relatively cheap and the cost of heavier plant for its application balances against the first cost and comparatively high upkeep expenses of furnaces. Further, cold-working operations of all kinds are very simple and almost fool-proof. Once the plant has been correctly designed and installed, very little expert supervision is required and many operations can be rendered automatic—all obvious advantages from the point of view of mass production. Finally, cold-worked material is often stiffer and appears to be stronger than the same material in the annealed condition and this apparent increase of strength is sometimes looked upon as a material gain.

With these great and obvious advantages of cold-working fully in our minds, we may now turn to consider the limitations of the process. The first of these is self-evident. Since the metal has to undergo a serious amount of deformation in the cold, it is clear that it must possess a large degree of ductility in the first place, and this limits the applicability of cold-working processes to the softest grades of material.

In the case of steel it is rare to find cold working, except in the special case of wire-drawing, applied to materials with a carbon-content higher than 0.2 per cent unless very gradual deformations are used in conjunction with repeated annealings. Such a limitation in the choice of materials for various purposes is a serious matter. It is true that the high ductility of soft metals is, from certain points of view, an advantage, but it is coming to be realized that this advantage is often purchased at too high a price. For very many purposes it is resistance to fatigue or alternating stresses, such as those arising from vibration, which is vital, and this power of resistance is undoubtedly a function of the real elastic range of the metal.

Soft Metals

Very soft metals always have a short elastic range and, correspondingly a low resistance to fatigue. There is only one real exception to this principle; it arises where a piece of metal is exposed not to a definite range of alternating stress but to a definite degree of alternating deformation of fairly considerable range. In such a case, however high the real elastic range of a harder material may be, that range may be definitely exceeded at every deformation and in that case failure may be much more rapid in the hard than in the soft metal, although—ultimately—failure will result in both, but the life of the soft material may be long enough to be useful in practice.

Apart from these very special cases, the use of the soft metals which lend themselves to cold working undoubtedly constitutes a sacrifice on the part of the designer. As against this it is sometimes suggested that the very process of cold working serves to harden and stiffen the material so much that in the cold-worked state it is as strong as a harder material in the normal or annealed condition.

If we confine our attention to the results of tensile tests this is undoubtedly true in those cases where the cold work has been applied in a thorough and fairly uniform manner to the whole mass of metal in question, as—for instance—in a well-drawn rod or tube. Both the ultimate tensile strength and the "static" elastic limit and the yield-point

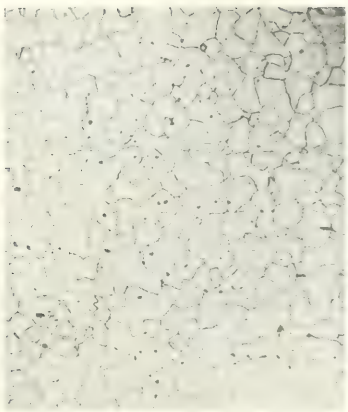


Fig. 1—Typical structure of nearly pure iron (very low carbon steel) in annealed condition.



Fig. 2—Same material of Fig. 1 after slight cold-working.



Fig. 3—Same material after more severe cold-working

are considerably raised while the elongation and reduction of area are correspondingly reduced. But if we look further we find that, in reality, the true nature of the metal has not been very much altered. Its real elastic range is displaced rather than truly enlarged. The bulk of the experimental evidence appears to show quite clearly that the extra hardness obtained by cold work does not materially increase the range of fatigue resistance of a metal.

The only contrary evidence hitherto produced is based on a few experiments made by Hatfield on cold-drawn brass, but even if these should be confirmed by subsequent workers it does not appear that the results apply to steel; there the work of Bauschinger, Bairstow and many others is quite conclusive in showing that from the fatigue point of view the added strength due to cold work is illusory, although the loss of ductility is entirely real and permanent.

Effects on Micro-Structure

To appreciate better what it is that happens to a metal when it is subjected to cold working it is desirable to consider the effects produced upon its micro-structure. It is true that, directly, the micro-structure is of no particular interest to the engineer who uses a material, but since it serves to explain the properties which the metal displays in manufacture and use, an understanding of this internal structure is none the less worth while.

Let us take as our example a "simple" metal consisting only of crystals of one kind, such as approximately pure iron. In practice, a very mild steel, such as that frequently used for cold pressing, shows a very similar micro-structure except that here and there we find a few small crystals of a second, harder, constituent. This simple micro-structure is illustrated in Fig. 1, which represents the typical structure of a piece of "Armco" iron in the fully-annealed state. It is an aggregate of crystals, varying in size and shape but approximately of equal dimensions in all directions. The photograph shows no direction of predominating length.

If we examine the same material after it has been extended by cold work by about 20 per cent, it shows the structure seen in Fig. 2, where the constituent crystals are still seen well defined, but markedly elongated in the direction of extension.

If we carry the cold working process still further, the structure becomes rather less easily intelligible, because the individual crystals are so much elongated that they assume the appearance of a bundle of fine fibres, Fig. 3.

If, instead of nearly pure iron, we take a piece of mild steel, containing about 0.15 per cent of carbon, we find a corresponding series of structures, except that we see two constituents which, originally arranged in a more or less uniform manner, become drawn out into the semblance of fine parallel fibres (See Figs. 4, 5 and 6).

Left in this condition, the metal is in the apparently strengthened and hardened state, but this arises rather from loss of its ductility than from real increase in strength. On annealing, the elongated crystals disappear and are replaced by a new growth of approximately symmetrical or "equi-axed" crystals which begin their growth mainly from the boundaries of the old drawn-out crystals and soon replace them entirely. When thus annealed and re-crystallized, the metal returns more or less completely to its initial condition, but by varying the rate of cooling and the temperature and time of annealing, a finer grain can be obtained than is usually present in the material as delivered by steel makers unless specially "normalized" steel has been specified.

The photographs Figs. 1 to 3 and 4 to 6 represent the whole of the structure characteristic of a piece of iron or mild steel which has received a uniform amount of cold work throughout. This can, of course, at best occur only where there has been uniform extension or compression throughout the piece, as in a carefully cold-drawn rod or wire.

Bending

Where bending has been used, a different state of affairs arises and the degree of cold-work varies from point to point in the piece so that micro-structures corresponding to Figs. 1 to 3 or 4 to 6 are found in different portions of the same piece. It will be clear at once that if a piece in such a condition is subjected to stress in service, its different parts must respond in different degrees and that a concentration or localization of deformation may easily be the result, leading to premature fracture. Where cold-bending or dishing has been used, however, there is a further serious point to be borne in mind and this is the unavoidable presence of severe internal stresses in any such piece which has not been annealed.

This can be readily understood. In any bar or sheet which has been bent cold we have extreme deformation in tension on the one surface and corresponding compression

on the opposite side. The amount of such permanent deformation diminishes as we approach the neutral axis of the section and at some particular point we reach the region where, at the moment when the bending operation was being carried out, the stress just exceeded the elastic limit of proportionality. Within this region the metal had undergone no permanent or plastic deformation whether of extension or compression, but outside of it such permanent deformation exists. When the original bending or forming stress is released, the metal tends to revert to its original shape so far as those parts are concerned which were only elastically stressed, but this tendency is resisted by the outer regions which have undergone plastic deformation. Since these outer regions generally constitute the stiffer parts of the piece, it retains very nearly its shaped dimensions, but there is always a slight degree of distortion—too slight, perhaps, to be of any practical importance in itself, but large enough to be of serious importance in regard to internal stresses. Any "fiber" of the piece which is unable to return from its elastically-strained condition to its original dimensions is held in its new position by a force equal to that which would be required to stretch it into its enforced size—and such forces are very large, in view of the high elastic modulus of steel, even where the actual forcible extension is quite minute. These internal stresses, which are sometimes very complex in their nature and distribution, "add up" with the working stresses which come on the piece in service and this must often lead to "mysterious" failures in cases where the calculated working stress lies far below even the elastic limit of the material.

Annealing

Thus, there are two good reasons why cold-worked metal should be suitably annealed:

1. There is the adverse change in micro-structure accompanied by loss of ductility.
2. The internal stresses set up by cold bending and similar operations.

But, if annealing or heat-treatment of any kind is necessary, one of the chief attractions of the cold-working process disappears. Furnace plant, and the careful control which it requires, must be used and the perfect surface finish of cold-worked objects must be more or less sacrificed.

Further, the annealing process itself requires careful control. Otherwise the material may be unduly softened and weakened. To realize this it is necessary to bear in mind that the strength of a mild steel of good composition and sound manufacture depends upon two principal factors which may be termed "grain size" and "carbide distribution."

"Grain size" is merely a question of the size or scale of the micro-structure; the smaller the crystals the better from all mechanical points of view. As a rule, crystal size can be readily regulated by avoiding the use of unduly high temperatures and securing rapid cooling at the end of the annealing process. Except in the cast of very heavy, bulky forgings, there is no advantage in cooling mild steel gradually.

Alloy Steels

Where alloy steels are concerned, the matter is somewhat different, as certain of these become hardened by rapid cooling, even in air, but these are generally treated in an entirely different manner by two thermal treatments usually called "hardening" and "tempering" respectively. Even in very mild steels, however, there is a certain danger about the annealing of cold-worked material. At certain temperatures and under certain conditions of cold-working, there is a danger of the very rapid development of extremely coarse crystals. This has been known to occur and has actually led to failures in automobile parts which have come under the writer's notice. There is, however, a perfectly safe course with regard to this trouble—if annealing or rather "normalizing" as it should be is carried out at a temperature decidedly above the critical range of the steel, then no coarse re-crystallization can occur. As we shall see, the use of these relatively high temperatures is also advisable for another reason related to the second factor in the strength of mild steel, viz., "carbide distribution."

Mild steel differs from nearly pure iron mainly by the presence in the former of a certain amount of iron carbide. Usually, this is present in mild steel in the form of the constituent known to microscopists as "pearlite," which is illustrated, under a high magnification in Fig. 7. This constituent consists of very fine alternate plates or laminae of iron and of iron carbide. Now the carbide plates are strong and hard but non-ductile. Their presence tends to harden and stiffen the steel because they serve as a sort of reinforcement to the soft and ductile crystals of pure iron. It is clear that if these soft crystals are small and the carbide plates are widely disseminated so as to produce the maximum amount of support, the steel will be, mechanically, in its best condition.

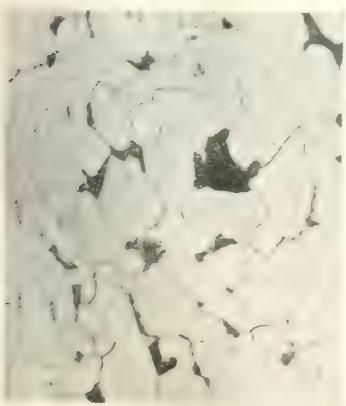


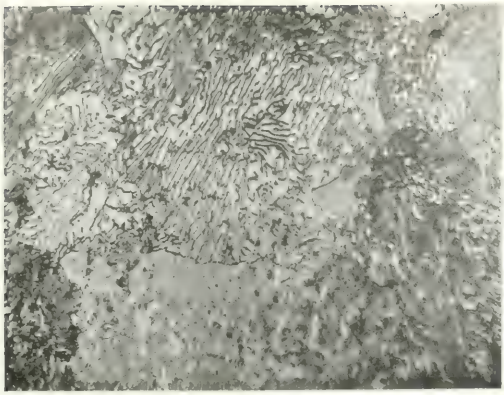
Fig. 4—Mild steel (Carbon 0.15 per cent) in normalized condition.



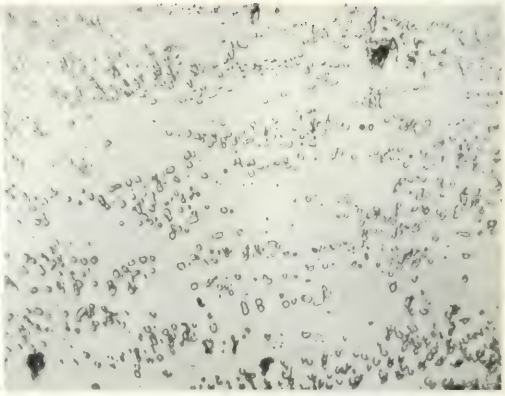
Fig. 5—Same material as Fig. 4 after moderate cold-working.



Fig. 6—Same material as Figs. 4 and 5 after severe cold-working.



7—Typical structure of "Pearlite" in steel



8—"Balled up" or "Globular" carbide in mild steel which has been softened by annealing below the critical range

We seek, therefore, to produce such a state of affairs and succeed in so doing by heating the steel to a point above its critical range. There the carbide plates disappear entirely, to be re-formed on cooling. Fairly slow cooling brings them out as moderately fine plates, interleaved with iron plates and fairly well distributed. More rapid cooling, however, produces a greater degree of dissemination, the carbide being often present in particles so fine as to be scarcely distinguishable under the microscope.

In this state, which is the result of good "normalizing," we have the steel at its best. On the other hand, very slow cooling leaves us with the carbide in a small number of comparatively thick plates and with many of the iron crystals entirely unsupported by carbide.

Still worse is the result of annealing at temperatures like 650 deg. C., just below the critical range of the steel. Here the result is that the plates of carbide become converted into numerous little rounded lumps and globules whose power of affording support to the iron crystals is practically nil. Here we have the steel—as seen in Fig. 8—in its weakest state. The ductility, it is true, is very high since the iron crystals can be stretched and deformed without overcoming the resistance of carbide plates, but the elastic limit is extremely low and the resistance to fatigue quite small. Prior to cold-working, this is a very desirable condition for the steel—as makers of weldless cold-drawn tubes well know. If satisfactory service under stress is desired, subsequent normalizing is essential.

It is perhaps unnecessary to pursue these matters any further from the present point of view. We have very fully recognized the great advantages of cold-working processes, but the serious disadvantages must not be forgotten and the application of subsequent heat-treatment must be regarded as unavoidable where good resistance, particularly to fatigue, is required.

This heat-treatment requires careful control of temperatures and of rates of cooling and that it counterbalances some of the apparent advantages of cold working. Whether the combination of cold-working with subsequent heat-treatment is advantageous as compared with hot working is a matter for the production engineer to decide, since both processes can yield entirely satisfactory products with the softer steels. Where harder steel is desirable, of course, there can be no choice, since cold-working becomes impossible.

"Engine" Versus "Motor"

IN 1916 the Society of Automotive Engineers prepared, in co-operation with engineers and representatives of service departments of automobile companies, a list of standard names for the common automobile parts, in order to eliminate confusion that existed.

The standard nomenclature was approved by the Society members and largely followed by service managers in making up parts lists. This has resulted in saving a surprising amount of time and money in the definite and prompt making and filling of orders for parts. Certain names, the use of which was recommended in the nomenclature, were, however, not adopted as generally as might be desired, probably the most important of these being the term "engine" for designating an internal-combustion unit of the most prevalent type of automobile, the work "motor" being used to a certain extent instead.

"Motor" is the correct name for an electric unit used for changing electrical into mechanical energy, and its meaning as applied to internal-combustion engines can be understood only by the context. An electric *motor* is commonly used on gasoline automobiles in connection with the starting apparatus.

The continued misuse of the word "motor" is probably due to two factors. It is used, and correctly, to designate a moving vehicle. In addition, many companies building engines were organized in the early years of the industry and included the word "motor" in their official names. As the companies prospered, the names became valuable assets and a change has been considered unwise.

Nomenclature is, in a last analysis, determined by usage. Many words are common to-day which are in a derivative sense entirely illogical, as well as entirely different in meaning from what they meant originally. "Electric motor" and not "electric engine" is, of course, the name for the electric unit; and the term "steam motor" is not used as applying to a prime-mover. "Engine trucks" and "engine vehicles" would be equally anomalous.

There seems to be little doubt of the logic and consistency of the use of the word "engine" to denote the internal-combustion or "gas" unit of motor vehicles.

An Industrial Relations Policy That Makes Production Cost Less

Personal grievances are constructively met by interview and adjustment. Social activities are encouraged, but are operated entirely by employees. Executive training course raises standards of supervision. Small items and trifles considered important.

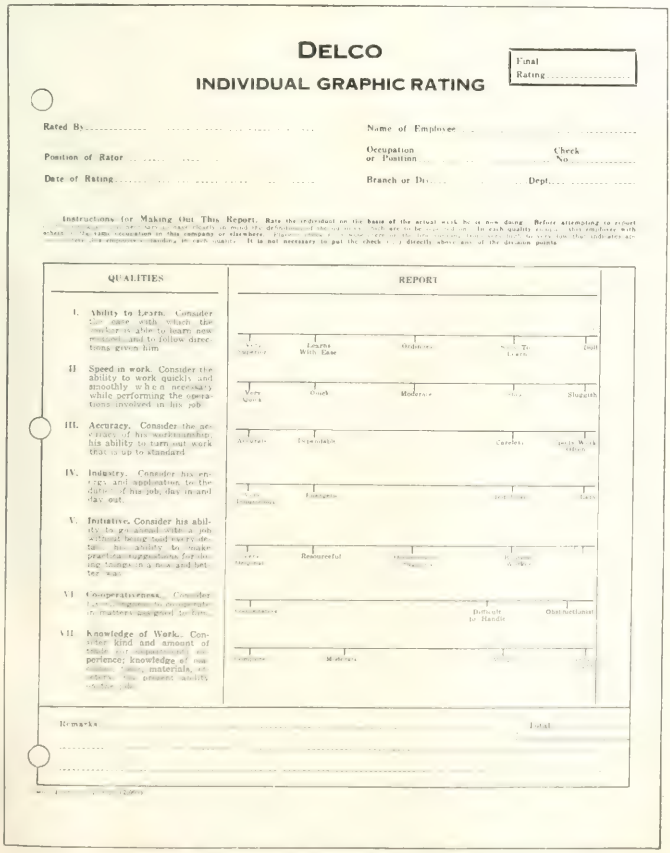
By Harry Tipper

THE Dayton Engineering Laboratories Co. operates an open shop. It is a successful open shop—not merely in the temporary control secured in some places during the depression or weakness of labor unions. It is successful because the average employee earns more money; the shop is provided with reasonable light and ventilation, decent conditions of work, and with a spirit of co-operation particularly visible, although no one thing can be cited as outstanding in connection with it.

There are no special systems of conference or representation in the plant. There does not appear to be any need for such items and, as we have pointed out many times, the system itself is worth little or nothing. It is only useful as it expresses preeminently the spirit of justice and decent co-operation which exists in the actions and ideas of the management. It is not possible to resort to system, therefore, to determine the value of the spirit of unanimity which seems to prevail in this plant from one part of it to the other.

The employment department is charged with the duty of introducing the worker to the plant, taking care of his grievances, adjusting details of difficulty which he may have, conducting the training classes, exercising decent supervision over the employees' activities, and maintaining contact at all times. With so many points of consideration, this department offers the best opportunity to observe the spirit of individual care exercised in placing the employee in his right position in the organization and endeavoring to give him an expression for his fullest capacity.

The employment department, in considering an applicant for work in the Delco organization, depends to some extent upon standard questions—some of these questions being devoted to trade, knowledge and experience; some of them to individual


DELCO

INDIVIDUAL GRAPHIC RATING

Final Rating

Rated By

Name of Employee

Position of Rator

Occupation or Position

Check No.

Date of Rating

Branch or Dr.

Dept.

Instructions for Making Out This Report. Rate the individual on the basis of the actual work he is now doing. Before attempting to report

QUALITIES

I. Ability to Learn. Consider the ease with which the worker is able to learn new methods and to follow directions given him.

II Speed in work. Consider the ability to work quickly and smoothly when necessary while performing the operations involved in his job.

III. Accuracy. Consider the accuracy of his workmanship; his ability to turn out work that is up to standard.

IV. Industry. Consider his energy and application to the duties of his job, day in and day out.

V. Initiative. Consider his ability to get started with a job without being told every detail; his ability to make practical suggestions for saving time, using a new and better way.

VI Cooperativeness. Consider [illegible] matters assigned to him.

VII Knowledge of Work. Consider kind and amount of [illegible] experience; knowledge of [illegible] materials, [illegible] present activity [illegible] job.

REPORT

Very Quickly | Learns With Ease | Ordinary | Slow To Learn | Dull

Very Quick | Quick | Moderate | [illegible] | Sluggish

Accurate | Dependable | Careless | [illegible] Work Often

Very Industrious | Industrious | [illegible] | Lazy

Very Resourceful | Resourceful | [illegible] | [illegible]

[illegible] | [illegible] | Difficult to Handle | Obstructionist

Complete | Moderate | [illegible]

Remarks

Total

Fig. 1—Individual qualification record card

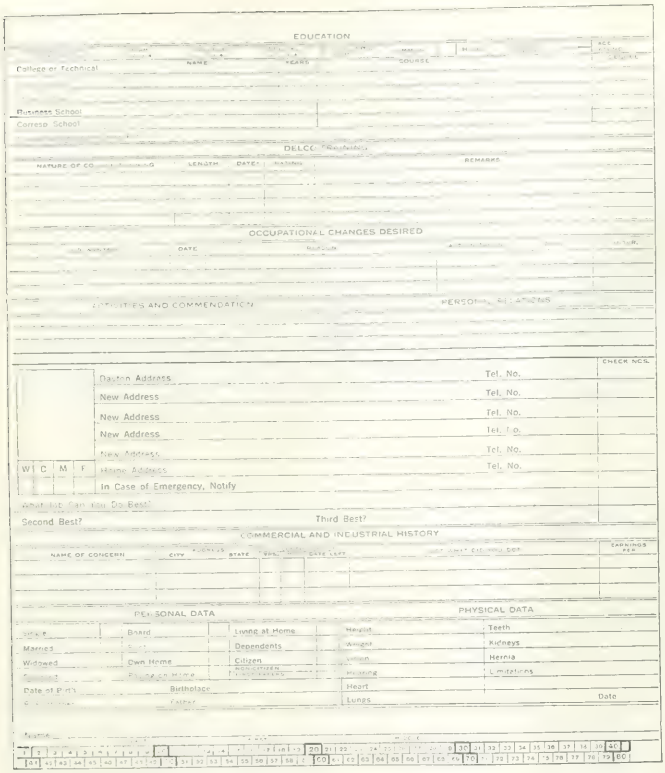


Fig. 2a—Individual graphic rating card

personal record; and some of them arranged from the best psychological tests. These questions and their answers are used, not as a means of rating the employee, but as the valuable aids to the interviewer in the rating, Fig. 1, which he will give to the employee after he has amplified the questions by casual elements of his interview.

The distinction is a slight one, yet it is important. In many cases, the adoption of standard trade, personal record, and psychological questions has been made to take the place of intelligent judgment in interviewing applicants and a large part of its usefulness has been lost. Men who are working in this employment department have evidently discussed the possibilities of all these standard questions so that their value is thoroughly understood, and the judgment to be exercised has come out of the intimate discussion of the objects which they have in view. The trade questions are arranged so that they are applied directly to the particular department or branch of the business for which the employee appears to be suitable on account of his experience and former occupation. Charts are used in connection with these questions, so that the interviewer may apply these with the charts to the particular performance of work and acquire a knowledge of the technique of the applicant.

From these various examinations an individual graphic rating is secured in accordance with the blank attached; those who are rated sufficiently to be worth putting to work are sent to the department on requisition from the different foremen or other supervisors. Each worker entering the employ of the company is given a booklet of information and instructions. This booklet covers twenty-eight pages of matter divided so that reference may be made to the different important requirements. The language is very simple and the instructions are quite short. They can be readily understood by any worker who can read English, and few of them would permit of more than one interpretation. The general headings are taken from the Index, and the Introduction is shown because the wording of it makes it particularly worthy of attention in this discussion:

INTRODUCTION

To meet each problem broadly and master it—to reduce manufacturing discrepancies to a minimum—to be in the game for the love of it—these are some of the ideals this company has had in the past and which have helped to make possible our rapid success.

We will not arbitrarily curtail the rights of anyone, but we feel that certain standards must be set and certain rules established. This is done for the same reason that we establish limits and gages in the making of our product—so that the whole may work harmoniously together.

We are mentioning in this booklet the things which from our own experience and the experience of others will, we believe, maintain a spirit of harmony throughout our entire organization.

Will you, therefore, co-operate at all times and give close attention to the following Information and Rules.

(The instructions in this book are subject to change at any time and will be obsolete upon the issuance of a new instruction book. This issue supersedes all previous instructions.)

INDEX

I. Working Hours 5
II. Pay 9
III. Rates 11
IV. Attendance Records and Vacation Bonus 12
V. Reporting for Work 12
VI. Entering and Leaving Buildings 13
VII. Promotions and Transfers 14
VIII. Discipline 14
IX. Health and Sanitary Conditions 15
X. Condition of Machinery 16
XI. Absence 16
XII. Personal and Company Property 17
XIII. Visitors 17
XIV. Lost and Found Property 17
XV. Change of Address 18
XVI. Subscriptions, Presents, Etc. 18
XVII. Delco Relief Association 19
XVIII. Delco Athletic Association 19
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XXI. Delco Girls' Club 21
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XXIV. Safety First 23
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The new employee is introduced to the employees' activities so that he may get into the community of interest at the earliest possible moment and feel himself a member of the organization instead of simply working there. As soon as a man is employed, a card is made out, Fig. 2, on which is kept a complete individual record and a complete service record, which is always available for examination, and which comes up under all necessary condi-

tions by an automatic method used in the employment department.

The employment manager has under his control the review of all adjustments of grievances by workers, and it is understood that he is available to any worker at any time in the plant for that purpose. The employment department has the right to review all cases of discharge, to consider cases of transfer, and to originate cases of transfer where such transfer seems desirable. The object of this review is to settle personal grievances with the utmost celerity and with justice.

Personal grievances are very important elements of the satisfaction in factory operations and they do not improve with age. The longer they stick in the mind the more they fester and the more infectious they become. Any method of reviewing them must take into consideration the rapidity of decision as a part of the visible and necessary justice of the matter. In the Dayton Engineering Laboratories it is believed that the quickest and best method of settling such matters is the opportunity for review and consideration by the employment department, and the knowledge well spread through the organization that the employee is entitled to discuss anything with the employment manager at any time.

Examples of the operations of this work were shown which indicated very fully both the spirit and the fairness of the decisions made and the way in which they were accepted by the parties at interest. Apparently, the employment department has the confidence of both employees and supervisors, so that a decision once rendered is held to by those concerned without any grumbling about it and with a full acquiescence in its desirability.

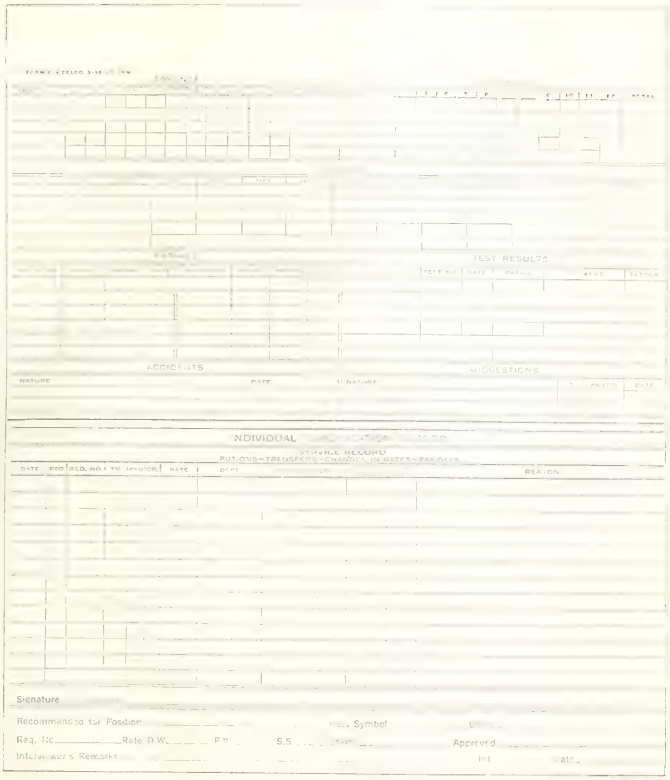


Fig. 2b. Reverse side

The educational work of this organization takes in the trade schools, which are, of course, a part of the organization of many factories, and the courses of training for foremen, supervisors and other executives. The executives' training courses are interesting because of their scope and character. This work was laid out by a committee of the Delco organization—the executives' course training committee.

The character of this course will be indicated by the index of the class of 1920 given herewith:

I. Principles of Industrial Organization.
II. Industrial Organization and Management.
III. Delco Apparatus.
IV. Designing the Product.
V. Plant Layout and Equipment.
VI. The Production System.
VII. Time and Motion Study.
VIII. Inspection Methods.
IX. Plant Construction and Maintenance.
X. Cost Finding and Records.
XI. The Shop Executive and an Analysis of Production and Cost.
XII. Human Relations in Industry.
XIII. Dealing with Men — The Foundation — A Square Deal.
XIV. Employment Management—Fitting the Man to the Job.
XV. Wage Systems.
XVI. Industrial Training.

This indication of the scope of the course, however, does not suggest the care with which the text has been prepared and applied specifically to the organization and the operations of the Dayton Engineering Laboratories Co. A great deal of study was given to the matter evidently. The list of texts suggested as supplementary material is very comprehensive—much more comprehensive than anything usually employed in industrial consideration, and the development itself shows that wise consideration has been given to the assembling of the material; to the method of presentation; and the development of the theme in such a way as to fit in thoroughly and readily with the application to the operations in that particular organization.

In addition to the educational activities, the employment office is active in the employees' associations and very directly concerned with the safety work. The Delco Athletic Association is one of these employees' associations, engineered very largely by the employment department where the athletic director resides, and governed by the members of the association, who are, of course, employees of the company. The only consideration given to the matter as a point of company policy is shown in one of the articles of the constitution of this association, where the Delco Athletic Committee, appointed by the Dayton Engineering Laboratories Co., selects the director of athletics. This committee works with the officers of the association, and through the director of athletics is represented on the board. In all other respects, the Athletic Association is entirely a matter of the employees and the

constitution specifically states that fact, so that the progress of the association and the development of the organization among the employees carries with it an increased organization spirit, because of the activities of the employees in this direction, and also increases the pride felt by the employees in the organization which is associated not only with their work, but with the growth of their own pleasurable activities through their own endeavors.

Interesting indications of the spirit of unanimity in the organization are found in the story of the Delco family week, which originated in 1919. A worker in one of the departments suggested that the families of the workers would like to see the place in which they were working. The suggestion was one of those casual ideas which are usually buried in the routine of daily operation, but in this case the suggestion was taken up and came to the attention of the factory executives, it appealed to them and arrangements were made. A little committee was formed and invitations sent to the families of all the workers. These families were arranged in groups for different days in the week. Guides were provided to take them through the factory and the whole week was spent as a family week. Another Dayton man, John H. Patterson, some years ago decided that he should interest the wives in their husbands' organization. This Delco experiment seemed to work out equally well. Each family going through the plant was presented with a booklet especially prepared for that distribution, showing the whole plant, photographs of the workers and the departments, and the story of the various operations. It was rather an interesting side light on incentive to note that the record of production in that particular week was higher than any other week in the same year, despite the confusion caused by the visitors. In other words, every worker was anxious to do his best before the audience of his family and acquaintances, where a strange audience might have meant a little less attention to his production for the time being.

It will be seen at once that these activities are none of them more than what are usually called "trifles," but they have a very important part in aiding in the solution of the production problem, which has been well solved in respect both to turnover and cost, and matters that are capable of aiding in such a solution are not "trifles," however insignificant they may appear to be.

Current S. A. E. Standardization Work

THE Truck Division held a meeting on July 24 to consider the important subject of motor truck rating. Other subjects were discussed and acted upon as recorded below. The Electrical Equipment Subdivision on Spark Plugs held a meeting on Aug. 18. The Subcommittee on Landing Fields of the Sectional Committee on Aeronautical Safety Code held a meeting on July 28.

Two series of meetings, as outlined in the accompanying table, have been scheduled for the months preceding the Annual Standards Committee meeting in January. The dates are subject to change, but Division and Subdivision members should bear them in mind in connection with any standardization work they are carrying on. In all cases individual notices definitely specifying the time and place of each meeting will be mailed to committeemen from ten days to two weeks in advance of the sessions. If meetings scheduled tentatively are cancelled or postponed, definite advices to this effect will be transmitted to them.

Aeronautic Safety Code

A meeting of the Subdivision on Landing Fields of the Sectional Committee on Aeronautic Safety Code was held in New York City on July 28. The original draft of the code covering this section was revised and will be reissued shortly for comment.

Body Hold-Down Clamps

A discussion on the standardization of body hold-down clamps at the Motor Truck Division meeting in July brought out the opinion that this subject is of more interest to body builders than to truck producers, inasmuch as the former usually make their own clamps. The following recommendation was, however, approved for adoption as S.A.E. Recommended Practice for the guidance of the smaller body builders:

> The top or bottom flange of motor truck frames should not be drilled for body or hoist platform hold-down clamps. "U" clamps should be used with a wood-block filler between the frame flanges to prevent bending.
>
> The use of too many hold-down clamps for securing the body to the frame should be guarded against, particularly in the mounting of very stiff bodies such as those for oil tanks.

Gages and Gaging

The report of the Screw Threads Division on Gages and Gaging was not approved at the meeting of the Standards Committee on June 20 at White Sulphur Springs, as reported in the August issue of *The Journal,* because it was felt that the report did not deal sufficiently with gaging for lead error. Earle Buckingham, who formulated the original report, has submitted the following paragraphs covering gaging for lead error as an extension of the report. These paragraphs have been referred to the members of the Screw Threads Division for approval.

> A screw thread is comprised of several elements. First, the outside or major diameter; second, the pitch diameter; third, the core or minor diameter; fourth, the angle of the thread form; and fifth, the lead. There is a broad general principle in regard to limit gages that should always be kept in mind. Where compound tolerances are not involved, a "Go" gage with fixed measuring surfaces may check as many dimensions at one time as desired, and effective inspection will be secured. On the other hand, an effective "Not Go" gage can check only one dimension. By effective inspection is meant assurance that specified requirements in regard to size are not exceeded.
>
> The most difficult element of a screw thread to gage is the lead. Lead testing devices for checking tools and gages are available, but in general their operation is too slow for use as production inspection equipment. In addition, the lead is the most important element of a screw thread as regards the nature of the contact between mating parts. Furthermore, an error in lead has almost double the effect of an equal error in diameter as regards interchangeability. Thus, for exacting threaded work, if the method of inspection of the parts produced does not effectively inspect for lead errors, the tools used to produce these parts must be carefully inspected for lead.

Progressive Dealers Make Pacific Coast Growing Future Market

Educational work being carried on among dealers and jobbers make for even better business in the West. Salesmen, garage men, and battery service agents are co-ordinating activities. Saturation point too far away to be worth considering.

By Gordon Lee *

GORDON LEE has just returned from an extensive Western trip. He made a study of conditions on the Pacific Coast by traveling by automobile from San Diego to Seattle. On his trip through the Yosemite Valley he was accompanied by George Haberfelde, president of the California Automotive Trades Association and R. W. Martland, secretary.

He addressed nearly every dealers' association on the coast and talked personally with hundreds of them.

This article tells briefly, in a general way, some of his impressions of the West as an automotive market. It has been written exclusively for Automotive Industries and contains information of interest to every executive.

DEVELOPMENTS of importance to manufacturers of automotive equipment were apparent on my trip through the Pacific Coast States. In the first place, the Western jobbers and manufacturers of automotive equipment, as a result of the educational work being carried on in behalf of the jobber and dealer by the Automotive Equipment Association, are now making an earnest attempt to follow out better business practices and eliminate the wastes from the methods pursued in the past.

I talked with many of the leading automotive jobbers and retail dealers, who felt that their profits in the future will come from better methods in eliminating the careless wastes which they have permitted in their business in the earlier days of their business career.

In San Diego a live dealers' organization exists which is not limited to a membership of dealers alone but embraces garage, repair and battery men so that there is being brought together through the combined ideas of these men a more complete understanding of the problems of automotive selling in all its phases.

In other words, the dealer no longer feels that the garage man and the battery man are merely a garage and a battery man but, due to a closer and more sympathetic understanding of the problems of each, there is a closer relation established which brings about a co-operation which characterizes not only the dealers' organization in San Diego but throughout the entire State of California as well. This is due in a large measure to the work of R. W. Martland, secretary of the California Automotive Trades Association, who is carrying on work of such a character as to be of immense value to the manufacturers in the East. Nowhere else in the country has a more complete organization been effected than in California, followed closely by Oregon, where the dealers' associations are occupying positions of importance to the business welfare of the entire community.

Within the last year the Washington Automotive Trades Association has been organized under the guidance of L. E. Titus of Olympia, and much of the constructive work which has been accomplished by the Washington and Oregon organizations has already been started under his direction. The General State Convention, which I attended on July 21 and 22, 1922, was the best I have ever encountered, and I am sure that in no small measure the work carried on by these associations is responsible for the extensive sales promotion which has characterized the automotive trade at the coast.

I want to set at rest the feeling that there is such a thing as a saturation point in the sale of automotive products to organizations in the Pacific Coast. Developments are taking place in the west coast with such rapidity that these dealer organizations which are studying all phases and problems of their business are now to see in them the possibility of future sales expansion. National parks draw thousands of tourists monthly and bring service requirements which are not to be found in the East at any point. I visited Crater Lake, National Park, Yosemite Valley, Mount Rainier and the Grove of Big Trees and on every hand found machines from practically every State in the Union.

One dealer pointed out the fact that the minute these parks became so over-crowded that the tourists were turned away from them there were still many parks to be opened up and service stations and equipment would be produced to take care of them. With the Columbia River Basin project to be put forth in the State of Washington, 1,900,000 acres of fertile and irrigable land will be released of such productive nature that every owner of one of the 120 acre plots will be in a position in a year or two to purchase an automobile and accessories to go with it.

The Colorado River project with the Boulden Canyon

*Chief, Automotive Division, Bureau of Foreign and Domestic Commerce.

dam on the Colorado River will release waters to irrigate 3,500,000 acres of land, second only to the productive acres in the Imperial Valley. I could go on citing numerous other illustrations showing why the automotive industry is bound to go ahead with even greater strides than it has in the past. Take, for instance, the development of aerial navigation, which is becoming more and more apparent on the Pacific Coast. At the beginning and end of every aerial flight, it is necessary for a motor car or other automotive vehicle to be utilized to take the passengers into the city, thus opening up another avenue of sales.

Great natural resources exist in the Northwestern forests, in which most of the timber of the United States is still standing. After this is cut down and sold and converted into dollars it will represent an increased purchasing power to the Northwest which doubles back again on itself when this same land is opened up and converted into producing ranches.

The thing which impressed me most in addition to the natural resources of the country was the attitude of the dealers and dealer associations who are attacking in common interest for the benefit of all the problems which confront all the automotive dealers of to-day. Men of picked caliber, such as L. E. Titus, president, and W. A. Simonds, secretary, of the Washington Automotive Trades Association; A. H. Brown, president, and Ralph Staehli, secretary, of the Oregon Trades Association, and R. W. Martland of the California Trades Association, are bringing about a realization of the possibility on the part of the dealers for the future in all automotive lines so that the Eastern manufacturer can look forward with confidence to the Coast States being one of their richest territories for many years to come.

Personally, I do not believe in a point of saturation because human intelligence and ingenuity will meet changed conditions as they arise. Certainly this is so in the West.

The purpose of my visit to the Pacific Coast was to bring a more intimate knowledge to Washington of the automotive industry which has heretofore not been accurately known by some of us here in the East.

Motor Buses Increase in Peru

THERE are sixty motor buses at present running in Lima, Peru. A year ago at this time the first one appeared. The great majority of the sixty have come out during the last six months.

Of these buses two are Chevrolet, two Graham Brothers, two Renault and three Benz. The balance are built on the Ford truck chassis. There is also a Mooreland truck converted into a bus.

The Ford buses, at least a portion of them, are limited to ten passengers. The great majority of the buses have both motorman and conductor, but a few are so arranged that the chauffeur or motorman could do all this work.

Most of the buses run from the Plaza Bolognesi to the Plaza de Armas, that is, from a point on the outskirts of the city to a point in the center. The distance is not much more than a mile. The fare charged is 10 cents Peruvian money, equal at the present time to about 4 cents gold. The reason why this route is chosen is partly because it does not compete in a direct line with the street cars, but more especially because it is the only route in the city that has good asphalt pavements.

A Ford automobile charges for 1 or 2 persons from Plaza de Armas to Plaza Bolognesi 50 cents Peruvian now about 20 cents gold. Street car fare is 5 cents second class and 10 cents first class Peruvian money.

The Mooreland bus, the two Graham Brothers buses and one or two Fords run from the Plaza de Armas to Miraflores, a suburb of Lima, six miles distant from the capital. The fare charged is now 30 cents, though there are rumors of a reduction to 20 cents. The interurban street car fare is 15 cents. Here again the reason why this route is chosen is because there is a good asphalt road between Lima and Miraflores that has been recently opened, the *Ave. Leguia.*

The buses have also begun running from the Plaza Bolognesi to Magdalena, over a macadamized dirt road, but this service is not yet well established. Also buses are running over one or two other streets of the city, despite their bad condition. It is not improbable, however, that the owners may find the cost of operation so high, owing to the bad streets, that they will be compelled to take their buses off.

The buses of Lima are privately owned, but operated under the direction of the traffic police of Lima, at the terminal points. The growth of the bus business in Lima has far outstripped street paving and road building. The only thing that at the present time prevents their being five times the number of buses there are in Lima and vicinity is the lack of five times the number of good streets and roads.

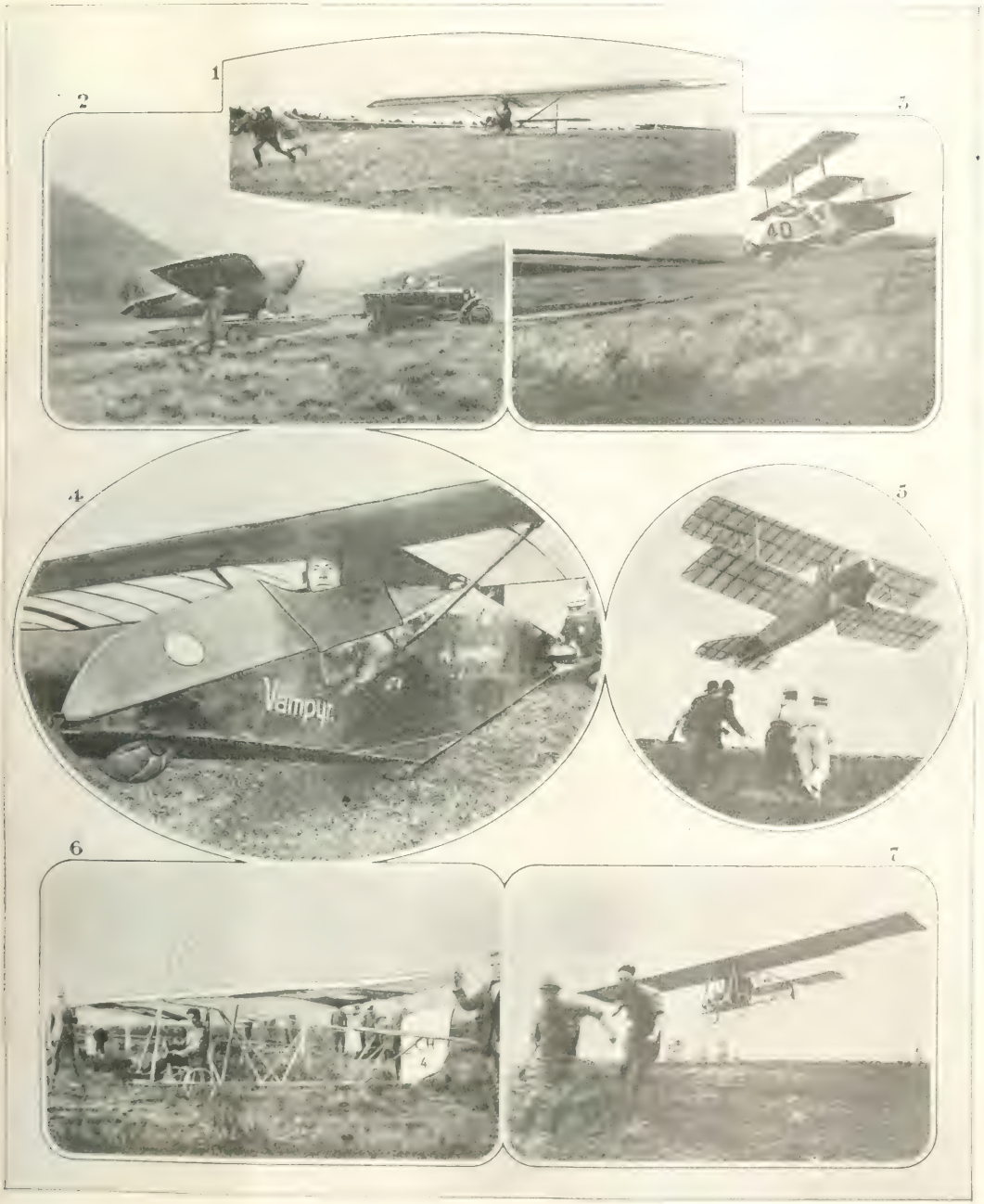
Outside of Lima, in the Provinces, motor bus or automobile service was in force between Tarma and La Oroya in the central Andes before it came into vogue in Lima. A Stanley steamer made the trip from Tarma to La Oroya in the south. Automobiles are now carrying passengers from Ica and vicinity to Lurin, the nearest point of rail connection with Lima. Here a motor bus will soon be following in the track of the automobile.

Exports of automotive products from Canada during July reached the total value of $1,818,359—an increase of about 21 per cent over the exports during June, which more than makes up for the decrease of 13 per cent during the latter month as compared with May, according to the Automotive Division of the Department of Commerce.

The markets of Canadian automotive manufacturers have not increased steadily as have those of American producers nor have they been stable in their demands, the Division states. Since the first of the year each increase in the value of Canadian exports has been followed by a decrease and each decrease by an increase, with the exception of March and April, when two consecutive decreases were recorded.

The number of passenger cars shipped monthly has fluctuated from 1334 in January to the high point of 2985 in March. July shipments of 2812 cars valued at $1,566,194 coming close to the March record and marking an increase of 24 per cent in number and 10 per cent in value over passenger car shipments during June. There were 211 trucks exported at a value of $99,052, an increase of 24 per cent in number and 33 per cent in value, while parts shipped reached the value of $153,113, a gain of 51 per cent in value.

Gliders in Recent European Contests



(Copyright, Wide World Photos)

1—*The Harth-Messerschmidt motorless airplane, which established a mark of 21 minutes, 37 seconds in the air in competition recently for the Rohn Prizes.* 2—*The glider of Deshayes at Clermont-Ferrand, France.* 3—*Clement de Sardier, noted French aviator, taking off in his triplane glider, at the recent international gliding meet held at Clermont-Ferrand, France, in which he remained in the air for 80 seconds. De Sardier's plane was the only triplane contesting.* 4—*F. W. Hentzen and his motorless sailplane in which he broke the world's glider record by attaining an altitude of 1200 feet, remaining in the air 3 hours and 5 minutes, at Gersfeld, Germany.* 5—*The French airman, Douchy, starting from the summit of the Puy de Dome, to fly for 9 minutes and 2 seconds in his motorless biplane glider, besting all previous French performances.* 6—*The frail monoplane glider of Aubut, a French entrant in the international airplane glider competition at Clermont-Ferrand, France.* 7—*Allen of United States glided 1000 meters and rose 45 ft. This glider was built at the Massachusetts Institute of Technology.* (Copyright, Brown Bros.)

Automotive Electric Association Develops Standardization Program

Annual summer convention well attended by major executives. Active standardization work undertaken. Service problems given attention. Desire car dealers to introduce owners to electrical service stations where necessary equipment is available.

By David Beecroft

OLD ORCHARD, ME., Sept. 1—Consistent pushing of a comprehensive program of standardization in electric starting, lighting and ignition units was one of the major topics considered at the annual summer convention of the Automotive Electric Association which completed its four-day session at the Old Orchard House here. The convention, the best in the history of the association, was well attended by all of the manufacturers with the exception of two, most of the companies being represented not only by their presidents or major executives, but also by their chief engineer, their service manager, and their legal representatives. Approximately 65 were present, including a dozen members of their families. President A. D. T. Libby, of the Splitdorf Electrical Co., presided at all general sessions.

The members realized the urgent necessity for more active work in standardization, and the standardization committee, under the chairmanship of Joseph Bijur, of the Bijur Motor Appliance Co., is already well under way with its standardization program. This program was really launched at a meeting held earlier this year at Atlantic City and was carried forward later in conjunction with the Society of Automotive Engineers at its summer meeting at White Sulphur Springs in June.

The basic consideration in this standardization work will be to make haste by not standardizing too hurriedly but rather standardizing where such standards will be generally accepted and used by the majority, if not all, of the manufacturers. All of the eleven manufacturers of starting, lighting and ignition apparatus are very much agreed on such a program, and there is a keen appreciation of the fact that most of them are manufacturing too wide a variety of designs.

Here is how Chairman Bijur summed up the standardization program:

"We are starting to standardize the size of electric generators as determined by the electrical output of them and will classify the different generators into different groups on this basis so as to have a minimum number of different sizes. We plan, also, to similarly standardize starting motors as determined by torque and power.

"In this way, perhaps, five or six different sizes of generators known as No. 1, 2, 3, 4, 5 and 6 which will serve for all engine requirements, will be agreed upon.

"The plan is then to follow this by an agreement in the size of parts entering into these generators and starters so as to arrive ultimately at a fair degree of uniformity of construction. It is probable that if this is agreed upon, it may be possible for different makers to use the same size of brushes, bearings, field coils, lubricating devices, terminals, etc., and if there is not total agreement in this, there certainly will be a very marked reduction in the variety of parts now in use."

This tentative standardization program will be submitted to the engineering departments of each of the electric manufacturers with an invitation to criticize the suggested specifications and suggest other possibilities of carrying the work further. It is hoped that manufacturers of cars, trucks and other vehicles, as well as large service organizations, will not only criticize the specifications but make suggestions on further phases of standardization.

Up to the present, the association standards committee has suggested specifications for different sizes of generators. These specifications are not final, they have not been adopted by the association but they are formulated for the purpose of receiving criticisms and suggestions. The generator program suggests six sizes, as follows:

No. 1 Generator—This, the smallest suggested generator type, is one intended for small cars using rather high-speed four-cylinder engines and the specifications are intended to be sufficiently broad so as to embrace practically all that are manufactured at present. The required output, hot performance, is zero amperes at 6½ volts at 9 to 11 m.p.h. car speed; 7 amperes at 7 volts at a car speed of 14-16 m.p.h., and a maximum output of 10-13 amperes at 8½ volts at a car speed of 23 m.p.h. The generator speed is 70 r.p.m. per mile per hour car speed. The permissible temperature rise is 100 deg. centrigrade above the room temperature. This rise being measured 1 16 in. from the armature within the housing of the generator. There would not be such a temperature rise with the car in motion and with air circulating around the housing.

No. 2 Generator—This generator, intended for all medium six-cylinder cars, would operate at 63 r.p.m. per mile, per hour car speed, a slower speed than No. 1, and would have a permissible temperature rise of 90 deg. centigrade. Its cold performance would be: At 6½ volts, zero amperes at 7 to 9 m.p.h.; would give 7 amperes output at 7 volts at 12 to 14 m.p.h., and a maximum output of 15 to 25 amperes at 8½ volts at not more than 20 m.p.h. car speed. Its hot output would be: A zero output at 6½ volts at 9 to 11 m.p.h. car speed; an output of 7 amperes at 7 volts at 14 to 16 m.p.h.; a maximum output of 12 to 15 amperes at 8½ volts at not more than 22 m.p.h., and a maximum output of not more than 11 amperes at 8½ volts at 30 m.p.h.

No. 3 Generator—This generator would be a slower speed design than No. 2 but having a hot and cold performance the same as No. 2. It would give its output at a lower speed and would use an engine speed or ratio of 1 to 1. This would be suitable for four-cylinder engines on trucks or where quietness and slow speed are most desired in passenger cars.

No. 4 Generator—This is a voltage type generator working at a speed of 45 r.p.m. per mile per hour car speed and is intended for the largest types passenger cars. Its cold performance would be: An output of zero amperes at 7½ volts at 8 to 10 m.p.h. car speed; an output of 7 amperes at 7½ volts at 12 to 14 m.p.h.; an output of 20 amperes at 7½ volts at 16 to 20 m.p.h. Its hot performance would be: An output of zero amperes at 7½ volts at 10 to 14 m.p.h.; an output of 7 amperes at 7½ volts at 13 to 16 m.p.h., and an output of 20 amperes at 7½ volts at 20-25 m.p.h.

No. 5 Generator—No attempt was made to write any specifications for this type of generator intended for motor bus service further than to describe it as a 375-watt type with an output of 25 amperes at 15 volts. This would be a 1-to-1 ratio machine. Some manufacturers are developing machines of this type at present and others are manufacturing them.

No. 6 Generator—No effort has been made to write even tentative specifications for this type but the indications are that perhaps a 750-watt machine is needed for airplane, aircraft and gasoline railway car use. It would have an output of 50 amperes at 15 volts.

The standardization committee is particularly anxious to get suggestions on specifications for generators No. 4, 5 and 6. Concerns operating motor bus lines and others in aircraft or railroad car work are invited to send in their suggestions.

The standards committee has not made much progress in writing its specifications for electric starting motors. And those written so far are largely tentative. The plan is to have a series, the number in which series has not been settled.

No. 1 Starting Motor.—Tentative specifications for this, the smallest starting motor type, are that it should deliver a lock torque of 10 lbs. at 1 ft. radius with not more than 500 amperes at 3½ volts. This would be at a 1000 r.p.m. This motor is for the small car and would be intended to line up with the No. 1 generator. It would be a direct acting motor, that is, the pinion on the armature shaft meshing with the flywheel ring gear.

The standards committee has not outlined any specifications for additional starting motors, but plans to arrive at some in the near future along the lines suggested.

President Libby for Standards

That the entire Automotive Electric Association is solidly back of its standards committee in a realization of the necessity for standardization was well brought out in the address of President Libby, himself a strong advocate of standardization and who described it as the light that would lead the manufacturers in the development of their new designs. President Libby summed up his views on this by enumerating nine stumbling blocks that have stood in the way of a greater standardization of electric equipment. These are:

1. There is no concerted or systematic effort made in the way of publicity to show the advantage of using more highly standardized products.
2. There is a disposition on the part of a few manufacturers not to use approved standards, evidently due to a desire to retain complete individuality.
3. That standards should be better commercially and cheaper to manufacture.
4. That standards have generally been approved as the result of a compromise in an attempt to meet divergent views.
5. That the engine designers have been considering electrical equipment last.
6. That a standard may be anything which any company is making in large quantities.
7. That, under present market conditions, electric equipment manufacturers find it impossible to even standardize their own productions.
8. That under market pressure electric equipment manufacturers yield to the demand for special machines on large orders.
9. That present designs (standards) were approved practically without trial. Many times there is no approach to what engine designers want in these standards.

Close to the problem of standardization and in no sense secondary to it, the members of the Automotive Electric Association are considering service, and in this are confronted with major problems. Perhaps no problem is greater than that arising out of the fact that the automobile manufacturer in his 90-day warranty explicitly states that his guarantee does not cover starting, lighting and ignition apparatus plus batteries. The electric manufacturers, generally, and they are not unanimous in this, are of the opinion that if the car manufacturer will not personally guarantee the electric product on his car then he should at least recommend that the service on this electrical equipment should go to those authorized service stations created by manufacturers of electric equipment.

Dealers Lack Equipment

At present, many motor car dealers want to service the electric parts, but many of the equipment makers declare they have not the necessary electric testing stands and equipment and that many of them have no electric workmen who would meet the test requirements of these makers.

The electric equipment manufacturers would, generally speaking, like a general adoption of what is known as the registration plan followed out. This plan is that when a car dealer makes a car sale he will give to the purchaser a card which virtually introduces him to the authorized service station of the maker of the electrical equipment on the car, so that this owner will virtually register his electric equipment with this electric service man.

There is a more or less general disposition among several of the electric equipment manufacturers to have the electric service done by the car dealer, providing he will install the necessary equipment and engage necessary help.

The greatest difficulty in this electric service comes frequently in the small town of 2000 population or under which finds difficulty in supporting an exclusive electric service station due to the fact that the car dealers endeavor, generally, to do their own electric servicing.

One manufacturer of electric equipment told of investigating the ability of car dealers in a certain section to adequately care for electric service and discovered that only 1 per cent measured up to service requirements.

So great is the importance of the service problem that the service committee of the Automotive Electric Association will hold a meeting every 90 days, this being held one day in advance of the meetings of the Board of Governors, so that speedy approval may be taken by the Board.

Little can be said about the work of the legal and patent committee under Chairman Victor S. Bean, patent counsel for Westinghouse Electric & Mfg. Co. This committee works very largely in settling patent controversies among members and preventing unnecessary legal litigation. The membership feels that perhaps hundreds of thousands of dollars have already been saved in this regard.

Distribution of 10-cent Fare in Motor Bus Operating Costs

Policies and methods that have worked successfully. Overloading buses unwise. Bus selling involves a knowledge of operating methods, etc. Data on bus operation and costs in New York City.

By G. A. Green*

WE are unqualifiedly behind any movement that will aid the bus to come into and remain in the field that is peculiarly its own. We are positive that the short road is the seated load and if builders will bear this in mind from the standpoint of design and warranty, the automotive industry will assuredly find ample repayment.

We earnestly hope that the automotive industry will read the writing that is so plain to see and that it will profit by what has occurred with the street railways, in regard to the matter of overloading. For it must be remembered that the bus has its limitations and that it is not the cure-all for every ill that transportation is heir to.

Strictly speaking, there is no actual relationship between the design of a bus and the fares charged to passengers. Obviously, however, the better the design, the lower will be the operating cost. Naturally, this will make for lower fares. We believe that in the present state of the art no real success can be attained with less than a 10-cent fare. We are, of course, assuming operation based on seated loads and ample service during both the light and the heavy hours. But with character service, properly designed and maintained equipment, the people are quite willing to pay a 10-cent fare. There is ample evidence of this in New York City, Detroit, Chicago, Toronto and other cities.

The necessity for a 10-cent fare does not rest with only the bus. Many electric railways need a 10-cent fare in order to be put on a paying basis. The last available tabulation shows that 140 electric railways in the United States are receiving a 10-cent fare, and that over 95 per cent of the electric railways in the cities of the United States have received varying increases in fare during the last few years. Some cities have a first fare of only 6 or 7 cents, but to this must be added a charge for transfers. Many cities have been placed on the zone system that works out in some cases as high as 3½ cents per mile. Even with an increased fare, the last available figures show that about 10 per cent of the electric railways in the United States are in the hands of receivers.

Obviously, a correct comparison of operating expenditures can be made only on the assumption that similar detail classifications are employed in conjunction with a similar accounting system. Here the difficulties begin, for as yet few companies operating buses use the same accounting methods.

There is shown in Table 1 not the customary detail cost statement, but what might be described as an income analysis. Actually it represents a distribution of the dime as received from each of those who rode on our buses during the year 1921.

From these figures it is abundantly clear that we should have made a very bad showing with a fare of less than 10 cents. Here is emphasized very clearly the fact that the success or failure from the standpoint of an undertaking such as our own depends absolutely on the addition or subtraction of what at first sight appear to be insignificant amounts. To emphasize this point, during 1921 we carried a total of 52,216,946 passengers, so the net income from this source at 1.44 cents per passenger works out at $751,924.02. To permit of a comparison being made between the conditions confronting us and those faced by others, it should be noted that we operate a total of 25 miles of one-way route, that our longest run is 10.2 miles and our average haul 5.0 miles.

Something may be gained by outlining the character of service that must be expected, for it is here that the average engineer underestimates the difficulties to be

EVERY bus manufacturer will be interested in this study of operating costs of the Fifth Ave. Coach Co. We printed some time ago those parts of Mr. Green's paper dealing exclusively with design, but held this cost discussion for separate consideration.

Bus selling for some years to come will involve a good knowledge of operating methods, costs, and possibilities on the part of the vehicle manufacturer.

TABLE 1—DISTRIBUTION OF EACH FARE RECEIVED

	Cents
Total Operating Expenses	6.77
Total Taxes	0.86
Reserved for Injury and Damage Claims	0.08
Reserved for Depreciation	0.60
Interest on Capital Investment	0.55
Net Income	1.44
Total	10.00

*General Manager Fifth Ave. Coach Co. Excerpt from paper read before Summer Meeting of S.A.E.

encountered. First, let us consider the cumulative result of a year's performance of the physical limitations that are primarily responsible for wear-and-tear. For the sake of argument it may be assumed that these data are applicable to any bus operated by any public utility. The figures are presented in Table 2.

TABLE 2—DATA ON BUS OPERATION IN NEW YORK CITY

Yearly Mileage	30,000- 60,000
Stops and Starts	180,000-360,000
Change-Speed Applications	360,000-720,000
Clutch Applications	360,000-720,000
Different Drivers	1,460- 2,920
Brake Applications	200,000-400,000

Assuming the same general plan of upkeep as employed by the Fifth Avenue Coach Co., each bus would be thoroughly inspected after every 2000 miles of operation and rebuilt and repainted yearly. A vehicle would be expected to require no incidental repairs between inspectional periods and no major repairs between either inspections or yearly overhauls. The inspectional periods would occur approximately every 14 days. The maximum inspectional allowance is 8 hr. The allowance for yearly overhaul is 7 days. Roughly, it may be said that under these conditions, each bus is scheduled for service 342 days out of 365.

The statistics quoted as to mileage, stops and starts, and the like, speak for themselves. Those who have never had control of a public utility operating buses cannot possibly picture the sum total of the abuse the average bus must suffer. More than anything else, frequent changes in drivers result in increased service difficulties.

It may be safely said that if one could with a bus have the same driver daily, at least 50 per cent of the service troubles would disappear. This, however, is quite impractical, since the loss in earnings would many times offset the decreased service cost. Even with an operation of moderate size, the bus must of necessity lose its identity. It becomes merely a transportation unit. There must be changes in drivers daily, many of whom will feel scarcely any pride of ownership. All they are concerned with is being on schedule time. This means that the bus will be subject to extraordinary abuse. The mechanisms of the bus must be capable of treatment of the most brutal nature; otherwise constant failures will occur.

BEFORE one can proceed very far from a design standpoint, there must be some fairly clear conception of the vehicle life that is to be expected. In this connection it is necessary to lay stress on the fact that motorbus design is still in its initial stages. Five to 7 years is about the maximum life of the most modern type. It is not a matter of wear-and-tear, for a vehicle may be so well cared for that there is no limit to its life. Obsolescence is the real issue. The ideal conception is to carry out the design so that the various units which when assembled comprise the complete structure have as nearly as possible an equal life.

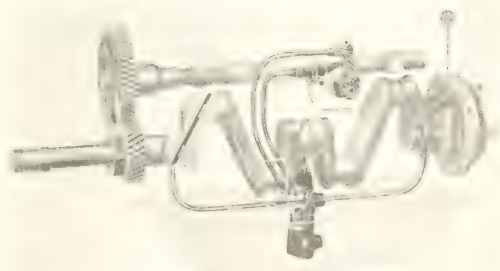
Maxwell Engine Changes

MAXWELL cars are now coming through with three-bearing crankshaft engines in place of two. Beyond this alteration the cars are exactly the same as recently described. The three-bearing crankshaft has necessarily brought with it some alterations in the crankcase and bearing mountings and on the new shaft an oil slinger ring is incorporated. The cylinder block, pistons and all of the structural parts of the engine unaffected by the crankshaft remain as before and the engine taken as a whole is the same product which has been developed over a long period of years for the Maxwell cars.

The new shaft is unusually heavy and consequently rigid for this size (3⅝ by 4½ in.) engine having a center bearing diameter of 2¼ in. The diameter at each end bearing is 1⅞ in. It is pointed out by the Maxwell engineers that this bearing length is approximately one-third of the total length of the shaft. The overall length of the engine remains unchanged.

In connection with the new crankshaft the lubricating system has been altered to take care of the interior of the engine by full pressure through a drilled crankshaft in place of splash. The oil pump is now a gear driven type operated from the camshaft. Oil is pumped under a pressure of 10 lb. per sq. in. at normal speeds through three large leads to the three main bearings. The front end bearing is so designed as to permit a flow of oil direct to the timing gears. Oil is also supplied to the lower connecting rod bearings through the drilled shaft and by spray from the rod ends to the pistons and other working units.

While there has been no fundamental change in the gasoline vaporizing system, the ramshorn type of manifold adopted some time ago being continued, the carbureter is now the Stewart. This is the only alteration in the exterior of the engine. The powerplant is the unit type and the clutch and gearset members remain unaltered except for a double row annular ball bearing in the rear of the transmission shaft in place of the plain bearing.



New Maxwell three-bearing crankshaft

SIX hundred and twenty-one thousand three hundred and seventy miles of flying with passengers, freight and mail were completed by the Royal Netherlands Aeroplane Company on July 22, 1922, says Consul Mahin, Amsterdam, in advices to the Department of Commerce.

Not a single accident has occurred, the consul reports. This company has a daily service between Amsterdam and Paris and a twice-a-day service between Amsterdam and London. The distance over each of these routes is approximately 300 miles.

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Employing Executives

CONSIDERABLE study has been given to the problems of selecting the proper workers for given jobs in the factory. Similar efforts have been made in connection with routine jobs in the office. Methods of gathering a large number of applications have been devised, with a view to carefully selecting the men best fitted for the position.

The facilities for getting a well-sifted list of engineers and executives have not been so well recognized. In filling jobs of this character the manufacturer has usually "looked around" in an indefinite sort of way without actually getting a clear vision of all the prospects in the field. As a matter of fact, selecting men for executive positions requires far more consideration than does selection for routine office or factory jobs. The cost of making a mistake in choosing a man is far higher in the latter case.

The employment departments of the engineering societies offer an especially good opportunity for getting in touch with the best fitted men for executive positions. The Society of Automotive Engineers has recently expanded its employment work to a point where it is capable of giving manufacturers very helpful and competent service.

The same thing is true of the Engineering Societies Employment Service in which the A. S. M. E., A. S. C. E., A. I. M. M. E., and A. I. E. E. are combined. This latter service, for instance, supplied nearly two thousand men to manufacturers during the first six months of this year.

These services are equipped to interview applicants and to judge with a high degree of intelligence the qualifications of the applicants for the positions open. In this way they reduce the number of applicants the manufacturer must investigate and interview to a minimum.

Glider Deductions

THESE days of dreams as to the possibilities of airplane gliders are apt to lead our thoughts far afield into avenues which seem now to border on the impossible.

The German tests, when the complete report is published, may show that a very great percentage of the reason for flights of 3 hours or longer is due as much to a study of the topography of the surrounding territory and to a study of general atmospheric conditions as to the design and operation of the gliders.

The use of gliders will accomplish a great good if it does nothing more than lead to a much more minute study of atmospheric conditions. The extent to which a study of atmospheric conditions, wind currents, etc., will aid commercial aviation, is practically an unwritten book. Such a study may have quite a distinct effect on reducing the number of airplane accidents, as there are cases on record where accidents were apparently directly due to ignorance of such conditions and might have been avoided had the operator studied such.

A case in question is that of a recent fatal accident where the aviator was killed by the plane falling into a small lake soon after the take-off. The take-off was from a sun-baked field near by on which was a large concourse of people. Undoubtedly there were upward air currents caused by the condition of the land, and accented by the people, which aided in lifting the plane to a certain extent after it left the ground. Over the surface of the lake with its cool water conditions were different, there doubtless being a downward current because whatever goes up must come down can be applied to air as well as to heavier objects.

Continuous experimentation with gliders should not only lead to greater safety in aerial navigation, but should focus attention on greater efficiency as well.

The high cost of aircraft transportation is today retarding the development of the art. Our air-

planes developed generally under the command of war had an abnormal development not only numerically but from the economic viewpoint. There was no lock on the treasury to hamper development. If more power were needed, dollars were the answer for such by the development of lighter and more powerful engines. If greater speed were needed, the answer was found in more dollars; in short, money was the open sesame resorted to. While such a program of development was satisfactory and commendable in war, it may not prove economical in days of peace when aerial transportation can grow only if it has regard for the cost.

The development of the glider will doubtless bring about a closer study of aircraft design apart from the engine; it should result in a lighter construction and a more efficient machine, so that less horsepower will be needed for a given performance; and it should accelerate the detailed study of atmospheric conditions that will not only render transportation cheaper but safer.

Durability vs. Cost in Batteries

FROM time to time we have drawn attention to the fact that there is much to be desired in respect to the serviceability or durability of the storage battery used in the average car of to-day. In a piece of publicity recently sent out by a prominent battery manufacturer, it is frankly admitted that the demand for lighter and cheaper batteries has resulted in their being manufactured in such a way that their average life is much below former standards. In short, they are built down to a price and not up to a high standard of quality.

The car owner, of course, takes the grief which usually comes about the second year of the car's life. In general he pays from two to four times what a reasonably serviceable battery would have cost the car manufacturer in the first place and the battery he receives is no better than the original one was when it was new. The car manufacturer saves perhaps $5 to $10 with the net result that the operation of the car costs the owner, during the entire life of the car, probably $50 to $100 more than it should. Besides, there is the frequent annoyance caused by trips to the service station occasioned by failure of the electric system to function properly.

This condition arises from a shortsighted policy which sooner or later is certain to react upon the car builder as well as the battery manufacturer. How many car purchasers would not gladly pay an additional $5 or $10 for a car if they knew that by so doing they would be saved several times that amount within two years, not to mention the advantage of a much greater freedom from trouble?

Items such as this simply aggravate the service problem and help to make the used car problem even more serious.

The time has come when many believe that it would be better for all concerned if manufacturers would pay more attention to improving quality and less to simply making something cheaper.

The Rail Strike Injunction

WITH hard and soft coal miners back at work, the industrial horizon still is beclouded by the rail strike. There are no present indications of a settlement of this difficulty. The railroads apparently have won, in the East at least. The handling of a record breaking Labor Day exodus was looked upon as a crucial test and the Eastern carriers met it surprisingly well. Roads in other sections of the country, particularly the South, are not so fortunate. It seems probable, nevertheless, that all of them will gradually escape from their difficulties.

Both sides to the controversy seem to be deeply incensed at the action of the administration in obtaining the most sweeping injunction ever granted against strikers. Labor stamps it as an attempt to crush unionism while the carriers contend that the complaint of the attorney general, alleging that transportation threatens to collapse, was based on ancient history.

If the Daugherty injunction stands and crushes the strike, it is likely to change the whole trend of trades unionism in the United States. Under existing conditions it would foredoom to failure any strike which would interfere seriously with the industrial life of the nation. It is too early yet, however, to predict the course of the court proceedings. They probably will result in a bitter legal battle with the Supreme Court ultimately deciding the issue.

Provided the injunction is made permanent and is sustained in the higher courts, the strike will have lost much of its effectiveness as a weapon to enforce the demands of labor. It inevitably will breed radicalism and will give great impetus to the Foster campaign for One Big Union. Gompers and his conservative associates may find themselves forced to align themselves with the element they have fought consistently for years. The very life of unionism, as they understand it, will be at stake.

Time alone can disclose the full effect of the course taken by the administration. It is not likely to result in a general strike at this time although the potentialities of the situation are sinister.

With no labor difficulties of their own, except a shortage of help, automotive manufacturers are more concerned for the moment with the freight jam which will follow the movement of coal in abnormal quantities simultaneously with bumper crops at a time when an extraordinarily large amount of rolling stock is in bad order.

Industry as a whole probably will not feel the full effect of the strikes for another month. Its problem will not be one of fuel but of getting cars to move its finished products and bring in raw materials.

The automotive industry will be wise, in shaping its policies, if it gives full consideration to the virtual certainty of unprecedented freight congestion for the remainder of the year.

Plants Keep Wheels Running Full Power

Production Being Maintained at High Speed—Parts Makers Keep Pace

NEW YORK, Sept. 6—Henry Ford's announcement of his intention to close his plants Sept. 16 because of the coal situation has not upset the rest of the automotive industry to any appreciable extent. Other leaders are making every effort to meet the situation and keep their factories up to the record breaking production pace the industry as a whole has been hitting the last few months. They will keep the wheels turning just so long as they have any coal left.

Hope for Strike Improvement

A survey of the industry shows that nearly every one is able to secure the necessary power and that they will not have to worry over the situation for at least two weeks more, when it is hoped the strike situation will have been improved.

More serious, in the minds of many, is what will happen after the coal strike is ended. It is feared that the railroads will be called upon to haul so much coal as well as handle the crops that industry as a whole will suffer through inability to secure transportation needed to bring materials into the factories and deliver the finished product into the hands of the dealers. It is thought that this situation may slow things a bit, although driveaways will relieve the situation so far as car deliveries are concerned.

Outside of the coal and transportation situations, the automotive industry is enjoying an unexpected prosperity. Production is being maintained at a record breaking clip and it is declared that when the August reports are all in it will be found that the industry has made more cars in the eight months of 1922 than it did in all of 1921. Indeed, it is believed that the production figures for the full year of 1922 will be greater even than the record breaking 1920, when 2,205,000 motor vehicles were turned out.

Parts Orders Increased

This prosperity is not confined to the car makers alone. The parts people are keeping step with their customers. Reports received show that there are enough orders on hand right now to keep the parts and accessories plants busy until after January. A surprising angle is that within the past week some of the leaders have had orders already received increased, which shows that the car manufacturers have no intention of slowing production at their end of the line.

Business in Brief

It is felt that the ending of the coal strike has benefited trade and industry to a certain extent and that the rail strike is the main deterrent. If the railroads can meet the demands that will be made upon them through the heavy movements of coal, materials, etc., and it is thought they can, the general outlook will be much brighter than it has been in some time.

Free movements of finished products to market are slowed by the rail strike, but it is felt that it will not be for long. Coal moved well last week, 10,000,000 tons of soft being produced as against 6,250,000 the week previous. Iron and steel prices are higher and production still is curtailed. While pig iron is moving freely, some points in the West report premiums being paid by needy purchasers.

There are new low levels for grain prices but other foods are higher. Corn is gaining in the Ohio valley, Missouri and Iowa, but is off in the Northwest and Southwest. Strike conditions affect cotton, lumber and crops in the South.

In a business way the fall jobbing trade is slightly improved. Cotton print cloths are firmer; hardware prices are stable; shoes and leather are selling better and so are silks and jewelry. Less activity in the retail trade is reported.

Car loadings of merchandise and miscellaneous freight increased 3639 in the week ending Aug. 19 and coal increased 2600. Total loadings of all freight were 856,219 cars as against 815,147 last year and 968,103 two years ago.

Stocks were buoyant after a reaction and bonds were irregular. Call money was firmer. Bank clearings aggregated $5,637,969,000, a loss of 3.9 per cent from last week, but a gain of 8.4 per cent over this week last year.

CADILLAC TO BE FILMED

WASHINGTON, Sept. 5—Something new in motion picture showing production methods in the automotive industry will be undertaken by the automotive division of the Department of Commerce in co-operation with the Cadillac Motor Car Co. The new pictures will in no wise interfere with the filming of production methods under the Department of Commerce in connection with the Studebaker Corp.

Walker Stockholders Tendered New Issue

Consists of 75,000 Shares of No Par Common Previously Authorized

CLEVELAND, Sept. 2—In order to increase the working capital of the company, directors of the H. J. Walker Co., maker of automobile engines, have mailed a circular letter to stockholders in which they announced that 75,000 shares of no par common stock of the company, heretofore authorized but not issued, will be offered for sale at $5 per share.

It is stipulated that subscriptions may be made by stockholders of record of Sept. 5 at that price and the time limit of such purchases is Sept. 15, 1922. The stipulation also is made that subscriptions will be made and accepted subject to the working out of arrangements satisfactory to the board of directors, bondholders and creditors of the company and subject to the disposition of such an amount of common stock as shall be adequate to permit the resumption of operations.

The directors feel that the entire 75,000 shares should be disposed of, but it is possible that arrangements can be made which will justify the company going forward with somewhat less additional money.

Feel Confident of Success

The directors say:

Your directors feel most strongly that the stockholders preserve this company; that the possibilities for a successful and profitable business amply justify preserving it; that the present investment of the stockholders should not be lost without further effort on their part; that our plant has a capacity of 100 motors per day and that, with that production, a profit of only 10 per cent would approximate $500,000 per year—or nearly $3 per share on our total authorized common stock; that there is every reason to believe that a large volume of business can be secured if satisfactory arrangements can be worked out.

As to working out satisfactory arrangements with our bondholders we feel confident of success. The great majority of the creditors had agreed to accept preferred stock in payment of their claims under the original syndicate for refinancing. As you undoubtedly are aware a petition in involuntary bankruptcy was filed recently against this company by certain creditors, but, after ascertaining the status of our affairs, it was apparent to their attorneys that the creditors' interest could only be saved by the plan of re-financing here proposed and they have agreed to defer action on their petition until after our plans has been fully tried out.

ELECTRIC BODY NAMES TURNER

OLD ORCHARD, ME., Sept. 1—Earl Turner, who has been assistant secretary of the Automotive Electric Association, was to-day made manager, this being one of the final acts of the four-day summer meeting of the association held here.

Bearings Companies Will Act Separately

Joint Service Organization to Be Dissolved Last of Present Year

DETROIT, Sept. 1—The Bearings Service Co. will be dissolved as an active organization Dec. 31, 1922, according to Alfred K. Hebner, president and general manager.

The company was incorporated June 26, 1916 and has acted through 32 direct branches and approximately 1000 distributors, as the service department of the Timken Roller Bearing Co., the Hyatt Roller Bearing Co. and the New Departure Manufacturing Co. for the distribution of Timken, Hyatt and New Departure bearings.

Hebner issued the following statement:

Although the same mutually friendly attitude exists among the manufacturing principals through whose efforts the Bearings Service Co. was brought into existence, with automotive service activities and policies becoming more and more important in the industry, as they have during the past several years, there has been a growing mutual realization between the Timken Roller Bearing Co. and the General Motors Corp., whose interests have been represented in the Bearings Service Co., that the best ultimate goal would be secured by each through a separation of their bearings service program.

New Companies Formed

To this end on and after Oct. 1, 1922 the servicing of Hyatt and New Departure bearings, the manufacturers of which are units of the General Motors Corp., will be handled by the United Motors Service, Inc., and a new company to be known as The Timken Roller Bearing Sales & Service Co. will care for the servicing of Timken bearings.

Until Jan. 1, 1923 when The Timken Roller Bearing Sales & Service Company will be in operation, the Bearings Service Co. will continue the servicing of Timken bearings as heretofore at all its 32 direct Branches located in the following cities: Atlanta, Boston, Chicago, Detroit, Los Angeles, Minneapolis, New York, San Francisco, Seattle, Kansas City, Dallas, Cleveland, Denver, Indianapolis, Birmingham, Richmond, Philadelphia, St. Louis, New Orleans, Pittsburgh, Omaha, Portland, Toronto, Winnipeg, Brooklyn, Fresno, Milwaukee, Salt Lake City, Baltimore, Buffalo, Newark, Oklahoma City.

In addition in any of these cities where the United Motors Service, Inc., does not have branches the Bearings Service Co.'s branches up to Jan. 1, 1923, will sell for service Hyatt and New Departure bearings.

Friendly Position Continues

To indicate the continued mutually friendly attitude in service affairs between the manufacturers of Timken, Hyatt and New Departure bearings, the United Motors Service, Inc., will appoint as service distributors of Hyatt and New Departure bearings, the direct branches of The Timken Bearing Sales & Service Co. in cities where the United Motors Service, Inc., has no direct branches and conversely The Timken Roller Bearing Sales & Service Co. will appoint direct branches of the United Motors Service, Inc., as its service distributors for Timken bearings in such cases.

These arrangements will result in the public obtaining as good, if not better, service on all these three bearing lines, Hyatt, Timken and New Departure, than has been available in the past through the Bearings Service Co.

Increasing Road Construction Will Tend to Bring Great Gain in Sales of Motor Trucks

By WILLIAM L. DAY

President and General Manager, General Motors Truck Co.

Detroit, Sept. 5.

FUNDAMENTAL conditions point to a good fall and winter in the motor truck business. Our own concern has just had the most prosperous August in several years and the orders on hand indicate a continuous demand. One of the noteworthy signs is that the business instead of being confined largely to the smaller capacity trucks has shown a very healthy demand for the heavier capacities.

A combination of circumstances has arisen which is greatly in favor of ever increasing sales in the heavier truck field and particularly in the tractor and trailer units. Legislation in a great many states has forced the contractor and road builder or other man engaged in heavy hauling to abandon the very heavy truck and go to the tractor and trailer unit where the weight is spread over more wheels and consequently the unit loads on the highways are less. The stresses on the tires also go down and instances have been found where in certain classes of work the tractor-trailer combination has resulted in hauling cost reductions of as much as 50 per cent.

Construction of paved highways throughout the country has been making the trailer a feasible proposition where it would otherwise have been almost impossible. Another factor which is of the utmost importance in developing the use of the trailer is in the possibilities of using greater gear reductions which help to nullify the effects of grades which have hitherto been the greatest obstacle in the path of tractor and trailer transportation.

The general business outlook of the country is now such that concerns in the transportation business feel themselves justified in investing in equipment. There is a great amount of replacement business in the truck field throughout the country just as there is in the passenger car field. With crops good and general business conditions sound there is every reason to expect that the motor truck industry will get its share of the coming prosperity. Road building is going on with increasing speed throughout the country and this alone would tend to bring a greatly increased truck business.

General Motors May Get Pierrot's Patent Rights

DETROIT, Sept. 4—Considerable interest has been awakened in automotive engineering circles regarding the possibility of the General Motors Corp. taking over the American rights, or at least a license under the Henry Pierrot four wheel brake patents.

Pierrot arrived in this country recently in company with A. P. Sloane, Jr., it is said, and has been in conference with General Motors officials here, although nothing definite has as yet been reported on his negotiations. Pierrot is conceded to hold several key patents in the front wheel brake field and is dealing with several prominent makers in Europe at the present time on a royalty basis.

GRAY MAKING 60 CARS DAILY

DETROIT, Sept. 1—Gray Motors Corp. reached a production of 1,000 cars for the month of August. Production is now going ahead on a schedule of 60 cars a day and unless the coal shortage causes a curtailment this schedule or better is expected to be maintained all through September. Beyond a couple of hand made sample cars, there were no Gray cars nine months ago.

American Steamer Plans Awaiting Ratification

CHICAGO, Sept. 2—Terms have been agreed upon by which the American Steam Truck Co., manufacturer of the American Steamer passenger car, will take over the plant of the Duty Motor Truck Co. at Elgin, Ill. The transaction will be ratified by the stockholders of the Duty company at a meeting to be held at Elgin.

R. R. Howard, president of the American company, announced to-day that his company will move its equipment and materials from the present factory, in Chicago, to the new factory immediately after the ratification of the negotiations. The American company also has placed an order for new machinery to be used in equipping the Duty plant which was never fully equipped by the Duty company. It is expected to have the new factory ready to start production within 30 days.

The American Steamer passenger car chassis was exhibited at the Chicago Pageant of Progress from July 29 to Aug. 20, and a great deal of interest was shown in it. Some orders were taken, although the manufacturers were unable to name a definite date for delivery.

WHITE EMPLOYS NIGHT FORCE

CLEVELAND, Sept. 4—The White Motor Co., for the first time since the peak was passed months ago, is now employing a night force. More than 200 men have been hired to help out in different departments.

Directors Selected for Owen Dyneto

Reorganization of Company Completed — Continued Expansion of Activity Planned

SYRACUSE, Sept. 4—Reorganization of the Dyneto Electric Corp., which was recently purchased by Ray M. Owen of New York City, has been completed.

The new company, known as the Owen-Dyneto Electric Corp., making generators, starters and lighting equipment for automobiles, has as directors: R. M. Owen of New York City; Harry M. Ballard, Chicago; C. S. Estabrook and James D. Grant of this city. Owen is president of the new company, with Ballard and Grant, vice-presidents; Estabrook, secretary, and Grant treasurer.

Improved types of generators, starters and lighting systems have been developed at the plant since Grant took over the management for the new company. It is expected that capacity production will be possible in several months.

A generator for farm electric lighting is being developed and can be used wherever there is engine motive power. The company intends to carry out a program of continued expansion. The company has property adjacent to the plant on which additions can be erected.

Owen purchased the plant several months ago buying it for $205,000 after creditors of the defunct concern had agreed to a system of payment of their claims.

Demand for Rolls-Royces Insures Plant Capacity

SPRINGFIELD, MASS., Sept. 5—A circular to preferred stockholders of Rolls-Royce of America, Inc., states that since the reduction in the price of the chassis in March sales have increased so fast that at present the company's unfilled orders are such as to tax the capacity of the plant for the remainder of the year.

With the present equipment the company can turn out 10 cars a week and that with a comparatively insignificant capital expenditure for equipment the output can be raised to 750 cars a year.

"On the basis of the manufacture and sale of only eight cars a week the company's net profits applicable to dividends and interest will approximate $600,000," says the circular. "On this basis full dividends on preferred stock will be earned with a fair margin after allowance for all charges and for interest and sinking fund requirements."

CHARLES A. SINGER, JR., DIES

NEW YORK, Sept. 1—Charles A. Singer, Jr., died suddenly in a New York hospital yesterday. For several years he was prominently identified with the company manufacturing the Palmer-Singer cars, his father being president of the concern. The company passed out of the automobile industry six years ago, and since the end of the war Charles A. Singer, Jr., has been a member of the firm of Partridge, Singer & Baldwin, which is an exporter, specializing in the sale abroad of American cars.

COPPER CONSUMPTION WILL SHOW BIG GAIN

NEW YORK, Sept. 2—A survey just completed by the Copper and Brass Research Association is followed by the prediction that automobile manufacturers in the United States will consume approximately 100,000,000 lbs. of copper metal this year.

This is an increase of 30,000,000 lbs. over 1921 and about 750,000 lbs. more than in 1920, when the automobile industry consumed 7.63 per cent of the total copper production in this country. The association finds that the use of copper in automobile construction varies from 50 lbs. in some cars to 250 in others.

Ford's Michigan Holdings Valued at $215,415,662

LANSING, Sept. 5—The annual financial statement of the Ford Motor Co. has been filed with the Secretary of State. The statement is of June 30, 1922, at which time the company's surplus was $289,935,296, while its holdings in the State of Michigan are valued at $215,415,662.

The Michigan statement gives Ford's cash on hand and in the bank, $145,985,669; plant, land, improvements, buildings, fixtures and structures, $81,626,015; machinery, tools and equipment, $39,531,079, and good will. $20,517,985.

Included in the Ford statements are the returns from the Dearborn Publishing Co. and the Lincoln Motors Co. The assets of the former are listed at $124,961, while a single item of $250,000 cash is shown as the total asset of Lincoln Motors.

Wallace Engine Interests London General Omnibus

NEW YORK, Sept. 6—It was learned through an authoritative source here today that the London General Omnibus Co. is much interested in the Wallace engine of the Argyle single sleeve type and is building experimental engines of this type, but statements to the effect that this engine has been officially adopted in place of the Knight engine now used are said to be premature.

Agents controlling the Argyle patents in this country are understood to be negotiating with American builders of bus engines with a view to interesting them in the manufacture of engines under these patents.

Traffic Truck Plant To Run at Capacity

May Also Be Made Assembling Base of Associated Motor Industries

ST. LOUIS, Sept. 4—Will I. Ohmer, chairman of the board, and Louis Ruthenburg, president of the Associated Motor Industries, made their first visit to the Traffic Motor Truck Corp. since the local company was merged with Associated Motors.

Ohmer stated that the Traffic truck will retain its name and individuality. The plant will be pushed to its full capacity of production, with prospects that it will be greatly enlarged after the manufacturing program of Associated Motor Industries is under way.

In addition, the Traffic truck plant may be the location of one of the five assembling plants of the Associated Motor Industries. This assemblying plant will not only assemble Traffic trucks, but cars made by Associated Motor Industries.

On account of the central location of St. Louis and its great distribution facilities, the St. Louis assembling plant is expected to be one of the largest units of Associated Motors. Guy C. Wilson, president, and Ted C. Brandle, vice-president of the Traffic Motor Truck Corp., will remain in office and will act as directors of Associated Motors. The Traffic truck plant is expected to maintain its present organization with the advantage of having back of it all the financial resources of the parent body.

To Ship Parts in Bulk

Traffic trucks will be assembled at the other assembling plants of the Associated Motor Industries as well as at St. Louis. It is the plan of operations to turn out as many as possible of the parts and to ship them in bulk to the various assembling units. These units will be at Boston, Indianapolis, Louisville and Oakland, Cal., in addition to the St. Louis plant.

Associated Motor Industries, while putting forth its efforts to push Traffic trucks to leadership, will continue to manufacture the other trucks now made by member companies. The Jackson four-wheel drive truck and the Old Hickory truck, made by the Kentucky Wagon Manufacturing Co. will be continued. There are several makes of cars.

Gets Wisconsin Charter

MILWAUKEE, Sept. 4—A Wisconsin charter has been granted to the Associate Motor Industries, Inc., a Delaware corporation, with principal offices at Dayton, Ohio. A Milwaukee office has been opened at 230 Grand Avenue, in charge of D. H. Davis. Of the $40,000,000 preferred and 800,000 common shares in the capital, it is stated in the application that $25,000 will be used in Wisconsin.

Schrader Changes Methods of Selling

Eliminates License Agreement and Price Restrictions—Policy Follows Government Suit

NEW YORK, Sept. 2—A. Schrader's Son, Inc., manufacturer of valves, gages and other tire accessories, has changed its method of selling. Instead of marketing its products under a license agreement and certain price restrictions, it has adopted a system whereby Schrader's goods will be sold direct to tire manufacturers and jobbers or through the Schrader company's consignees who will sell at the same price as the Schrader company.

This new policy went into effect Sept. 1 and was preceded two days earlier by the Department of Justice filing a suit in the United States District Court for Eastern New York asking for a permanent injunction. The complaint charged violations of the Sherman anti-trust law. The Government found fault with the old policy, claiming the Schrader system attempted to fix prices and control resales. It charged that the policy violated the anti-trust law, in that the issuing of licenses to wholesalers, which were revokable at the will of the Schrader company, constituted a monopoly.

Regarded as Friendly Suit

In a way it was regarded in the light of a friendly suit. Some time ago, when the Department of Justice pointed out to the Schrader company that it thought the old system conflicted with the Sherman law, the Schrader people determined to make a change. This new policy of marketing its goods direct was settled upon and Sept. 1 selected as the date for putting it into effect. The Department of Justice filed the suit, however, as a sort of a precautionary measure, according to Frank M. Avery, the Schrader attorney, to prevent a possible return to the old system. This Schrader has no intention of doing, the attorney contends.

"We saw officials of the Government and agreed upon a form of decree to the entry of which the Schrader company would consent, and it was arranged to have the bill filed on or before Aug. 31 while the old agreements were still in force, so that the court would have jurisdiction," Avery said. "Immediately after Labor Day we will enter our consent to the decree, since the Schrader company cannot have any objection to the restraint of a sales agreement which it now has discarded."

RECORD FRANKLIN DRIVEAWAY

Syracuse, N. Y., Sept. 5—Following a visit to the factory of more than 200 dealers from 24 states and Canada, there was a record driveaway of Franklin cars of the new series just announced. Representing a retail value of nearly $7,000,000, there were 250 cars in the parade through the city that marked the start of the driveaway, the largest single day's movement of cars out of the plant.

From now on all cars shipped from the Franklin factory will be of the series 10 type. Franklin officials announce that the production schedule for the new car is the largest ever set by the company.

Locomobile Will Expand Its Dealer Organization

BRIDGEPORT, CONN., Sept. 5—The reorganized Locomobile Co. of America, now headed by W. C. Durant, has issued a statement to its branches and dealers outlining its plans under the new leadership. No radical changes are contemplated either in policy or design of the product, it is stated. The Locomobile as now known, with its 48 hp. low-speed six-cylinder engine and four-speed transmission will be continued.

"In a market of unsettled prices for motor cars, it is interesting to note that the company states there is no price reduction in view, but that on the contrary an increase in price is not an improbability," says the statement. "As to the marketing of the car, the familiar policy of the company in handling its product through its own branches will be continued. This system of branch houses will be amplified by direct dealers for territory not covered by branches."

Willys-Overland Reports Biggest August in History

TOLEDO, Sept. 5—Willys-Overland reports the biggest August in its history, shipments of 14,007 Overlands and Willys-Knights being recorded as against the previous best August of 11,718 in 1917. August, 1922, deliveries were greater than those in any single month since June, 1920.

August profits are reported to have been $1,500,000, while the three months since the company's May 31 statement are said to have averaged $1,000,000 a month. It is expected that the company's $16,000,000 debt will be wiped out without interfering with current profits through the formation of a real estate company to take over the branches valued at approximately $16,000,000.

PENCO CORP. ORGANIZED

DETROIT, Sept. 1—All automotive products of the Penberthy Injector Co., as far as sales, advertising and market development is concerned will be handled by the Penco Corp. which has opened offices in the General Motors Bldg. this city. The Penberthy company makes several well known parts and accessories for the automotive field, notable among these being the Ball and Ball carbureter, Penberthy Re-Atomizer, Flo-meter and gasoline gage. The officers of the Penco Corp. are Homer S. Johnson, president; Ivan A. McKenna, vice-president; Charles B. Johnson, secretary, and Carl Reese, treasurer.

Seeking to Protect Hydro-United Assets

Factional Struggle Seen by Creditors—Appraisers Appointed Under Receivership

PHILADELPHIA, Sept. 2—Benjamin F. Evans, W. W. Whiting and LeRoy Deininger have been appointed to appraise the property of the Hydro-United Tire Co. of Pottstown, Pa., for which receivers recently were appointed. They will report to the United States District Court of the Eastern District of Pennsylvania.

It is claimed by Ephraim Lederer, one of the receivers, that while he believes it possible that the plant may be operated at great financial benefit to the stockholders and creditors, he is unable to ascertain the validity of certain notes and whether certain merchandise and raw material in a warehouse, which the National Iron Bank of Pottstown claims it holds as collateral security for loans approximating $56,000, actually has been pledged as collateral security.

This, he says, is owing to the peculiar merging of the different companies, referring to the connections of the Hydro-United. The merchandise in the warehouse, which includes more than 5000 tires and tubes, is valued at about $90,000.

Sufficient Liquid Assets

Lederer states his belief that there are sufficient liquid assets available in the receivers' hands to settle the company's indebtedness to the National Iron Bank and others. He further asserts his belief that John W. Shorb and Jacob G. Feist are parties in a conspiracy to sell about $100,000 bonds held as collateral security for the company and that if they do, this will entail great loss to the company. He prays for an injunction restraining note-holders from the sale of any assets of the company.

A committee representing what is alleged to be a great percentage of the creditors, headed by A. R. Atwater, requests the court for leave to intervene as a protective group, representing that a factional struggle is going on in the Hydro-United stockholders' group to obtain control of the Hydro-United assets.

Files Bankruptcy Suit Against Master Trucks

CHICAGO, Sept. 2—A petition in bankruptcy has been filed against the Master Trucks, Inc., Chicago, by the Maremont Mfg. Co., Up-To-Date Machine Co. and the Auto Body Co., all of Chicago, claiming $750,000 due them on goods delivered to the company.

Gesas, Epstein & Leonard, attorneys for the petitioners, claim that the Master Trucks made preference to creditors by favoring the Vacuum Oil Co. with a payment of $500 about a month ago.

S. A. E. Will Witness Aberdeen Test Oct. 6

Later in Month Production Subjects Will Be Discussed at Detroit

NEW YORK, Sept. 2—The Society of Automotive Engineers has arranged two meetings of its members, one to be held on Friday, Oct. 6, at the Aberdeen Proving Ground, Md., and the other in Detroit, Oct. 26 and 27. The Aberdeen meeting, which has been arranged through the courtesy of the Ordnance Department of the United States Army, is for the purpose of witnessing a program of test firing and a demonstration of post-war ordnance apparatus.

Will Be Joint Meeting

Following the custom established last year this will be a joint meeting to which members of the American Society of Mechanical Engineers and of the Army Ordnance Association, in addition to members of the S. A. E., are invited. Special badges admitting members of the organizations mentioned are to be issued. Details of the program have not yet been announced, but it will start at 9:00 a. m. and continue through the day, luncheon and dinner being served to those who make advance reservations. Only citizens of the United States will be admitted.

The Detroit meeting is to be devoted entirely to consideration of automotive production subjects and will be held in an auditorium in the new General Motors Building on Grand Boulevard. There will probably be two morning sessions and two afternoons devoted to factory visits. Luncheon is to be served in a room adjacent to the meeting hall, and an informal production dinner, at which representative executives of the industry will speak on the business of the industry, is to be held on Thursday evening, Oct. 26, at a place to be announced later.

Men prominent in the production of passenger cars are co-operating in the preparation of papers for the production sessions, among them being Karl Herrmann of Studebaker T. J. Litle of Lincoln, H. C. Wills of Wills Ste. Claire and F. A. Whitten of General Motors. Members of the production staffs of Ford, Dodge Brothers and Packard are also preparing material for a symposium in which several prominent men familiar with latest production methods will join.

Novel Inspection Trips

There is expected to be consideration of manufacturing problems common to all producers, such as cutting accurate gear teeth and screw threads, production of true cylinder bores, etc. Certain outstanding developments peculiar to certain plants will also be described, and authorities on machine tools will be invited to contribute to the discussion.

Inspection trips to several plants will be arranged, and these will differ materially from ordinary factory visits in that the routes through the plants will be selected in such a way as to avoid, as far as possible, ordinary routine methods and thus allow close inspection of the particular processes which are unusual or unique and most highly developed in the particular plant. These inspections will be conducted in each case by the production executive in charge of the plant.

Non-member production executives are invited to attend the meeting.

The annual meeting of the Society is to be held in New York City, Jan. 9-12, 1923. Papers for this meeting are already being secured.

Vincent Wins Motor Boat Race at Detroit Regatta

DETROIT, Sept. 5—By capturing three straight heats, Col. Jesse G. Vincent, vice-president of the Packard Motor Car Co., won the Gold Challenge cup race at the Detroit motor boat regatta, which was concluded on Labor Day. Vincent piloted his Packard-Chriscraft boat, which is motored with a twin-six Packard engine, with half the cylinders dismounted to make the boat eligible for the race. In the final heat Vincent traveled the 30 miles at an average of 39.8 m.p.h., after which he went a lap against time at 42.2 m.p.h., which is a world's record for displacement boats of less than 625 cu. in. displacement. Vincent's victory breaks the winning streak of Gar Wood, who had won the Gold Challenge cup five times previously.

Wood had to content himself by winning the Wood-Fisher trophy race for express cruisers with his Baby Gar II. Wood's Baby Gar 3d., driven by Kinney, won the final heat of this race at 51.75 m.p.h., a new record for displacement boats for the distance, 30 mi. The former record was 48.9 m.p.h. made by Wood himself in Friday's event.

Edsel Ford, driving his Woodfish, did 53 m.p.h. in the seventeenth lap of the big event. He was not eligible for the Wood-Fisher trophy in which he was driving because he did not compete in the previous heats.

C. A. Shaler Operates Waupun Plant Full Time

WAUPUN, WIS., Sept. 4—The C. A. Shaler Co., manufacturer of tire repair tools, equipment, vulcanizers, etc., and headlight lenses, is now operating full time in its new factory, and to handle the overflow of orders is erecting a shop addition and an office building. The original plant was destroyed by fire in March and the industry has been entirely rebuilt at an investment of more than $350,000. The plant is employing 150 persons, the largest number in the history of the company, which was established in 1906.

The Shaler company is working an international market on vulcanizers and lenses. An export office is maintained in New York under the management of R. T. Butts and Frederick Werner.

Bordino Wins Race for 92 Cu. In. Cars

Covers 373 Miles in 4:28:38 in Event Opening New Speedway in Milan

MILAN, ITALY, Sept. 5 (*By Cable*)—The opening meet on Italy's first automobile speedway took place to-day and was a complete success. The new track which is 6.2 miles to the lap, is located within six miles of Milan, and was built by the Automobile Club of Milan, so that Italy's automobile industry may have a suitable course on which to try out cars and also promote sporting events of an international caliber.

To-day's was the first of two races scheduled for September, the other being the Italian 500 mi. Grand Prix for cars of 122 cu. in. piston displacement for which are entered 38 cars representing France, Italy, Germany, Austria and England.

The race to-day was for 91 cu. in. cars, the winner being Bordino, who competed in several California races in the United States last winter, who drove his Fiat to victory over the 373 mi. course in 4:28:38. Lampiano, Fiat, was second, in 4:34:12 3/5; Salamano, Fiat, third in 4:35:48. Ramassotto, Chiribiri, Pocher and Haiden in Austro-Daimlers were still running when the race was called off. Nine cars started.

A heavy rain fell throughout the running of the event, but no accidents were recorded. A remarkable feature of the contest was that no tire changes were made.

So well pleased are the Italians with the success of the track that the City of Milan is considering sending a national Italian team to the Indianapolis speedway race in the United States next spring.

W. F. BRADLEY.

Miller Now Constructing Racer; Body 27 in. Wide

LOS ANGELES, Aug. 29—Harry Miller, veteran builder of racing cars, has under construction at his plant here the first of two 122-cubic inch displacement engines which he expects to enter in the 1923 race at Indianapolis. The new engines will have eight cylinders all in line.

The chassis that will carry the Miller engines will have a wheelbase of 104 in., but will show a narrower frame and the body will be only 27 in. wide, accommodating a driver only. The bore of the cylinders will be 2 11/32 in. with a stroke of approximately 3½ in. Although the parts will be smaller, the motor will be similar in design to that which Jimmy Murphy has used in his car this season.

The entire car will weigh about 1400 lbs. and the power plant is expected to develop from 90 to 95 horsepower. With the exception of the wheels, tires and electric units, the cars will be built complete in Miller's shop.

F. O. B. Prices Annoy Los Angeles Buyers

Complain of Quotations in Advertisements—Some Dealers Blame Factories

LOS ANGELES, Sept. 4—The public has begun to protest against the practice of Los Angeles motor car dealers advertising factory prices only. Letters have been printed in newspapers signed by motorists calling attention to the misleading information derived from the advertising. One correspondent claims he was so disgusted upon learning the difference between the advertised and delivery prices that he decided to keep his old car.

The freight differential between factory and local prices is quite high. In many instances it is more than $200. This means that when a prospective buyer reads an advertisement and learns the advertised price is $1,495 he learns later that the quotation means the price in Cleveland, Detroit or some other eastern manufacturing center, and in Los Angeles the car costs $1,735 or some such figure. Many of the dealers use very large display type setting up the price and below it type of very inconspicuous size, stating "Freight and war tax extra" or "F. O. B. Detroit."

When asked why they advertised in this way, some dealers said it was because the factories will not permit them to change the prices to correspond to the actual cost delivered in Los Angeles. They admit they are caused a lot of grief by this kind of advertising, but owing to the fact that the factory usually pays a percentage of the cost of advertising they are not privileged to make the change.

Other dealers are frank enough to say that they advertise factory prices because they are so much lower than delivery prices and if they can get a prospect to look at the car and take a ride in it they don't have much difficulty in selling the freight charge, when, if they advertised actual delivery prices, the prospect might not come into the place.

Ford Special Is First In Pike's Peak Climb

DENVER, COL., Sept. 4—The winning of the Penrose trophy for the fastest time in the fourth annual Pike's Peak hill climb to-day was a surprise to the 5,000 spectators when it went to a Ford special in the less than 183 cubic inches displacement class. The driver was Noel E. Bullock and the time was 19 min. 50 4/5 sec. for the 12 2/5 mile course of 7 to 10½ per cent grades and 60 curves, mostly sharp switchbacks.

Glen Schultz in an Essex and Roy W. Beavers in a Chevrolet took second and third in this small car event in 20 min. 41 sec. and 23 min. 3 2/5 seconds respectively.

The first three places in event No. 2 for up to 300 cu. in. displacement went to Harold Brinker in a Wills Sainte Claire, H. L. Chapin in a Dodge and Sam Marcus in a Haynes in 20 min. 46 seconds, 23 min. 25 4/5 sec. and 24 min. 18 4/5 sec.

A Hudson driven by King Rhiley, winner of the trophy last year, won first prize to-day in the event for cars above 300 cu. in. in 20 min. 5 sec., with a Packard driven by P. B. Abbott only two seconds behind, a Mercer piloted by W. S. Haines captured third place in this large car event in 20 min. 31 sec. Eighteen cars started and 15 finished, three being forced out by slight breakages, but there were no serious accidents.

All three events were for non-stock cars, with $2,100 in cash prizes divided into firsts and seconds of $500 and $200 for each event.

Kelly Truck Directors Get Optimistic Reports

SPRINGFIELD, OHIO, Sept. 5—That there is a general business revival in sight and that prospects are bright for the sale of motor trucks this fall, was the announcement made here by President Charles Willard Young, of the Kelly-Springfield Motor Truck Co. following a dinner which he gave at Hotel Shawnee for the Springfield directors. Young said the company is now employing 300 men, which is about 50 per cent of normal.

Reports from various parts of the United States, even the far west, show that business men, manufacturers and farmers are ready to buy motor trucks, Young said. He is optimistic about the future.

The Kelly company is aiming to standardize its motor trucks and is re-organizing its sales force throughout the United States preparatory to the anticipated rush of business this fall and winter. Hopes are entertained that it will not be long before the big plant will be working with a normal or above normal force. During the war period 1100 men were employed.

In addition to Young those at the dinner were: B. J. Westcott, J. Elden Bowman, E. S. Kelly, James L. Geddes, P. H. Diehl and Grayson Lathrop, all directors; and F. H. Pietsch, sales manager and acting general manager.

Geddes, chairman of the board, who was critically ill for several months, is now fully recovered and is at the plant daily.

CARLOAD OF DURANTS SHIPPED

OAKLAND, CAL., Sept. 5—The first carload of automobiles built at the new plant of the Durant Motor Co. here was shipped to Seattle late last month to W. S. Dulmage, distributor of the Durant car in the State of Washington. Officials of the Durant company were present at the loading of the first car. Following this first shipment, sixteen more carloads of Durants were shipped to Dulmage for distribution in his territory.

Cotton Crop Brings South Tractor Hope

Branch Managers Say That Outlook Is Best Since Summer Three Years Ago

ATLANTA, Sept. 4—According to reports early this month from several southern managers of tractor and power farming equipment manufacturers, many of whom have southern offices in Atlanta, tractor sales during the past sixty days were about 60 to 70 per cent better than during the spring months.

The outlook, these managers say, is many times better than it has been since the summer of 1919, and most of them are looking forward to the biggest volume of business in tractor sales during the next six months the industry has ever experienced in this section. They base this prediction on daily reports received the last two or three weeks from field men over the entire district, who declare that the southeastern farmers are in better shape financially than they have been in more than three years.

This year's cotton crop estimated at well over 10,000,000 bales, will bring the growers millions of dollars, the farmers making a real profit from cotton for the first time since the war. While much of this money will be needed to liquidate their debts, enough will be left to enable the farmers to buy such equipment as they need. Dealers throughout the section are advising the Atlanta branch managers that they have three to four times as many live prospects for tractor sales as they had a year ago, and ten times as many as two years ago.

Georgia and South Carolina are expected to be the only two states in the Southeast where power equipment sales will not boom during the next six months; business in these states is expected to be below normal due to the failure of the cotton crops.

New Jersey Sales, 5672 in July; 7450 in June

NEW YORK, Sept. 6—July registrations of new automobiles and commercial cars in 21 counties of New Jersey showed a decline from the previous three months, during which there had been a consistent gain. Sherlock & Arnold, hitherto confining its sales analysis to counties in and around New York, has branched out into New Jersey and is publishing the New Jersey Automobile Sales Analysis, starting its compilation with April of this year. July sales aggregated 5672 automobiles as against 7450 in June. The re-capitulation for the four months gives a total of 26,310 new cars and 5437 commercial cars.

In April there were five cars registering over the 600 mark with the rest running some distance behind. The following month saw four over the 500

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Milwaukee Awaiting Greater Coal Supply

Production Schedules May Be Curtailed Month Hence Unless Relief Comes

MILWAUKEE, Sept. 4—With orders on the books which will occupy normal capacity at least until Dec. 31 and, in some cases, past Feb. 1, 1923, manufacturers of automotive parts and equipment are in a comfortable postion in respect to business, but the fuel situation remains alarming, and no appreciable relief has been felt as yet as the result of the resumption of mining.

The larger plants maintain their own power plants, but a great many automotive equipment and parts shops use central station current. Industries generating their own power are only one step worse off than the public utilities, both feeling the shortage of steam coal very seriously. The principal source of central station current derives a part of its supply from hydroelectric plants, but the bulk is generated from steam locally. No curtailment of supply has been made so far, but it is likely that in four to six weeks, unless the coal supply is greatly improved, some sort of rationing or other economies will have to be invoked.

Rail Shipments Limited

Although mining has been resumed, the railroad strike situation has choked up the movement. Milwaukee's supply comes largely by Great Lakes vessels from Lake Erie ports, but the movement of coal from mines by rail to those ports is still limited.

It is difficult to get definite statements from manufacturers upon their present coal supplies and prospects for the fall and winter. However, the local situation may best be described by the fact that while on Sept. 1, 1921, a total of 4,000,000 tons had been placed on Milwaukee docks during the season, this year only 1,000,000 tons have arrived. Therefore, if a normal supply is to be furnished Milwaukee for local, State and Northwest needs, 500 boatloads of an average of 6000 tons each would have to come up the lakes between now and the close of navigation, about Dec. 1. This is regarded as an impossibility. Until the railroad strike is dissolved, little help from rail shipment of coal from mines to Milwaukee is possible.

Inland Manufacturers Worse Off

Manufacturers in the interior of Wisconsin are worse pressed than Milwaukee, for coal consumers usually look to Milwaukee for supplies. Other receiving ports are Sheboygan, Manitowoc, Green Bay and Superior, but docks at these points are relatively as bare as those in Milwaukee.

In the northern and western sections of Wisconsin, hydroelectric power is abundant, and many industries either are purchasing such power or intend to do so. It is true, however, that the hydroelectric power companies are pretty well sold up right now, and any material increase in the supply must await new power plant construction and building of new transmission lines, which require large investments and much time.

At this moment, no industry, so far as can be ascertained, is in danger of having to close down for lack of fuel or current, but a month hence it is probable that operating schedules will have to be reduced unless broad relief comes. Automotive manufacturers take an optimistic view of the future, despite the critical condition of the power supply.

Best Week Locally

So far as the effect of the railroad situation is concerned, motor transport is relieving the strain so far as short hauls are involved, and it is gradually being extended to meet heavier needs. On the whole, however, railroads, are doing well in the handling both of incoming raw and semi-finished materials and outgoing finished products. It is a struggle to get cars and delays are frequent in transit, but there is consolation in the recalling of wartime memories, when things were a great deal worse.

The past week was one of the best this year regarding both distributors' and dealers' business in Milwaukee. This was due to the genuine stimulation of the big motor show in conjunction with the annual Wisconsin State Fair, held in West Allis, a suburb of Milwaukee. Hundreds of dealers from all parts of Wisconsin and Upper Michigan, the Milwaukee distributing territory, came to Mil-

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RAW CRUDE OIL USED IN TRACTOR ENGINE

JANESVILLE, WIS., Sept. 4—Crude oil in its raw state, as it gushes from the ground, was successfully used as fuel in a kerosene tractor engine by the Townsend Manufacturing Co., in special tests made during the past week. The oil came from a well in Montana owned by Janesville capital. It differs from the Texas crude in that it resembles ordinary lubricating oil in color and consistency.

The Townsend engine operated as well, judging by all appearances, as it does on kerosene fuel. Further tests will be made before the Townsend tractor is put forth as adapted to crude oil. Work along this line has been going on in the experimental shops for a year or longer, it being recognized that crude oil use represents a large economy over kerosene or gasoline. The average crude can be purchased for 3 to 4 cents per gallon, while kerosene is selling at 16 to 18 cents per gallon.

Fleet Owners Report Gain During Strike

Bus Operators, Too, Feel Spurt—No Abatement in Progress Expected

CHICAGO, Sept. 2—Motor truck fleet owners and passenger bus operators in and around Chicago have experienced a decided spurt in business since the railroad shop men's strike was called, and it is thought by a majority of these men that the present high mark in their lines will not be abated by the return to work of the strikers.

Short hauls to neighboring towns via the motor truck have grown more popular, and passenger buses have been busy all summer running into the resorts of Indiana. Preparations are now being made to continue this interurban service throughout the winter, and more trucks are to be added within the next few weeks.

Merchants in Hammond, Gary, Miller and other towns in Indiana are now receiving and sending much of their goods by truck. Between Kankakee, Aurora, Batavia and towns in the Fox River Valley, a truck service has grown within two years from a single-man job to a corporation employing fifty people and 15 trucks. Garages are maintained by these people in Chicago, Aurora and Kankakee.

Fleet owners in Chicago, that is those who rent out their vehicles, say that, although the year started out poorly, business has grown in leaps and bounds within the last month until now, practically every truck in their garages sees at least eight hours service every day.

Increased Steel Wages Make Birmingham Boom

BIRMINGHAM, ALA., Sept. 1—Shipments of automobiles into the Birmingham district were received more promptly the past week than during the month previous. A number of concerns stated that they had received cars and others that notices indicated early deliveries.

The recent announcement of the United Steel Corp. of a 20 per cent increase in the pay of common labor, followed by the announcement of the coal operators of Alabama that they would do likewise and then by several of the independent furnace and iron concerns stating that their increase would be effective the same date has affected about 50,000 men in Birmingham directly and caused the entire city to put on "boom" optimism.

Philadelphia Demand Good

PHILADELPHIA, Sept. 2—Automobile dealers generally report a good demand for all classes of cars, the trend being toward closed models. Prices are still on the decline, which evidently is an aid in stimulating the demand.

Men of the Industry and What They Are Doing

Templar Appoints Chestnutt

Ralph C. Chestnutt has been appointed chief engineer of the Templar Motors Co. at Cleveland.

Hyman Named Stutz Ad Head

Herbert R. Hyman has been appointed advertising manager of the Stutz Motor Car Co. of America, now under control of Charles M. Schwab. Hyman comes from the Charles H. Fuller Co., the advertising agency which handles the Stutz account. Before that connection he had been a prominent executive of the Cole Motor Car Co. for many years. This most recent change brings him back to his old home, Indianapolis.

Brennan Manages Inland Sales

B. G. Brennan has been appointed general sales manager of the Inland Products Co., manufacturer of the Inland Spiral-Cut and Oilless piston rings. Brennan has had a wide experience in merchandising and advertising and will devote his time to the sales development of the complete Inland line.

King Appoints Graham

The King Motor Car Co. has appointed C. L. Graham factory superintendent. Graham has been connected with the automotive industry for many years, serving in a similar position with the General Motors Corp. in Flint for four years and later going to Alma, Mich., as production manager of the Republic Truck Co.

American Piston Makes Changes

The American Hammered Piston Ring Co. announces the appointment of Joseph S. Jacobs as secretary and assistant treasurer. Jacobs joined the company in sales promotion work in 1919, when it was purchased by the Bartlett Hayward Co. and moved to Baltimore. Later he became manager of the sales promotion department, and a year later was appointed advertising manager. C. B. Cook, former assistant, succeeds Jacobs as advertising manager. He came to the company two years ago from the staff of the Baltimore Sun. C. A. Grainger has been made assistant general sales manager to succeed Thomas B. Blakiston, who now is general sales manager. For the past year and half Grainger has been district sales manager for the company in the Gulf States district.

Weaver Leaves Star Rubber

O. L. ("Buck") Weaver has retired from active association in the Star Rubber Co. He first left the company on June 1, 1921, due to ill health, but returned on March 1 of this year. He has been a large factor in the Star since its reorganization in 1916, acting first as its secretary, and later as its vice-president. During the war he spent considerable time in Washington in the interests of the smaller factories with the War Industries Board, was later in the Motor Transport Corp. work, and subsequently a member of the executive committee of the tire division of the Rubber Association. He entered the industry in 1899, first with Diamond, and later served with Goodyear for 10 years. He represented Pierce Arrow for five years in northeastern Ohio. His future plans are incomplete, but his efforts will doubtless be continued in the automotive field.

Black & Decker Promotes Allen

W. C. Allen, who has been in charge of the Chicago branch of the Black & Decker Manufacturing Co. for the last year, has been appointed sales supervisor for the company. In order to release Allen for his new work, R. S. Mitten has been appointed Chicago branch manager. Mitten formerly served as sales manager of the Electric Appliance Co., Chicago.

Talbott Goes with Virginia Rubber

Frank Talbott, who was formerly general manager of the Victor Rubber Co., has been appointed general manager of the Virginia Rubber Co., with headquarters at Charleston, W. Va. Since leaving the Victor, Talbott has been directing the manufacture and sales end of a new tire he has invented. It is announced that the tire will be manufactured at the Virginia plant instead of at Cleveland.

Maxwell Announces Changes

E. A. Nelson has been appointed chief engineer in charge of the work of all engineering branches of the Maxwell Motor Corp. Clyde Sauzedde has been appointed assistant chief engineer in charge of the designing department having supervision over chassis, body and equipment designing, while H. E. Maynard has been appointed assistant chief engineer in charge of all the technical sections of the department. John Squires has been made assistant to the chief engineer in charge of the administrative work in the department. Nelson is well known through the industry for his connections with the Hupp Motor Car Co. over a period of years and afterward for the manufacture of his own product. Sauzedde has been with General Motors, Studebaker and Dodge Brothers, being one of the original engineers with the latter organization. Maynard has come up through the Maxwell organization.

Yates with Interstate Forge

Robert C. Yates, for many years identified with the Union Drop Forge Co. of Chicago, has resigned to become general manager of the Interstate Drop Forge Co. of Milwaukee. Yates, after graduating from Union College, was connected with the American Locomotive Co. at Schenectady, N. Y., and Bethlehem Steel Co., having been manager of the Chicago district office for Bethlehem prior to his connection with Union.

Industry's Newest Acquisition



To commemorate his debut into the automotive industry, Charles M. Schwab, after acquiring control of the Stutz property in Indianapolis, faced the camera with W. N. Thompson (right), president and general manager of the Stutz Motor Car Co. of America, Inc. Schwab reiterates his statement that the Stutz plant will be operated as an individual and independent industrial unit and that he will be active in the management from now on

Detroit Has 2 Weeks Coal Supply on Hand

More Fuel Coming in—Power Has Not Yet Been Curtailed—Ford's Plans Unchanged

DETROIT, Sept. 5—Although the movement of coal is improving, the Detroit supply is one step nearer the curtailment period than it was a week ago. At that time the Detroit Edison Co., which is the dominating factor in the power requirements for this zone, had on hand an 18 days' supply. This has now been reduced to about 14 days, and the Labor Day holiday will cut this down somewhat more. On the other hand, whereas a week ago only 50 per cent of the requirements of the daily consumption was coming in per day, this has moved up to about two-thirds of daily consumption.

According to Alex Dow, president of the Detroit Edison Co., the fuel situation is skirting the edges of trouble and will probably continue to do so all winter as the longer days and the demands for light and heat will soon begin to boost the requirements.

Rail Situation Bad

The situation with the Louisville & Nashville roads is very bad, and along the Chesapeake & Ohio roads not very much better. The N. & W. is said by Dow to be doing creditably.

When asked to what extent he would let the Detroit Edison supply of coal get down before a curtailment order would be issued, Dow stated that this would depend on weather conditions and upon the possibilities of coal coming in. He stated that he could not let the supply get very much lower without issuing a curtailment order, and if he had to do so, he realized it would have a very serious effect on the automotive industries, as the primary requirements would have to go to public utilities.

So far as stocks of coal for plant heating, compressed air, hammer rooms, boiler rooms and other special requirements are concerned, none of the factories are as yet worried seriously regarding the situation, as practically all have a supply on hand for 30 days or more, and it is felt by that time the coal supply will be materially augmented.

No Change with Ford

DETROIT, Sept. 6—Plans of the Ford Motor Co. for closing Sept. 16 because of fuel shortage are unchanged. Conferences of executives on the company's manufacturing policy are being held regularly, but as yet there has been no statement forthcoming.

Among other things considered is a plan for operating at all times on a scale that will enable parts to be turned out in sufficient quantity to keep all cars now on the market in operation.

The sales department will not attempt to formulate special plans for meeting the unusual situation, but will simply ship all cars as long as they hold out, according to priority of shipping requirements. Orders received after these are all gone will be taken subject to delivery when the factory reopens, and will be shipped in the order in which they are received.

The tractor plant at River Rouge closed 10 days ago to divert all available power to the car factory at Highland Park. In addition to the power received from the River Rouge power house which operates with coal fuel, the Highland Park plant is also burning oil and tar, and is getting a part of its power from Detroit Edison. Ordinarily the power from the latter source is about 25 per cent of requirements. Oil and tar used approximates 90,000 barrels daily.

Ford production in August aggregated 136,000 in the plants located in the United States.

Four New Sport Models Added to Haynes Line

KOKOMO, IND., Sept. 6—Four new sport models have been added to the Haynes line for 1923. These consist of a five passenger sport phaeton, two passenger sport roadster, three passenger sport coupe and a five passenger sport sedan.

The cars are finished in maroon and have de luxe equipment, including six disk wheels, polished protection bars on the back of the body, front and rear bumpers, nickel plated radiator, ornamental radiator cap and headlamps, Motometer, windshield wings on open models, sunshade, etc.

These sport bodies are mounted on the 121 in. wheelbase Model 55 chassis. Individual steps are standard equipment. The fenders are crowned higher than before.

The list prices of the new models are: 5-passenger sport phaeton, $1,895; 7-passenger sport roadster, $1,895; 3-passenger sport coupelet, $2,195; 5-passenger sport sedan, $2,695.

22,000 Pounds, Limit California May Adopt

SACRAMENTO, Sept. 5—A gasoline tax of two cents a gallon, more rigid policing of the state highways, weight limit of 22,000 pounds for loaded trucks, and a graduated weight tax on all kinds of automotive vehicles, in addition to the present license fee based on horsepower, will be asked of the California State Legislature at its next session this fall, according to Drury Butler, chairman of the Highway Legislative Committee of the County Surveyors' Association of California.

RUBBER PLAN FAILS

NEW YORK, Sept. 5—According to cable advices received here failure has attended the efforts of the committee appointed by the British and Dutch governments to formulate a plan for the restriction of rubber production and the arrangements are declared ended.

Ford's Closing Order Hits Goodyear Plant

Curtails Production — Firestone Will Catch Up with Orders on Other Types

AKRON, Sept. 5—Following the announcement of Henry Ford that he would close his entire plant on Sept. 16, due to the coal situation, the Goodyear Tire & Rubber Co. has curtailed production of Ford automobile tires by nearly 30 per cent. Goodyear has been making between 6000 and 8000 tires a day for Ford at plant No. 2 in Akron.

Under the new schedule now in effect, plant No. 2 drops from a five and a half day week to a four day week, thereby cutting 36 hours off the week's working time and reducing production by approximately 28 per cent. No change is made in production in any other tire or mechanical goods departments at Goodyear.

The Goodyear reduced output program on Ford tires will continue until the Ford plants re-open and until Henry Ford again begins to order tires extensively, Goodyear officials state.

Well Fixed for Coal

No other Akron company has altered its production program on account of the contemplated Ford shutdown. The Firestone Tire & Rubber Co., making more tires for Ford than any other rubber company, announces that a diminished demand for Ford sized tires for original equipment will enable the company to catch up with orders on other types and sizes of tires.

Practically all Akron companies are well fixed as to coal. A majority receive the bulk of their electrical power from the Northern Ohio Traction & Light Co., which has a 60 day supply of coal on hand and several hundred cars in transit. In addition to this power, Akron rubber factories combined burn about 100 cars of coal a day in generating steam for their vulcanizing departments. All have coal on hand. Firestone recently secured nearly 500 cars. Goodyear has its own mines in southern Ohio.

Ford Reinstates Order Calling for Rubber Mats

SPRINGFIELD, OHIO, Sept. 4—The Victor Rubber Co. received a telegram from the Ford Motor Co. Saturday reinstating an order for rubber mats which was rescinded when Ford announced he would close his plants on Sept. 16 rather than pay the price demanded for coal.

Treasurer H. H. Durr in speaking of the re-instatement of the order said that only a moderate delivery of mats will be made this month.

Ford's representatives are out now endeavoring to get an adequate supply from privately owned coal companies. They were in Springfield a few days ago on their way to Kentucky and other points in the south.

August Tire Output Equals That of July

Production Approximated 2,750,000 in Akron District—Busy Fall Expected

AKRON, Sept. 4—Tire production in August was practically abreast that of July in the Akron district when new output records were established, and manufacturers here look for busy times during September and October.

While some tire companies here decreased production slightly during August, others swelled their daily output, thus more than balancing the decreases and giving August a record of approximately 2,750,000 tires in the Akron district, or about the same as July's production. These marks are above any others ever set in the tire industry, not even excepting the unusual period of business in early 1920, just before the automotive slump came.

Bumper crops mean bumper business for automobile and tire manufacturers, say Akron tire builders. Farmers are getting good money for their crops, and their successful season will reflect itself in stimulated sales of both automobiles and tires, and manufacturers here are planning to meet heavy demands from dealers in the middle and western agricultural states.

Consumer Sales Break Records

While the demand for tires for original equipment has declined somewhat, due to retrenched activities upon the part of automobile manufacturers in view of the coal situation, consumer sales of tires have broken all previous records and all Akron manufacturers report unprecedented dealer activity in all parts of the country.

Practically every company in Akron faces September and October business buoyantly and optimistically and with every anticipation of record breaking business. November and December will see diminished sales, these months constituting the usual dull tire season, but January will see early resumption of orders from dealers for 1923 spring trade, and Akron manufacturers already are laying plans for another record-breaking production next year.

Milwaukee Awaiting Greater Coal Supply

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waukee, many of them bringing prospects who desired to see the 1923 models before placing orders. Local buyers who have been waiting to view the field before placing orders found opportunity of ample dimensions at the State Fair show to see practically every passenger car built in America in its new types.

The results of this year's State Fair show were eminently satisfactory, especially as it appears that the farmers are again becoming a buying factor, both in passenger and commercial cars. Exhibitors of farm machinery said that tractors and power operating equipment aroused more interest than in 1920 or 1921, and some actual sales were made on the grounds.

Upstate dealers said that there was a slowing up in demand in cities, but rural districts were producing some good business in passenger cars especially. April, May and June of this year represent probably the biggest and best selling period on record. July showed a falling off which was relieved to some extent in August by price reductions and the appearance of 1923 models. September is looked upon to produce a healthy volume. Closed types are running strong in the sales ratio, and if deliveries were quicker, probably more would be sold. A great many buyers do not want to wait anywhere from 30 to 90 days before the car is placed in their hands.

New Jersey Sales 5672 in July; 7450 in June

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mark, some distance setting apart the last in that group from the next highest. The same ratio obtained in June but in July there were only two cars exceeding that figure.

The registration figures follow:

	Automobiles	Commercial Cars
April	6,535	1,257
May	6,653	1,478
June	7,450	1,517
July	5,672	1,185
Total	26,310	5,437

Los Angeles Car Demand Showing Little Decline

LOS ANGELES, Sept. 5—This month is showing very little diminution in the demand for motor vehicles. Sales are running somewhat behind those of July, but this is customary during August. Several dealers cannot make deliveries and that is another reason for the falling off in sales. These dealers claim they get no encouragement from the factories and at least two firms claim to be from thirty to sixty days behind their orders.

Unless every indication fails, this year will prove the biggest on record in Southern California. Dealers in the surrounding small towns again are active and there is a marked demand for representation, especially among the better known lines of passenger cars.

Through the organization of finance companies, dealers are finding it easier to get their time payment paper handled. The banks are showing no particular desire to lend their money, but it is a known fact that the very banks which have refused to accommodate the dealers have organized and financed funding companies which serve the purpose but absolve the banks direct from the risk and are able to charge a higher rate of interest.

Casing Total in July Reached 2,476,636

Production Shows Decline of 93,888 from Year Ago—Tubes Increased

NEW YORK, Sept. 5—The monthly report of the Rubber Association of America, compiled for the Bureau of Foreign and Domestic Commerce, shows that July, 1922, produced 2,476,636 casings, a decrease of 93,888 from July of last year. The production of tubes for these comparative months was about the same, this July showing an increase of 7218.

The report follows:

PNEUMATIC CASINGS

1921—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan.	45	5,319,605	703,430	965,417
Feb.	45	5,193,018	819,892	1,073,756
March	47	4,597,103	1,163,314	1,614,651
April	49	4,527,115	1,651,418	1,785,951
May	59	4,451,668	2,150,917	2,085,882
June	63	4,154,456	2,313,265	2,643,850
July	63	3,892,037	2,370,524	2,757,581
1922—				
Jan.	66	4,174,000	2,055,000	1,597,000
Feb.	66	4,691,000	2,084,000	1,562,000
March	63	5,183,286	2,645,790	2,073,963
April	65	5,464,336	2,401,187	2,086,651
May	65	5,523,095	2,721,503	2,639,273
June	64	5,042,147	2,838,890	3,133,260
July	63	4,834,106	2,476,636	2,695,095

INNER TUBES

1921—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan.	47	5,586,163	740,824	1,042,617
Feb.	46	5,115,461	916,627	1,129,881
March	48	5,041,861	1,346,183	1,643,690
April	51	4,916,772	1,762,122	1,983,571
May	57	4,751,880	2,210,040	2,342,567
June	60	3,835,098	2,359,928	3,232,673
July	61	3,122,815	3,020,981	3,603,248
1922—				
Jan.	66	5,247,000	2,343,000	1,890,000
Feb.	65	6,142,000	2,597,000	1,703,000
March	63	6,991,118	3,017,511	2,090,737
April	65	7,230,096	2,650,573	2,329,343
May	65	7,189,552	2,970,636	2,938,947
June	64	6,186,534	3,120,629	3,973,679
July	63	5,675,839	3,068,199	3,630,744

SOLID TIRES

1921—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan.	12	303,753	21,220	29,116
Feb.	12	304,374	23,365	29,599
March	12	283,508	27,710	43,926
April	12	269,985	28,853	42,080
May	12	264,663	35,156	40,122
June	11	240,336	28,395	49,867
July	11	220,003	35,123	55,678
1922—				
Jan.	11	182,000	40,000	33,000
Feb.	11	183,000	39,000	37,000
March	11	182,197	49,433	48,350
April	11	173,748	46,664	52,309
May	11	170,904	57,640	60,711
June	11	168,808	66,089	63,408
July	11	176,375	71,505	60,425

Explanation

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic work in factory and in transit to, or at warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

Automotive Exports Keep at High Level

Expected Decline in Shipments from June Reported by Department of Commerce

WASHINGTON, Sept. 5—The export shipment of American automotive products continued at a high level during July, although an expected decline was recorded from the large shipments made in the previous month of June. This was shown to-day by the Automotive Division of the Bureau of Foreign and Domestic Commerce which announced the export sales made in July of automotive equipment from the United States, following the announcement of the Canadian shipments for the same period a week ago.

Details of the United States trade are given in the table adjoining but a capitulation of the totals shows the shipment of 5600 passenger cars, valued at $4,395,541; 822 trucks valued at $734,148; parts (not including engines and tires) to the extent of $2,825,335; and 965 motorcycles having a value of $267,220. The Canadian shipments for July were previously announced as 2812 passenger cars and 211 motor trucks, giving a total trade in these two items of 8412 cars and 1033 trucks. The comparison with June is:

	Cars	Trucks
July	8,412	1,033
June	10,085	1,291

This decline, although small, is the first recorded since the summer of 1921, when the low point in international trade was reached on both these two items. Month by month, until July, the curve has been upward, reaching its highest point during June. The drop in July is explained as being seasonal, due to the fact that shipments to the countries south of the equator, then in the midst of their winter season, necessarily were at a lower rate.

These countries are expected to return to the buying column in late August or September, in conjunction with their spring, and, although shipments will slack up to the northern half of the world, a continuing high level is to be looked for, it is thought by those closely in touch with the developing demand for automotive products abroad.

United States Exports, Imports and Reimports of Automotive Products for July, 1922, and for Nine Months That Preceded

	Month of July				Nine Months Ending July 31			
	1921		1922		1921		1922	
	No.	Value	No.	Value	No.	Value	No.	Value
EXPORTS								
Automobiles, including chassis	2,563	$2,187,605	6,451	$5,165,643	24,558	$30,041,421	42,362	$33,049,041
Electric trucks and passenger cars	....	....	29	35,954	....	....	198	269,559
Motor trucks and buses, except electric	339	314,237	....	....	5,092	7,793,907	....	....
Up to 1 ton	....	....	552	199,721	....	....	3,837	1,548,009
Over 1 and up to 2½ ton	....	....	186	288,190	....	....	1,220	1,694,108
Over 2½ ton	....	....	84	246,207	....	....	467	1,164,025
Total Motor trucks and buses, except electric	339	314,237	822	734,148	5,092	7,798,907	5,524	4,406,142
PASSENGER CARS								
Passenger cars, except electric	2,224	1,873,368	....	....	19,466	22,242,514	....	....
Value up to $800	....	....	3,568	1,778,995	....	....	23,200	11,153,754
Value over $800 and up to $2,000	....	....	1,837	2,070,316	....	....	12,254	13,612,768
Value over $2,000	....	....	195	546,230	....	....	1,186	3,606,818
Total passenger cars, except electric	2,224	1,873,368	5,600	4,395,541	19,466	22,242,514	36,640	28,373,340
PARTS, ETC.								
Parts, except engines and tires Accessories, parts of	....	1,952,525	*11,791,538	2,825,335	. . .	26,768,707	*92,999,156	22,504,525
Station and warehouse motor trucks	5	5,397	9	11,887	268	194,797	104	108,106
Trailers	....	....	27	15,300	....	....	293	134,738
Airplanes	....	....	7	28,300	30	193,775	32	58,130
Parts of airplanes, except engines and tires	....	2,444	*7,933	6,005	....	113,573	*129,038	55,966
BICYCLES, ETC.								
Bicycles and Tricycles	....	100,594	790	11,256	....	1,225,225	5,555	77,031
Motorcycles	441	124,523	965	267,220	8,398	2,799,760	9,433	2,505,373
Parts, except tires	....	....	176,448	100,729	....	....	1,881,471	1,015,319
Gas engines	40	7,513	487	86,191	733	239,449	3,131	435,467
Traction engines, (steam) except agricultural	....	....	1	950	65	98,340	21	32,311
Automobile engines	415	108,472	4,608	551,189	5,812	1,195,920	33,975	3,773,086
Aircraft engines	....	....	3	6,190	....	....	95	54,600
Complete tractors, except agricultural	17	29,990	1	525	5,090	5,603,874	46	70,612
Other internal combustion engines	251	83,534	266	36,743	5,838	1,322,449	2,715	399,796
IMPORTS								
Automobiles	45	90,532	37	72,438	290	544,200	210	407,212
Parts, except tires	....	72,253	....	31,208	....	682,297	....	390,925
All other	....	7,183	....	16,472	....	96,599	....	59,373
REIMPORTS								
Automobiles (free of duty)	893	1,174,065	102	144,510	2,445	3,829,598	912	1,557,029

*Pounds.

Courier Motors Reports Many Orders for New Car

SANDUSKY, OHIO, Sept. 5—The Courier Motors Co., which, under its previous name, the Arrow Motors Co., acquired the assets of Maibohm Motors Co., reports that production is under way on six-cylinder models, which are custom built and painted. It is stated that enough orders are on hand for the "Courier" to keep the plants at capacity for several months.

The officers of the company are: President, A. C. Burch, formerly vice-president and director of sales of the Clydesdale Motor Truck Co.; vice-president, O. O. Brace, president of the Sandusky Nut Co.; treasurer, E. E. Ernst; secretary and general counsel, J. G. Pyle; directors, E. G. Kirby, vice-president of the Commerce-Guardian Trust & Savings Bank, Toledo; R. E. Hayslett, treasurer of the Hydraulic Steel Co., Cleveland, and N. T. Brotherton, of the Brotherton Co., Detroit.

SAFETY MEETING PLANNED

CHICAGO, Sept. 2—A conference of highway commissioners, railroad officials and presidents of automobile clubs in Illinois has been called by the Illinois Commerce Commission to meet at Springfield Sept. 30 to plan a campaign for the purpose of reducing the number of accidents to automobiles at railroad crossings.

M.A.M.A. Completes Convention Plans

Meeting Will Be Opened Sept. 13 by President E. H. Broadwell —Long List of Speakers

NEW YORK, Sept. 5—Plans have been completed for the sixth annual credit convention of the Motor and Accessory Manufacturers Association which will be held Sept. 13-15 at Hotel Lafayette, Buffalo. In connection with the credit convention there will be special conferences on advertising, export and traffic which will be addressed by speakers of national prominence. It is to be the greatest convention effort ever made by the association.

The convention will be opened on Wednesday afternoon by President E. H. Broadwell and the speakers will include M. L. Heminway, general manager M. A. M. A.; C. A. Burrell, manager credit department of the M. A. M. A., and Merryle Stanley Rukeyser, financial and business editor New York *Tribune*. The discussion of their papers will be led by I. K. Schnaitter, assistant secretary-treasurer of the Willard Storage Battery Co. The association dinner will be held in the evening.

Credit Convention on Thursday

Thursday will be the big day. The credit convention will be addressed by R. E. Hayslett, treasurer, Hydraulic Steel Co.; Alfred Reeves, general manager, National Automobile Chamber of Commerce; C. A. Dana, president, Spicer Manufacturing Corp.; T. M. Simpson, credit manager, Continental Motors Corp.; and T. E. Challenger, credit manager, McCord Manufacturing Co.

Speakers for the advertising managers' council include Ezra W. Clark, advertising manager, Clark Equipment Co.; Harry Tipper, business manager, Automotive Industries; C. A. Musselman, vice-president Chilton Co.; Frank N. Sim, advertising manager, Timken-Detroit Axle Co.; John C. Long, secretary educational department, National Automobile Chamber of Commerce; Walter Bermingham, automobile editor, Chicago Evening Post; James C. Dalton, editor, Automotive Industries; R. E. McKenzie, advertising manager, Timken Roller Bearing Co.; William P. Green, director, National Vigilance Committee Associated Advertising Clubs of the World; Maurice Switzer, vice-president, Kelly-Springfield Tire Co.; J. C. McQuiston, publicity manager, Westinghouse Electric & Manufacturing Co., and S. E. Baldwin, advertising manager, Willard Storage Battery Co.

Speakers at Export Meeting

The export managers will listen to S. W. Dorman, vice-president, Overseas Motor Service Corp.; George E. Quisenberry, managing editor, El Automóvil Americano; George F. Bauer, secretary, Foreign Trade Committee National Automobile Chamber of Commerce; Gordon Lee, chief of Automotive Division, Department of Commerce; Glenn Davies, foreign manager General Motors Acceptance Corp., and W. F. Earl, advertising manager United States Rubber Export Co.

Speakers for the traffic conference include A. L. Viles, general manager, Rubber Association of America; J. S. Marvin, general traffic manager, National Automobile Chamber of Commerce; H. E. McGiveron, traffic manager, Motor Wheel Corp., and W. M. Twohig, traffic manager, Willard Storage Battery Co.

The final day, Friday, will be given up to golf, field sports and a motor trip, winding up with a dinner dance at the country home of the Automobile Club of Buffalo.

PARKS GIVEN STATE AS DODGE MEMORIAL

DETROIT, Sept. 5—Dodge Brothers, Inc., has donated 11 tracts of forest and lake sites to the State of Michigan for motorist, picnic and camping parks. The parks total 627 acres of natural woods and lakes. All of the sites are within 50 miles of Detroit.

The purpose of the donation is to provide a memorial to the late John F. and Horace E. Dodge and to "give motorists places where they may have their picnics, games and bathing without being constantly driven from pillar to pillar by indignant owners of private property."

Ten of the eleven parks have large lakes or river frontage and the other is a rugged, almost mountainous parcel noted for its natural scenery. The parks will be known as Dodge Brothers State Parks Nos. 1, 2, etc. The presentation was made in a formal letter to Governor Alex. J. Grosbeck by chairman Howard E. Bloomer of the board of directors of Dodge Brothers.

Anderson's Price Cuts Range from $155 to $455

ROCK HILL, S. C., Sept. 5—Lower prices are announced by the Anderson Motor Co., the reductions ranging from $155 up to $455. The new list is as follows:

	Old Price	New Price
5-pass. phaeton	$1,650	$1,495
Convertible roadster	1,650	1,495
7-pass. phaeton	1,795	1,595
4-pass. sport	1,750	1,595
2-pass. speedster	2,195	1,785
4-pass. ultra sport	2,395	1,945
4-pass. coupe	2,450	1,995
5-pass. sedan	2,550	1,995

BEST PAIGE AUGUST

DETROIT, Sept. 5 — Paige-Detroit Motor Car Co. reports its best August from the standpoint of output and sales. Roughly, 4000 cars were turned out in August as compared with 3600 in July. September is expected to produce 4200. Of this August total about two-thirds were Jewetts. It is estimated that present earnings are about $500,000 a month. The company is said to be free of bank debt and to have $5,470,000 in cash assets.

Equipment Business Better on Seaboard

At Fall Meeting Eastern Jobbers Report It Ahead of Last Year—Lines Narrowed

ATLANTIC CITY, Sept. 5—Automotive equipment business along the Atlantic seaboard is running ahead of last year, according to informal reports made by jobbers attending the fall meeting of the Eastern Automotive Equipment Association. New England jobbers reported the biggest increase in business, in some cases running as high as 30 per cent over last year in dollars and cents. The Pennsylvania and New Jersey districts also reported good sales. In New York city territory jobbers have had little, if any, improvement over the business in 1921, and competition, particularly on a price basis, has been keener than previously.

The meeting, presided over by Wallace G. Page of the American Motor Equipment Co. of Boston, president of the association, was addressed informally by Robert A. Stranahan, chairman of the merchandising committee of the Automotive Equipment Association, and Ray W. Sherman, merchandising director.

Urges Jobbers Help Dealers

Stranahan urged constant campaigning by jobbers to assist dealers in getting more rapid turnover of goods as the most important requirement in the process of building up business.

It developed that jobbers in the New England territory co-operatively have a sales promotion campaign well under way in connection with the Automotive Equipment Association movement. Plans are being developed in Pennsylvania, New Jersey and some of the other eastern territories.

Cut Down Lines

The meeting showed a steady gain in the trend toward narrowing distribution lines. Several jobbers reported that they had cut down the number of competing makes of articles they are handling in various lines and had increased rather than lost business as a result. They reported also that quite a number of manufacturers were leaning toward reduction of the number of jobbers handling their lines in given territories, with the result that competing makes of numerous lines of merchandise are now being pushed by competing jobbers instead of all jobbers handling virtually all makes and giving no particularly aggressive attention to any. It was the general opinion of the meeting that this standardization of lines will continue and will benefit both manufacturers and jobbers.

FRITZ HEADS ASSOCIATION

CHICAGO, Sept. 7—George Fritz, formerly manager of the Research Club, an organization of automotive jobbers, has been appointed business manager of the Association of Automotive Equipment Manufacturers.

A.A.A. of Air, Plan of Nation's Flyers

Association Will Be Formed at Convention to Be Held in Detroit

DETROIT, Sept. 5—Definite plans for the formation of a national aeronautic association were announced to-day by Howard E. Coffin of this city who is chairman of the national advance committee on organization, in inviting 30 of the country's best known aviation experts, pilots and enthusiasts to form the executive committee in charge of arrangements for the convention to be held in Detroit during the national airplane races, Oct. 12, 13 and 14.

"All that the American Automobile Association, with its half million members, has done for motor car transportation, for good roads and for legislation, this new national body here proposed must do for aviation, and more," said Coffin.

He stated further:

Commercial aviation is a vital background in all military-naval plans for the national defense and the earliest possible steps must be taken for its encouragement. Federal laws for the control and regulation of all flying are an immediate and crying need. Life and property must be safeguarded and a foundation of public confidence laid for the commercial progress of this newest and fastest of the transportation arts. The attitude of mind of our Federal, State and municipal authorities must be directed along sane and constructive lines. We stand on the threshold of a new realm of navigation and travel, the uncharted ocean of the air.

Two Governors Invited

Among the 30 members invited to form the executive committee are two governors, who are themselves enthusiastic flyers. Governor James Hartness of Vermont, and Governor Ben Olcott of Oregon. E. M. Cowie, vice-president of the American Express Co., is also invited to serve, as is Frederick Patterson, president of the National Cash Register Co., Dr. Joseph Ames, of the Bureau of Standards, J. Howland Bibbens, manager of the transportation department of the United States Chamber of Commerce and Glenn Martin, famous airplane designer, of Cleveland, are also among the number.

A number of famous World War pilots, some of them America's best known "aces," are invited to represent the flyers on the committee.

Detroit is represented on the committee by Sidney D. Waldon, president of the Detroit Aviation Society and also president of the National Air Association, formed at Omaha last year. The National Air Association proposes to merge its membership, together with that of the Aero Club of America, into the new national aeronautic association.

FLIES ACROSS CONTINENT

SAN DIEGO, CAL., Sept. 5—A flight across the continent with only one stop—that's the achievement of Lieut. James H. Doolittle, who flew a De Haviland plane from Pablo Beach, Jacksonville, Fla., to San Diego in 21 hr. 18 min. The distance is approximately 2275 miles, and the average was nearly 100 m.p.h. Doolittle's one stop was at San Antonio, Tex., where he remained for 1 hr. 13 min.

FINANCIAL NOTES

Latex Tire & Rubber Co., Fond du Lac, Wis., will market a bond issue of $125,000 to provide capital for extension of production. More than 75 per cent of the issue already has been subscribed for by present stockholders. The business was established about three years ago. The plant and business are valued at more than $750,000. Business on the books is sufficient to keep the factory busy at full capacity for five to six months. With new capital a larger volume now available can be handled.

Stromberg Carbureter Co. announces a quarterly dividend of $1 a share payable Oct. 2 to stock of record Sept. 18. This is a resumption of dividend payments at the same rate which prevailed from July, 1919 to October, 1920. In January of last year the rate was reduced to 50 cents quarterly and in the following quarter payments were suspended entirely. Up to the present no dividends have been paid since the first quarter of last year.

Paige Detroit Motor Car Co. has declared the regular quarterly dividend of 1¾ per cent on preferred, payable Oct. 1 to stock of record Sept. 15. It has declared a dividend of 3 per cent on the common stock payable Oct. 1 to stock of record Sept. 30.

Fisher Body Ohio Co. has declared a quarterly dividend of $2 a share on the preferred stock payable Oct. 1 to stock of record Sept. 21. This is the first dividend paid since the expiration of the parent company's guarantee.

Reynolds Spring Co. directors have declared a dividend of 1¾ per cent on the preferred "A" and "B" stock, payable Sept. 30, 1922, to stockholders of record at the close of business Sept. 18.

Mack Trucks, Inc., has declared the regular quarterly dividend of 1¾ per cent on the first and second preferred stocks, payable Oct. 1 to holders of record Sept. 20.

J. I. Case T. M. Co. has declared the regular quarterly dividend of $1.75 a share on the preferred stock, payable Oct. 1 to stock of record Sept. 11.

Motor Wheel Corp. has declared the usual quarterly dividend of 2 per cent on common, payable Sept. 20 to holders of record Sept. 11.

Kelly Springfield Tire Co. has declared a quarterly dividend of $1.50 a share on the 6 per cent preferred stock, payable Oct. 2, 1922, to stockholders of record Sept. 15.

Buda Co. announces a 1¾ per cent dividend payable Oct. 1 to stock of record Sept. 20.

NO PACKARD VACATION

DETROIT, Sept. 5—The annual two weeks shut down of the plant of the Packard Motor Car Co. will not take place this year. Production demands are so pressing that members of the entire factory organization have voluntarily given up their vacations in order to get out the cars. As a reward the company will give the men bonuses.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Last week the rates for call loans ranged between 3¾ per cent and 5 per cent as compared with 3¼ per cent to 4½ per cent. There was an increased firmness noted toward the end of the week, responsibility for which might doubtless be attributed to the preparations for Sept. 1 dividend and interest payment. The slight stiffening in rates is believed in some quarters to be only temporary. In time money, 60 days' maturities continued to be quoted at 4¼ per cent, 90 days' and 4 months' at 4¼ per cent to 4½ per cent, as compared with 4¼ per cent, and 5 and 6 months' maturities at 4½ per cent to 4¾ per cent, as compared with 4½ per cent in the previous week. The prime commercial rate remained at 3¾ per cent to 4 per cent.

The outstanding events in the coal mining industry last week were the settlement of the anthracite coal strike and the return to work of the bituminous miners.

The various sections of the United States, with the exception of the South, showed increases last week in the number of failures, the total being 376, as compared with 348 in the previous week and 346 for the corresponding week a year ago. The number of defaults involving liabilities of $5,000 or more was 223, or 59.3 per cent of the total failures for the week, as compared with 190, or 54.6 per cent for the previous week, and 189, or 54.6 per cent for the corresponding week a year ago.

Despite the rail and labor disturbances which interfered with general transportation during the whole month of August, car loadings of merchandise and miscellaneous freight showed an increase of 3639 in the week ending Aug. 10, and coal loadings, an increase of 2600. Total coal loadings for that week aggregated 81,959, as compared with 152,513 cars for the corresponding week last year and 204,178 two years ago, while total loadings amounted to 856,219 against 815,147 cars for the corresponding week last year and 968,103 cars two years ago.

Patents Should Extend to Europe, Consul Says

WASHINGTON, Sept. 6—The need for extension of American patents on automotive products in foreign countries is emphasized in a letter received to-day by the Department of Commerce from an American Consul in Portugal. It is reported that certain firms in Portugal buy American truck bodies and use them for patterns.

The bodies are then made locally at prices averaging from one-half to one-third of the present American prices. It is suggested that American manufacturers of truck bodies secure production through obtaining patent rights in European countries.

Milk Producers Get Fenn's Truck Data

If Plan Is Adopted Sales of Vehicles Will Be Greatly Stimulated

WASHINGTON, Sept. 6 — Definite plans for the haulage of milk products by motor trucks were submitted to the National Milk Producers Association today by F. W. Fenn, secretary of the motor truck committee of the National Automobile Chamber of Commerce.

This report is very comprehensive in that it covers thoroughly a new field for motor transportation of milk and milk products. It gives the concise account of motor truck operation costs from one ton to seven and one-half tons, covering the operation of costs from per mile to per day, week, month and year.

The report is submitted from the standpoint of the user and not manufacturer of trucks, and if adopted by the milk producers will mean sales of trucks on an enormous scale throughout the country.

Big Saving in Plan

The data prepared under Fenn's direction for the milk producers involves a plan whereby the co-operative organizations of milk producers will own their own trucks and manage and operate the motor transportation system. Figures are given to show that the plan if developed will result in tremendous savings to milk producers.

The report shows that it is possible to transport milk products from farm to city markets over distances up to 50 or 60 miles at less than half the cost of rail transportation. The success which has attended the inauguration of motor milk routes in Syracuse, N. Y., and Cincinnati, Ohio, has aroused the farming interests to the possibilities of motor truck transportation.

A chapter of the report shows that in some large centers fully 90 per cent of the milk supply is now being received by motor trucks. Information given the motor truck committee by operators and owners of milk trucks shows that Milwaukee is enjoying milk at 11 cents a quart while the average American city is paying approximately 13 cents, owing to the high rail freight rates.

Glass Lined Tanks in Plan

Of the ideas submitted by the National Automobile Chamber of Commerce one concern specially built glass lined tanks which have proved efficient in actual operation. It is stated that milk transported in tanks over the highways covering a distance of 20 to 40 miles suffers very little change in temperature, the average being about two degrees Fahrenheit. In localities where glass-lined tanks are used, they are mounted on a motor truck chassis back of which is hauled a trailer, similarly equipped, increasing the load capacity and cutting down the cost of transportation.

Copies of the report will be printed at an early date and distributed to the members of the association for their consideration.

The failure of the Interstate Commerce Commission to reduce the rates on milk products early this summer, when a general freight rate reduction of 10 per cent was authorized turned attention of milk producers to a cheaper and efficient method of transportation—the motor truck.

INDUSTRIAL NOTES

Western Reserve Cotton Mills Co., following installation of $75,000 worth of new machinery for weaving at its tire fabric plant, Millen, Ga., started production at full capacity on a 24-hour day and night schedule the last week in August. So rapidly has the tire industry improved the past few weeks that the mills have been compelled to ship several 10,000-pound fabric orders to the Mason Tire & Rubber Co., at Kent, Ohio, by express, to enable the company to keep up with the increasing demand. The Millen mills are now using cord wood for fuel purposes because of the coal shortage.

Cropper-Kinney Auto Spring Co. has been incorporated at Lebanon, Ohio. George Cropper, president and treasurer has been connected with the Milburn Wagon Co., on its sales force, for the past 25 years. L. H. Kinney, vice-president and general superintendent had charge of the Studebaker spring factories for over 12 years. Lately he was president of the Cincinnati Auto Spring Co. A. M. Kinney will be assistant superintendent. The company expects to be in operation by Oct. 15 and will manufacture the Star Brand spring.

Federal Rubber Co., Cudahy, Wis., has started construction work on three additional floors of a new seven-story manufacturing addition, 120 x 250 ft., the foundations and first floor of which were erected last year. The structure is projected as a seven-story building, and the remaining three stories will be built early in 1923. It will represent an investment of about $400,000, including equipment.

Dallmann Machinery & Manufacturing Co., Milwaukee, has purchased the rights to the Smith sliding gear and clutch heretofore manufactured by the Smith Sliding Gear & Clutch Co. of North Lake, Wis. The Smith company will receive a royalty on the Dallmann production. The North Lake works will concentrate on the manufacture of pulleys for Fordson tractors and similar mechanical devices.

Firestone Tire & Rubber Co. of Canada, Ltd., will place its new plant at Hamilton, Ont., in operation Sept. 15. This is the first unit of an extensive manufacturing development. The plant will be devoted exclusively to the manufacture of passenger car and truck tires. Between 300 and 400 Canadian hands will be employed at the start.

Borg & Beck Co., clutch manufacturer, plans to transfer its recently acquired **Hough Mechanical Hoist Co.** from Chicago to Moline with a force of 100 men. Production is scheduled to start in 60 or 90 days. The hoist is used to elevate dumping wagon bodies. Earl Hough has joined Borg & Beck as sales manager of the product.

Corrocan-Victor Co. of Cincinnati, manufacturer of automobile lamps, tool boxes and automotive devices, has opened a sales office in the General Motors Building, Detroit.

METAL MARKETS

A new chapter of steel market history is being written. Of this there is not the least doubt, but there is doubt whether the caption "inflation" which many astute market observers have chosen as befitting the impending developments will be justified by the latter. Those who are positive in their opinion that inflation has set in are equally positive that it will not endure for any appreciable length of time. To many equally discerning beholders of steel market conditions it looks as though inflation ill fits the prevailing and impending state of affairs.

Inflation presupposes buyers eagerly falling over one another to secure steel at any price. So far, at least, there is no indication of such a condition coming to pass. What has taken place is that production costs have unexpectedly taken a sharp upward turn. The steel industry is now seeking to translate these advanced production costs into selling prices at which it can make both ends meet and continue to operate a fair percentage of its capacity. So far consumers have shown no disposition to place tonnage orders at these higher prices.

Requirements for building operations are certain to shrink more and more as the colder weather approaches. The railroads undoubtedly are in need of considerable steel and of considerable steel containing equipment. Whether they will be financially in a position to cover their wants more liberally than has been the case heretofore remains to be seen.

To a very large extent the attitude of the automotive industries toward the steel market will determine whether it is headed for a period of actual inflation or whether competition among the steel mills for what business is obtainable will result in the leading interest's prices becoming a convenient level for cutting under rather than, as at present, one on which to base higher quotations. Of course, the steel industry is only a cog in the mechanism of commodity markets, and, if there should ensue in the next few weeks a general tendency toward inflation, steel prices would be buoyed up by the tide. The opinion so frequently encountered these days that the leaders of the steel industry have thrown up the sponge and are ready to let inflation take its course is obviously faulty. Judge Gary is as uncompromisingly opposed to-day to everything that may tend to bring about a recrudescence of inflation as he was two years ago when he led the movement to bring about a return to sanity in the matter of commodity prices.

Pig Iron.—For the time being there is no market. Automotive foundries urgently in need of fill-in tonnages are obliged to go scouting for pig iron and drive the best bargain they can. Many melters are having recourse to more and more scrap.

Steel.—Prices for nearly all automotive steels are irregular. For sheet bars prices up to $40 are heard. Hot-rolled strip is held at 2.75c., base, and cold-rolled at 4.25c. Cold-drawn bars are held at 2.25 @ 2.50c., Pittsburgh, with a $5 per ton advance predicted here and there. Higher bolt and nut prices are also spoken of.

Copper.—Further advances in wrought copper and brass products have become general. Most mills have orders on their books to keep them running until November. The raw metal market is at a standstill.

Aluminum.—A brisk demand for aluminum scrap is noted from foundries making passenger car step plates. Aluminum sheets are quiet with prices firm.

Calendar

SHOWS

Sept. 23-30—New York, Closed Car Show, Grand Central Palace.

Oct. 7-14—New York, Electrical and Industrial Exposition, Grand Central Palace.

Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8-13 — New York Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Sept. 1922 — Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Associação Automobilista Brazileria.

Sept. 15-20—The Hague, Automobile Show.

September — Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.

Oct. 4-15 — Paris, Automobile Show, Grand Palais.

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show, British Cycle Motors, The Tower, Warwick Road, Coventry.

November—Buenos Aires, Argentina, Annual Exhibition Automovil Club Argentino.

Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

CONVENTIONS

Sept. 13, 14, 15—Buffalo, Lafayette Hotel, Annual credit meeting, Motor and Accessory Manufacturers Ass'n.

Sept. 14-15—Chicago National Used Car Conference, National Association of Automobile Show and Association Managers, Congress Hotel.

Sept. 18-23, 1922 — Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

Oct. 2-7—Detroit, Fourth International Steel Exposition and Convention of the American Society for Steel Treating and the American Drop Forging Institute, General Motors Building.

Oct. 7-14—Detroit, Second National Aero Congress and National Airplane Races.

Oct. 18-20—Chicago, National Association of Farm Equipment Manufacturers, Congress Hotel.

Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

RACES

Sept. 10—Monza, Italy, Italian 500-mile Grand Prix Race.

Sept. 16—Kansas City Speedway, 300 mi. International Speed Race.

S. A. E. MEETINGS

Sept. 16—Metropolitan Section, Annual Outing, West Point; Sept. 21—Automobile Club of America, George A. Round, Lubrication.

Sept. 22—New England Section, Engineers Club, Boston, Starting and Lighting Equipment, Louis Ehrlich.

Sept. 29—Detroit Section, Lubrication, A. A. Bull.

Oct. 6 — Aberdeen Proving Ground, Md.—Oct. 26-27, Detroit, General Motors Building.

Jan. 9-12—New York, Annual Meeting.

T. W. Warner Is Buyer of New Process Gear

SYRACUSE, N. Y., Sept. 6—T. W. Warner, president of the Warner Corp. of Muncie, Ind., and Toledo, bought the New Process Gear division of the Willys Corp. at court sale to-day. He was the only bidder, and the price paid was $1,904,000, which was $4,000 more than the court's upset price. The sale will come up for confirmation before Federal Judge Cooper in Albany Sept. 16.

It is said that this Syracuse plant will become a part of the Warner Corp. which will be enlarged. In all likelihood, there will be an issue of stock to finance this sale, and it is probable that this stock will be marketed through the Durant corporation, W. C. Durant being interested in the Warner company.

The balance sheet of the New Process Gear Co. shows assets of $2,766,217. Against this there is due the Willy company a total of $170,000. The land and buildngs were appraised at $790,000; machinery and equipment, $650,000; unfinished goods, $588,354; cash, $622,598; accounts receivable, $329,717 from the Willys company and $52,000 from Durant Motors, Inc.

The New Process plant here has been producing gears for the Star and Durant cars for some time and has been working at full capacity.

New Franklin Series Has Victoria Coupe

SYRACUSE, N. Y., Sept. 7—In addition to the changes in the engine and chassis, which were fully described in the Aug. 31 issue of AUTOMOTIVE INDUSTRIES, the new Franklin models show the addition of an entirely new body, the Victoria Coupe, which is a three passenger job. The price of the new coupe is $2,750.

Some changes have also been made in the exterior appearance of the entire line. Most noticeable of these is the location of the front license plate bracket, which is a forging extending over in front of the left front wheel, so as to remove any interference of air supply to the cooling system. Watson stabilizers are also standard equipment on all models.

Canada Will Produce 100,000 Cars in 1922

TORONTO, Sept. 1—That Canada's automotive investment exceeds $600,000,000; that motor vehicles carry at least five times the number of passengers transported by all the railroads combined in Canada, that the Canadian automotive industry will produce approximately 100,000 cars this year and export from 40,000 to 50,000 cars, that Canada with over half a million cars and trucks ranks second only to the United States in motorization; that every unit entering Canadian made cars will be made in the Dominion in the near future and that the country's motor population will double and triple within a few years are some of the high lights of the address by R. S. McLaughlin, president of the Automotive Industries of Canada, delivered at the Directors' Luncheon of the Canadian National Exhibition.

PACKARD BUILDING DOCK

DETROIT, Sept. 5—The Packard Motor Car Co. is building a railroad loading dock along the inner belt line of the Michigan Central railroad at its plant in this city. The new dock is made of steel and concrete and is 702 ft. long and 22 ft. wide. It will have a capacity of 30 railroad cars at a time, providing for the loading of 90 automobiles at each clearing.

Curtiss Keeps Glider in Air for 9 Seconds

NEW YORK, Sept. 6—What is believed to be the first flight of an aquatic glider was accomplished to-day over Manhasset Bay, near Port Washington, L. I., when Glenn Curtiss made a sustained flight lasting nine seconds. Towed by a motor boat at a speed of 35 m.p.h., and while at a height of about 20 ft. above the water, Curtiss cast loose the tow rope and the glider remained in the air for nine seconds.

This flight was made after four unsuccessful trials during which there was no wind whatsoever. Returning to the hangar in tow, Curtiss discovered a puff of wind which led him to try for the fifth time with the results recorded above.

The glider used is one which has just been completed by Curtiss and which has been described in these columns. Except for its blunt nose, it is an exact copy of the N.C. boats built by the Curtiss company for the Navy. Its weight empty is 140 lbs. and it is operated by means of a system of shoulder controls.

DODGE TO EXPAND

DETROIT, Sept. 6—A manufacturing building costing about $1,500,000 and having a capacity of 500 000 sq. ft. will be added to the Dodge Brothers' plant, which will increase the capacity from 650 cars a day at present to between 800 and 900. The total production for the year will be 160,000, it is estimated, as compared with 141,000, the best previous year.

DELIVERING STARS

NEW YORK, Sept. 6—Actual deliveries of Star cars to purchasers are now being made. The Star is in production at three plants now—Lansing, Leaside and Long Island City.

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Making Western Highway Programs Build Car Sales

Practical view of road building and finance problems will enable automotive industry to increase sales in far West. Chief MacDonald of Bureau of Roads, returning from recent trip, says road programs in Western States portend more extended use of cars.

By Norman G. Shidle

AUTOMOTIVE manufacturers should use their influence to prevent friction between local automobile organizations and state highway officials, since such open conflicts usually result in losses for both sides and in decreased benefits for the whole industry.

Every effort should be made to complete road programs in all the states during the present period, as business revival promises to put a strain on transportation facilities that cannot adequately be borne under present conditions. Greater highway mileage, especially in the Western States, will lighten this transport burden and will react very directly to the benefit of automotive manufacturers both in increased sales and in more efficient carrying of manufacturing materials.

Greater mileage of smooth, firm roads suitable for comparatively high speeds is the chief highway need of the Western States, where distances are incomparably greater than in the East. These roads need not be wide in many cases, so long as they permit operating speeds ranging from 30 to 40 miles per hour and are strung out over the greatest distance.

These are the chief impressions brought back by Chief Thomas H. MacDonald of the Bureau of Roads from a recent trip to a number of western states. Correlating the impressions a recent motor tour through the long stretches of California, Arizona, Nevada, Washington and Oregon with a wide knowledge of highway problems in general, MacDonald is vividly impressed with the need for some very practical co-operation and effort by the automotive industry.

Local bodies of motor interests sometimes make strong opposition to plans of the State Highway Department, chiefly with a view to obtaining some special benefit for their local community. Such fights, when dragged into public, have a demoralizing influence on the progress of highway development and incidentally on automobile sales.

In several western states, for example, constructive highway programs have been laid out. These states now contain long stretches of country without transport facilities. If funds are provided to carry through the road plans during the next decade these states will be provided with highways which will result in vastly increased touring and make car sales mount more rapidly than ever.

At the present time, the state highway departments are waiting to see what the next Legislature is going to do. They are uncertain as to whether or not they will be permitted to carry through the necessary programs which have been mapped out. These programs

are not extravagant. They have been carefully planned with the co-operation of the Bureau of Roads and are laid out on a broad basis that will make for the development of highway transportation throughout the territories involved. It is to the interest of automotive manufacturers that these plans be put through.

Local fights, often centering about details, tend to increase the uncertainty of any adequate appropriation. Consequently, the automotive industry as a whole should throw its influence in favor of harmony on minor issues.

Present Work Sound

CHIEF MAC DONALD is convinced of the essential soundness of the road work planned by the highway departments of the states which he visited. While there is always room for difference of opinion as regards details, the work which these states have accomplished is remarkable, when everything is considered. MacDonald particularly approves the general idea of making appropriations produce as great a mileage of serviceable roads as possible. This is being followed in practically every case in the states under discussion.

The highway problem in these states is an intensely practical one and the automotive industry in lending its influence should not be too greatly concerned with theoretical considerations.

Highway building has been and should continue to be a development. It is useless to expect that the wearing surfaces built to-day are going to last forever To build such surfaces under many conditions would be uneconomical to a high degree.

Take a State like Arizona, for example, where there are long stretches of desert country. The chief necessity there is for the greatest possible mileage of road constructed well enough to stand high operating speeds. The surfaced roadways need not be more than 10 ft. wide in many cases, as the traffic would not be dense for some time to come.

Many narrow roadways were built in California in the past. They are now being widened and improved where traffic demands. The foundation and everything else that has been put into them is being used in this improvement process. Nothing has been lost by the construction of a cheaper surface in the beginning. In the meantime many years of good service have been rendered by those roads to the motoring public.

Thus it is perfectly possible to build a road to-day in such a way that it will be economical and adequate for present requirements, without sacrificing its future usefulness as a basis for improvement.

Viewed over a long period of time, past efforts have not been at all bad. The man who built 10 miles of 8-ft. concrete surface over desert territory ten years ago was exercising better judgment than if he had built 2 miles of 20-ft. roadway. In building to meet present conditions the original 8-ft. surface can be used, so that the money originally invested has not been wasted.

This phase of road construction is specially important in the Western States, because of the great distances which have to be covered. The use and utility of the automobile will increase only in proportion as the facilities are given it for going long distances at comparatively high speeds.

As regards matters of highway finance, the automotive industry should take a very practical view, MacDonald feels. The industry is interested primarily in getting more good roads, as such roads will increase sales in certain territories more than any other single factor. It is useless, for instance, to say that motor vehicle license fees should not be used for road construction, but only for road maintenance. The fact is that these fees are being used for construction and will continue to be so used. Even the theory is not sound, according to MacDonald, because it is based on the assumption that a certain standard of road has been built in the first place.

It is perfectly possible, for example, that maintenance costs might be reduced by taking part of the motor vehicle money to enable the state to build a better quality road in the first place. It might be more sensible to do this than to insist that a poorer quality road be built with the funds available and the motor vehicle tax money used up in maintaining that poor road. He suggests even that the gasoline tax in California might have been advisable.

In all matters of highway finance, MacDonald advocates an intensely practical view, since the next few years are highly important in highway construction. The results achieved during that time will be of vast importance to automobile and truck manufacturers.

In his view of the use of motor vehicle tax money for road construction and on the possible usefulness of the gasoline tax in certain cases, MacDonald is at variance with the Motor Vehicle Conference Committee and many people in the automotive industry. His view is worth serious consideration, however, because of his wide experience and intimate connection with the highway problems of this country.

CHIEF THOMAS H. MAC DONALD of the Bureau of Roads says:

The far West needs the greatest possible road mileage, built to carry cars operating between 30 and 40 m.p.h.

Car manufacturers should support the long, "fast" road programs which are being carried out in these states, as the completion of these plans means greatly increased sales.

Service creates a demand for better service. Give a man some kind of road which will meet his immediate needs, and he will vote for a bond issue later to get the better road which he later needs.

The automobile manufacturer doesn't want to be judged to-day by the product he put out fifteen years ago. Neither does the road administrator.

Motor Buses

THE bus will have a very distinct development in these Western States, MacDonald predicts. It is already widely used and its potential utility is very great. In certain instances companies are already operating buses over routes which would not be considered fit for passenger car travel in the East. The lines are being run simply on the strength of the future value of the franchise when good roads do come to that section.

The bus will be a distinct supplement to the railways when these long, hard surfaced highways have been connected through the desert areas. The bus can be used for sight-seeing and touring purposes to a very great extent and will take people over many beautiful touring routes after they have left the railway trunk lines. The bus will take the place of the short-line railway development which the East has had, but which the West has lacked.

The future of truck traffic in connection with the long,

"fast" highways is not quite so clear. The truck will undoubtedly be used as a feeder for the railroads, but it is too early to determine whether or not its service to the communities involved would be in proportion to the cost of building these fast highways to carry very heavy loads. In any case, there is a distinct future shown for the speed truck and freight-carrying vehicles of a similar capacity.

Chief Needs in Highways

The chief needs in highway development for these states may be summed up as follows:

1. Great mileage capable of carrying rapidly traveling vehicles.
2. Subjugation of local animosities to the development of a comprehensive state and inter-state highway development.
3. Roads built for needs of the immediate future with the idea of cumulative improvement in the more distant future.
4. Practical consideration of problems of highway finance and construction, rather than an attempt to maintain predetermined theories.

In summing up his views resulting from this western trip, MacDonald said:

"I was strongly impressed with the highway work which has been done by the states which I visited. In view of the vast distances which they have to consider in laying out a highway program, I think they have performed wonders. Their task is almost inconceivable to one familiar only with conditions on the Atlantic Coast and in the Middle West.

"In answering critics of some of the highway building of the past in these states, it is well to bear in mind the practical facts. Roads can be built only when money to build them is supplied. The only way to get a man to vote for bond issue for roads is to give him service from a road. If you build the best road you can with the funds given and spread it over the widest possible area, you are giving service to the greatest number of people. This service creates a demand for better service. Thus cumulative road improvement is made possible.

"The automobile engineer wouldn't like to be judged to-day by the product which he put out fifteen years ago. Neither does the road builder and road administrator."

Germans Fly for 2 Cents a Mile

"EVERY civilized government in the world that is not bankrupt, with the exception of the United States, is finding it worth while to develop aviation.

"German air lines total about 4000 miles, most of the distance flown once daily. The fare is astonishingly low. At the last of July, reckoning exchange at the rate that then applied, one could fly for 2c. a mile. The distance between Berlin and Hamburg is about 200 miles and the fare by air is only $3.50. In addition to this, the government pays the commercial companies a subsidy of 8c. per airplane mile."

These are the statements made by Professor Warner upon his return from the French and German glider contests. Discussing the air situation abroad, Warner goes on to say:

"The safety factor of such travel is encouraging. So far as I know, there were only two fatal accidents in Germany this summer.

"Nearly all countries grant subsidies, the French being the heaviest and the English about the lightest. Even in Austria, in the last stages of financial collapse, a new air operating company is being planned. It has been shown that if a commercial aviation enterprise is operated solely as a commercial undertaking, without regard for possible military use, and applying the same methods of sound business management as would be required of any ordinary activity, there is every prospect that it can be made to stand on its own feet. As an example of what can be done, one English line during June made 84 trips between London and Paris, with only one airplane. This machine traveled a total distance of 19,000 miles, with only one forced landing and that due to fog. Twenty trips were made in five days, or an average of 900 miles each day, which meant about ten hours of flying daily. During all this, the advertised schedule was maintained. One English company is operating successfully without government subsidy.

"The record for safety is reassuring. Taking all the European lines, there has been one death for every 400,000 passenger miles. Some lines have made a much better record, one having flown 650,000 airplane miles without fatal accident.

"Aviation in England is the center right now of hot parliamentary controversy. The British feel very keenly the military necessity of proper air defense. The small compass of the British Isles makes aviation primarily a matter of imperial communication and it is being so developed. The military control of Mesopotamia is being turned over to the Royal Air Force. The chief commercial lines in England are between London and Brussels, where one company operated, and between London and Paris, operated by three. About ten ships are scheduled each way each day at the London air port. The rate is about 12 cents a passenger mile. The subsidy is not large and is on a basis of business actually obtained by the carriers.

"The French development is more largely for military reasons. Nine great routes are operated, including the London-Paris trip, which has two French companies; Paris-Brussels; Paris, Strassburg, Prague, Vienna and Budapest, and Toulouse-Casablanca, in Morocco. The fare is 8 cents a mile. The subsidy is the most elaborate in Europe and under some circumstances it is possible to operate and clear expenses without carrying a passenger."

Imports of Motor Vehicles Into Madras Presidency Decrease

THE value of passenger car and truck imports into the Madras Presidency decreased to Rs. 2,907,000 ($969,000) for the fiscal year ending March 31, as compared with imports valued at Rs. 11,819,000 for the preceding year. The contemplated increase in the import duty hindered importations as much as the drop in Indian exchange and the general business depression. The number of passenger cars imported dropped from 1733 in 1921 to 425 in 1922, 193 of which came from Canada, 120 from the United States and 57 from the United Kingdom. Motor trucks declined from 265 to 160, the majority of which came from Canada, and consisted of light truck chassis for conversion into buses, a number of bus services having been started around Madras. Imports of motorcycles fell from 783 to 110—England furnishing 69 and the United States 19.

1,000,000 Motor Vehicles Built In Four Months

Many factors created this demand. Market promises to remain steady throughout year, with farmers gaining strength as buying factor. Industry must guard against undue plant expansion.

By James Dalton

AFTER producing over 1,000,000 motor vehicles in the past four months, the industry naturally is wondering what the rest of the year has in store. This speculation seems to be just as interesting to men in other lines and to the public generally. The perennial pessimists, with whom the wish is father to the thought, are shaking their heads and predicting dire disaster. A careful survey of the situation, however, discloses no serious cloud on the horizon unless it is the freight car shortage, which will reach record proportions in the next three or four months.

A good many people are asking where all the motor cars are going to and it's a hard question to answer. The fact remains, nevertheless, that they are going to purchasers and not into warehouses. Many explanations have been offered for the apparently insatiable market and probably all of them together give the correct reply.

There has been an increase of billions of dollars in the market value of securities, for one thing, and a large number of persons who felt themselves poor a year ago now have money to spend for the things they want. The tremendous increase in purchasing power resulting from the industrial revival has been another factor. The general improvement in sentiment and morale has made motor car purchasers of many thousands of people who clung grimly to their available funds while the country was in the midst of depression. Finally, good crops and higher prices for his products have brought the farmer into the market.

America has learned the necessity of the motor vehicle and its economic value. For that reason there is not and will not be any bottom to the market. There are a good many millions of potential purchasers who never have owned a car and there is an enormous replacement market.

Motor vehicle manufacturers are not underestimating their market for the remainder of the year nor are they running wild by building in reserves of cars. Models must be changed frequently and it is unsafe to build up large stocks. Then, too, they have learned the folly of piling up huge inventories of finished and unfinished products. They are not likely to repeat the mistakes which proved so costly in 1920.

In any discussion of markets for the rest of 1922 the farmer must be given first consideration. He will buy more motor vehicles than seemed possible even six months ago. As a matter of fact, generically speaking, the farmer is not as poor as he thought he was. He is naturally temperamental and given to brooding. When prices are not as high as he expects or crops not as large, he is prone to think he's ruined and positively refuses to spend money for anything not absolutely essential.

But the farmer as a class is not broke by any manner of means. He is going to have more money available this fall than he expected. For example, farmers in the South were supposed to have been hit harder than those in any other section of the country, and yet the Federal Reserve Bank of Atlanta reports that the great majority of them in many sections of that district have paid all their bank obligations. If that condition prevails in the South it undoubtedly does in other sections.

Some motor car makers seem to have been a bit too conservative in their estimates of what farmers will buy the coming fall and it might be wise for them to revamp their expectations somewhat. The market in the agricultural regions is stronger to-day than it was expected to be and it will grow steadily stronger as crops are marketed. City sales, generally speaking, have fallen off somewhat but the market is not by any means dead and from the rate at which cars are selling it is evident that rural demand is fully counterbalancing any falling off in urban business.

Naturally, production cannot continue for the next four months at the pace of the past four. There must

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be a let-up sometime, but few persons expected August output to reach such huge proportions. Usually it shows the effects of the mid-summer slump, although it was the biggest month of 1921. Preliminary estimates of the National Automobile Chamber of Commerce show a total for the month of approximately 280,000, which closely approaches the record of 289,000 set in June. The total for August, 1921, was only 180,000. The figures for the last six months are simply astounding—March, 173,000; April, 218,000; May, 256,000; June, 289,000; July, 246,600; August, 280,000. They read more like a census table than a sales record.

The August showing is one of the most surprising of the year, but it is not difficult to explain. In the first place the market, especially in the rural districts, has been stronger than was expected. In the second place there naturally has been some concern on the part of manufacturers as to the effects of the coal and rail strikes. As a result some of them built, for the first time in months, a few more cars than actually were needed to fill current orders. It was felt, very wisely, that if the railroads were unable to move shipments at the usual speed, it might be wise to have a few more cars on dealers' floors or in transit to them.

This small excess of supply over actual orders was relatively small and by no stretch of the imagination can it be described as overstocking, or overloading dealers. Full consideration must be given for the rest of the year to the practical certainty of an acute freight congestion. Any attempt to build up a large reserve supply of finished products would be extremely hazardous, but good business men are forehanded and farsighted.

Business this fall is going to be very good for the latter part of the year. Demand for closed models is almost universally strong and it is hard to get deliveries in some of the more popular lines. This market promises to be steady throughout the year. It will be stimulated by the closed car shows which dealers all over the country soon will begin to put on. The market for open cars will continue to be good in the South and in the farm districts.

Speculation as to production for the year is more or less idle. It is not safe to hazard a guess of much more than 2,000,000 vehicles, about 10 per cent of which will be trucks. The total for this month will be pulled down sharply if Ford makes good his threat to close his plants Sept. 16, and there is no indication thus far that he has changed his mind. If his factories remain down for a month October production also will be adversely affected. It may mean that the record for the year will not equal that of 1920. It can be predicted safely, however, that production this month in plants other than Ford's will not fall very far below the level of August.

As a matter of fact, surface indications are that practically all factories have planned for a still larger output in September. Almost all parts makers report that their specifications for this month are larger than they were in August. It is significant of the confidence felt by the industry that they have a reasonably large amount of business booked through until Jan. 1. Increased specifications for September include all classes of cars, from the lowest to the highest price fields.

September delivery probably has been ordered on a portion of these materials because of the prospective jam on the railroads, but most of it will be used in the production of vehicles to meet current demands. No hesitation need be felt in saying that business has held up much better than was expected and that no signs of a serious slump are in prospect.

Much interest is felt throughout the industry in the real reason for the impending Ford shut-down. Little credence seems to be placed in the explanation that it is due to a fuel shortage. Other plants, with far smaller resources than Ford, are getting coal. The only persons in the industry likely to suffer from a fuel famine are some of the comparatively small parts makers.

A good many persons profess to believe that there has been a sharp falling off in sales of Ford products and that he will close for a month to let them pile up because it is more profitable to run at full speed than at half speed. This theory also is discounted.

Ford is exceedingly close mouthed as to the purposes of what have been called his master strokes, but persons usually well informed about his plans see in the present move a political motive. They assert he has visions of the White House and believes that if he can break coal prices it will help him to get there. This may or may not be true. It is entirely possible that he has no other purposes than that avowed in his statement when he announced his intention of closing his plants—a determination not to pay what he considers an extortionate price for fuel. He believes Wall Street controls the mines and he has no intention of paying tribute to Wall Street. He credits a certain section of Wall Street with having tried to break him, and not without justification.

High fuel prices will add a little more to the manufacturing costs of all vehicle makers. These costs have risen steadily, although not alarmingly, for several months. They will have at least one beneficial effect, in a period of sharp competition, for they will tend to stabilize prices. Any wise manufacturer will think several times before he will cut the prices of his products time after time when manufacturing costs are constantly going higher. It seems practically certain that price readjustments for this year are almost over.

A certain amount of planning can be done to meet the problems which will arise for the remainder of 1922, but most of them will be of a nature which must be met from day to day. Most of them will be bound up in the railroad situation and the constant effort which will have to be made to get coal.

No one can view with equanimity the situation of the carriers. Even if the shopmen's strike is broken or

A GOOD many people are asking where all the motor cars are going to and it is a hard question to answer. The fact remains, nevertheless, that they are going to purchasers and not into warehouses. Many explanations have been offered for the apparently insatiable market and probably all of them together give the correct reply.

America has learned the necessity of the motor vehicle and its economic value. For that reason there is not and will not be any bottom to the market.

There are a good many millions of potential purchasers who never have owned a car and there is an enormous replacement market. That is the answer to the time honored question about reaching the saturation point.

settled almost immediately, nothing can avert a very serious car shortage. It already is being felt to a certain extent by automotive plants, especially in the Detroit district, but as long as warm weather lasts cars can be driven away from the factories, and not so much trouble has been experienced in getting parts and raw materials.

FULL effects of the car shortage will not be felt for another three or four weeks. By that time all coal carrying roads will be making frantic efforts to move fuel into the districts which need it most and at the same time handle enormous crops. In spite of denials made by the carriers, it can be stated that their rolling stock is in much worse condition than they are willing to admit. Unless they can man their shops with full forces of competent men for from 30 to 60 days before snow flies, there is serious reason to believe that a good many roads will practically collapse unless there is an unusually open winter.

It should not be forgotten, in spite of reassuring statements, that the fuel needs of the northwest cannot possibly be met at this late date, nor can those of New England. There will be much suffering in both sections the coming winter. Even New York will not begin to receive large supplies of anthracite much before Nov. 15.

Car loadings are significant of the demands being made on the carriers. The total for the week ending Aug. 26 was 890,838, the largest for any week since Oct. 1, 1921. It exceeded the same week last year by 61,955, but the coal loadings of 111,030 cars were 48,483 less than for the same week last year. The total for the week was only 110,470 less than for the same week of 1920 and it will be seen that coal constituted nearly half the difference.

Even under the most favorable circumstances, the rolling stock of the railroads is utterly inadequate to handle the business of the country when it is moving at full speed ahead. Much equipment has been ordered but it will not be delivered in time to be of material help this year.

There is another factor in the situation which may cause trouble. It is based on the old question of priorities, essentials and non-essentials. It had been supposed that the archaic idea that motor vehicles are non-essentials had been vanished, but it seems to have risen again like Banquo's ghost. It may interest the industry to know that a representative of one of the principal components of the United States Steel Corp. recently informed at least one parts maker that he had been instructed not to accept orders from industries which had been classed as non-essential. The rank injustice of such a stand needs no argument when it is realized how great a part the automotive industry has played in hastening the return of prosperity.

So far as 1923 is concerned, it promises to mark the real beginning of a long period of prosperity, but the country will suffer eventually, as it did in 1920, if prosperity brings unwarranted inflation. There are reports from Detroit and other centers of the industry that numerous automotive companies are planning plant expansions. In some cases plant enlargement may be justified, but generally speaking a waiting policy in this respect will be wisest. It is not pleasant to have to refuse orders for lack of plant capacity, but it is much less disagreeable than it is to have a white elephant on your hands eating up your profits and that is what surplus factory space amounts to.

IT seems improbable that the market for passenger cars can be much larger in 1922 than it has been this year. The truck market is much more likely to expand materially next year. At any rate, caution will do no harm. If a manufacturer is sure he can continue indefinitely to market more of his goods than he can make he is justified in enlarging his plant. Unless he is mighty sure of it, however, he had best let well enough alone.

S. A. E. Progress in Standardization Work

THE standardization of gasoline railroad cars was discussed at the July Truck Division Meeting in consequence of a suggestion that had been received by the Society that a new Division of the Standards Committee be established to work on the standardization of this type of vehicle. It was indicated that the conventional truck chassis will be the basis for the construction of gasoline railroad cars, rather than gasoline powerplant equipment being adapted to typical railroad car construction.

There was a considerable discussion as to whether railroad or automotive engineers should carry on such standardization work, general opinion indicating that the automotive engineers should do so; also that, if the work is undertaken, a separate Division should be established.

Motor Bus Bodies

It was suggested at the last Truck Division meeting that the standardization of mounting dimensions for motor bus bodies be studied, but it was thought that it is too early in the development of this type of vehicle to undertake such standardization.

Motor Truck Cabs

At the July meeting of the Truck Division H. B. Knap, of the Packard Motor Car Co., was appointed a Subdivision of one to prepare a report on the standardization of motor truck cabs. Tabulated dimensions showing present practice as to cab construction was turned over to Mr. Knap for use in this connection.

Motor Truck Rating

In response to demands from the highway authorities of the State of Connecticut, a meeting was held at Detroit on July 24 to discuss the formulation of a "yardstick" of gross carrying capacity and safe operation of motor trucks for administrative use by licensing and law enforcement officials that can be definitely determined by the manufacturer, buyer and the law enforcement official. This meeting was attended by members of the Truck Division, a representative of the National Automobile Chamber of Commerce and representatives of various truck builders.

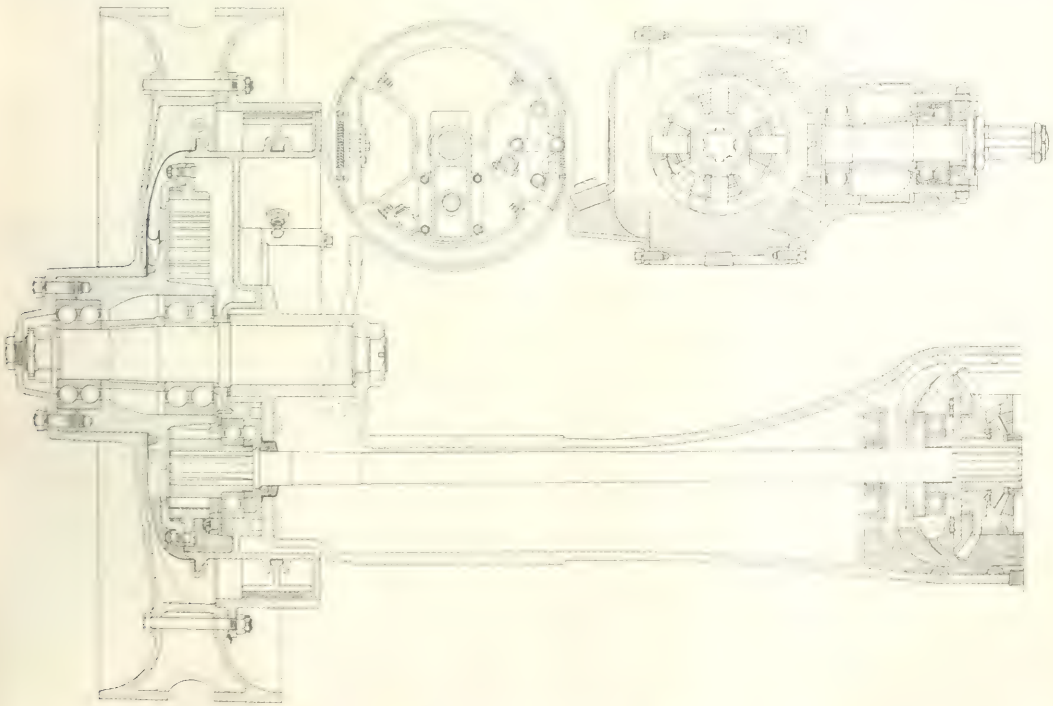
It was felt that there is a definite need for a rating and that the essential elements to be considered are the strength and ability of steering gears and of brakes and the strength of the axles. It is considered that these three factors are the important ones in determining the safety ability of a truck on the road and that all are equally important. A subdivision, consisting of A. K. Brumbaugh, chairman; D. C. Fenner and A. J. Scaife, was appointed to submit the suggestions of the meeting to the manufacturers for their consideration and comment.

A New Rear Axle Designed for Motor Buses

Is of internal gear cranked type with live axle below the center line of the wheel spindle to enable use of a low frame without kickup. Method of retaining ring gear lubricant is interesting.

THE growth of bus transportation is being reflected continually in the announcement of parts makers regarding parts made especially for bus chassis. Among such parts which have recently come to our notice is the rear axle illustrated in the accompanying cut. This, it will be noted, is of the internal gear cranked type. The entire central housing is a one-piece malleable iron casting of oblong box section with the long axis in the vertical plane. The live axle is enclosed within the box section which is designed to take both bending and torsional strain and with a view to securing minimum weight. The driving pinion is in the lowest point of the gear circle and this arrangement, in conjunction with the flattened differential housing, affords good floor clearance above the differential as well as sufficient ground clearance. With 36 in. wheels and 24 in. frame height, there is 8 in. ground clearance and 6¾ in. clearance between a 1 in. floor and the differential without frame kick up or underslung springs. This is said to permit of the use of a straight frame and to bring the spring eye in approximately the same plane as the center of the wheel. The axle is designed for 72-in. tread and 51½-in. spring centers.

The differential and the spiral bevel gears, as well as the driving pinions and internal gears, are arranged to run in heavy oil. The outer enclosure of the ring gear is in the form of a saucer shaped stamping which is clamped to the rim of the brake anchor disk by a V-shaped clamp ring held together by a single bolt. At its inner circumference this diaphragm bears against a felt washer which is said to be necessary only for the purpose of excluding dust and



Sectional view of Atlas motor bus internal gear cranked type rear axle

dirt. Oil, which is carried up by the internal gear, spills into a trough riveted to the upper part of the diaphragm and is returned to the lower part of the casing. Oil which escapes the trough is caught in a groove in the circumference of a flange on the inner wheel hub and is thrown off by centrifugal force. Oil is introduced through a plug filler spout in the brake anchor disk.

Special attention has been given to the matter of accessibility. The entire differential assembly can be removed as a unit from the front and a detachable cover plate at the rear provides for bevel gear and pinion adjustment. Wheels, with the hub cast integral, can be removed by taking off the nuts and the driving studs and inserting a 1-in. bolt in the center of the hub cap as a wheel puller. The wheel comes off without disturbing any bearings or the internal gear lubricant. When the wheel is off, removal of the diaphragm clamp bolt and diaphragm discloses the driving gears. The internal gear and inner hub can then be taken off by removal of the wheel spindle nut which exposes the driving pinion and allows the pulling of the driveshaft.

Internal Brakes

The internal expanding type brakes have 3 in. face and 21 in. diameter. The designers of this axle count upon the use of a propeller shaft brake and consequently provide only one pair of brakes on the wheels. This brake, as will be seen from the drawing, is actuated by toggles. The anchorage is at the front or point of application and consists of a cast boss on the brake anchor disk against which the ends of the brake shoes bear. The tendency of the shoe to revolve with the drum when the brake is applied brings the shoe against the anchorage at the farthest point on the periphery without regard to the direction of rotation. This is said to give a full wrapping brake which bears at all points on the periphery. The toggles are so arranged as to pull toward the center. This is claimed to result in better distribution of wear and to entirely overcome the tendency to wear more rapidly at the points of the shoes. Adjustment for wear is accomplished by means of a wedge block located at the junction of the rear ends of the shoes.

Cast metal wheels designed and manufactured by the Atlas Axle Co., which concern is also the manufacturer of the axle described above, are furnished with the axle. These can be arranged for either 36 x 7 or 36 x 8 in. solids, with the felloe machined to take a cushioning element, or to receive 36 x 6 in. dual pneumatic tires. The brake drums are of special high carbon steel (0.65 carbon) and are claimed to be superior to pressed metal drums in wearing qualities.

The differential used is made especially for the purpose by the Brown-Lipe-Chapin Co.

Differential Gear

The differential gear and pinion are 3½ per cent nickel steel with hardened teeth. The pressure angle is 20 deg., the spiral angle, 29 deg. 19 min., and the pitch, 3.4. The internal gears are splined to the inner hub flange, are 4/5 pitch and 20 deg. pressure angle and have 1¾ in. space The spur pinion is carefully fitted on the spline drive shaft, the splines extending the entire length of the hub.

The axle is being brought out in two sizes, model LC 8, 8000 lb. capacity on spring pads and model LC 12, 12,000 lb. capacity. The former is suitable for average 25-30 passenger single deck buses and the latter for the double deck buses. Model LC 8 is designed for a maximum allowance engine torque of 190 lb. ft., is provided with standard 6.6 to 1 gear ratio and weighs approximately 1100 lb. complete with wheels.

Average Gasoline Increases in Volatility in U. S.

FOR several years the Bureau of Mines has conducted surveys to determine the changes in motor gasoline being sold throughout the United States.

The present survey shows that for the districts in which samples were collected the average gasoline is becoming more volatile instead of less so, as is sometimes supposed. This year's gasoline is much more volatile than that sold two years ago, and it has a somewhat better distillation range than last summer's samples.

A comparison of the average figures for several years shows that motor gasoline is also becoming more uniform in character. The large seasonal change is disappearing, but "winter gasoline" still has a lower initial boiling point than "summer gasoline." This difference in volatility is made intentionally to facilitate starting the motor in cold weather. The end point shown in the present survey is slightly lower either than that of last winter or of the summer of 1921.

The average of the entire country considered as a whole does not show much change from a year ago, but samples from individual cities show some distinct changes. In Denver, for instance, the initial point is lowered 15 deg. Fahr., the 90 per cent point 14 deg. Fahr. and the end point 21 deg. Fahr., whereas the 20 and 50 per cent points increased 11 deg. Fahr. and 13 deg. Fahr. respectively. This change may be due to the fact that Denver receives gasoline from one group of refineries at one period, and from another group at other times. Of 132 samples collected in the present survey, 10 failed to meet Federal specifications (adopted Nov. 25, 1919), as regards the initial boiling point of 140 deg. Fahr., and 61 samples failed at the 90 per cent point (374 deg. Fahr.).

Motor Taxes Opposed in France

AUTOMOBILE manufacturers and dealers in France continue their aggressive campaign to remove discriminatory taxes from the industry. A brochure has been sent to all Senators and Deputies in France by large automobile manufacturing firms, asking the cancellation of the 10 per cent luxury tax on automobiles.

It is also reported that an American firm manufacturing magnetos is developing a good business. The American Consul at Calais reports that the demand for automobiles, especially for commercial trucks, is improving in Calais, France. Like many other French cities, Calais is suffering from financial depression, in spite of which, however, there will be a good demand for industrial motor vehicles, and to a smaller extent, for pleasure vehicles. American cars are held in high esteem and manufacturers should quote prices c.i.f. Calais, as prospective buyers want to know what the first purchase will cost them.

Advantages of Evaporating Type of Cooling System

Promises to be lighter, simpler and more efficient than conventional types using thermostatic control. Is less likely to permit overheating and loss of water. Smaller radiator can be used, while temperature control is inherent. Positive pumps employed.

By A. Ludlow Clayden

WHILE discussions on cooling have mostly centered on the direct air system as compared with water cooling, there is rapidly growing interest in an intermediate system which theoretically appears to have some of the advantages of both, plus certain good points entirely peculiar to itself. This is steam cooling which could perhaps better be described as the "evaporation system."

No example of this system is in actual use in production, but several have been experimented with to a considerable extent. It is known that the patent applications recently made by various parties have shown some conflict and that there is argument about priority of idea, but actually it appears that several quite independent experimenters arrived at similar conclusions, at times almost coincident.

The only system of which all details have been made public is the Rushmore system described in AUTOMOTIVE INDUSTRIES last year. This has been improved in detail and will be dealt with directly. It is a well known fact that several other experimental systems exist, but the patent situation regarding them has not yet reached the stage of development that makes publication of descriptions possible.

However, in all steam-cooling systems the basic idea is to make use of the latent heat of steam, to allow boiling in the engine jacket, under conditions which will not give the effects of "overheating" and to use the radiator as a condenser. The fundamental advantage common to these systems is that they provide a constant jacket temperature without any form of thermostat and give a mean radiator temperature hotter than is obtainable with a water system, which means that the rate of transfer or rapidity of cooling is greater. There are also many lesser advantages.

Before entering on the description, however, one common misconception should be dealt with. This is that deliberately boiling water in the engine will produce the effects of overheating such as warped valves, poor lubrication, spark plug troubles and so on. It should be necessary only to point out that the temperature of the cylinders in air cooled engines is far above anything existing with steam cooling and that overheating effects arising from a boiling condition of a water system are due to the temporary stoppage of circulation, as described in a previous article. Such stoppage allows valves and such parts to get far hotter than in any system where the formation of steam is deliberately sought and controlled. This is why evaporation cooling seems perhaps better than steam cooling as a name. However, it is too late to change the name and the misconception will become of small importance if any of the steam systems come into use.

In writing on the water flow characteristics of radiators, in a previous article, it was mentioned that turbulent water parts with heat more readily than water flowing smoothly, and it was suggested that water flow in an engine jacket was always slow compared with the velocity necessary for turbulence. When heat is being supplied to any part of the cylinders faster than the slowly flowing water can remove it, steam must be formed. If the system were previously filled with water such steam must displace water with the result that there will be ejection from the overflow.

There are two other effects less precise in character, but probably even more important; admittedly theory, but theory with a fair amount of evidence back of it. Steam bubbles tend to cling to the rough surface of the cylinder casting, and as soon as a bubble forms and clings no more heat is abstracted from the part of the iron it is touching, this heats up adjacent areas of iron and so stimulates the more and more rapid formation of steam around that area. Formation of considerable volumes of steam are thus made possible. Not only do steam accumulations of this kind allow the area of iron beneath them to become very hot, but the intermittent formation and break away of large bubbles causes seri-

STEAM or vapor cooling systems appear to possess many of the advantages of both the water and air types. No thermostats are required and the radiator can be smaller than the usual water type. This is said to make the steam systems lighter, simpler and cheaper than the conventional type, while the advantages of constant jacket temperature are preserved.

The subject will doubtless receive an increasing amount of study in the near future.

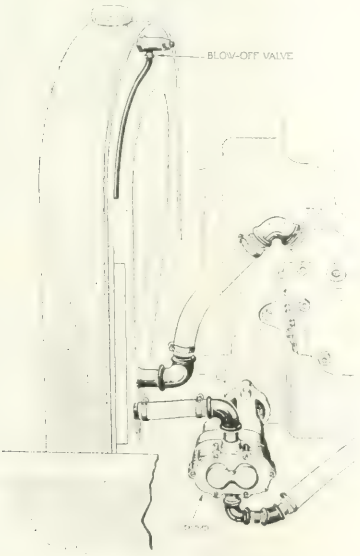
This is the third of Mr. Clayden's articles on cooling systems. The concluding article dealing with air cooling will appear in an early issue.

ous disturbance to the flow of water throughout the system. For example, there may easily be perceptible pressure existing in the top tank of the radiator. In most cases the outlet from radiator to pump is a restriction, so the pressure head on the water cannot greatly accelerate the downward flow of water through the radiator, but it can back up against the water coming from the engine.

High Temperature in Water Systems

It should be mentioned here that careful tests on an engine of high engineering standard showed the maximum temperature existing anywhere in the jacket to be 225 deg. Fahr. with outlet water just below the boiling temperature, but that directly steam began to appear in the cylinder outlet pipe the maximum jacket temperatures in restricted areas jumped to over 400 deg. Fahr., this proving that after boiling began water was unable to get to the hot areas except in very small quantities. After the formation of the first bubble of steam, when it broke, the iron under it was so hot that the water contacting in its place was instantly flashed into steam again. Probably the size of the successive bubbles would show rapid increase.

Now steam under the conditions described is forming under water and, when it does break through the



Diagrammatic view of Rushmore system showing positive pump, blow-off valve and radiator connections

water restriction surrounding it, it is merely a nuisance, there are no means for condensing it except splashing water itself very near the boiling point. The evaporation cooling systems, on the other hand, both encourage the breaking away of the steam (which is the same as discouraging the formation of large bubbles) and condense the steam formed directly it breaks free. The point especially to be grasped is that the size of the bubbles formed when a water system boils is quite large and consequently parts of the cylinder get very hot indeed. The dimensions of the bubbles are due to the system's normal operation being interfered with by the steam. In evaporation systems it is believed, on good grounds, that the size of bubbles is very minute and that the mean temperature of the cylinder iron is very near the maximum temperature of any point in it.

So far as they are known to the writer the fundamental principle of each of the systems other than Rushmore's is the same. The radiator is empty except for a small amount of water in the bottom tank. The cylinder jacket is filled, and kept full, by a positive pump which maintains a predetermined level in the jacket, the excess returning to the tank. There is direct connection between the top of the jacket and the top tank of the radiator. Thus the small amount of water heats up very rapidly—a matter of a minute or less to get a good working degree of heat. As soon as boiling begins the steam rises free and unobstructed from the water surface and passes to the radiator where it condenses, flows down into the lower tank and again enters circulation.

Upon this basis considerable detail can be and has been built. Methods for keeping the radiator free of air pockets, methods for controlling the degree of plus or minus pressure within the system and thereby the boiling point and mechanical details are the subject of applications now in the patent office. The details which the writer has actually seen are mostly simple, rugged and inexpensive. Without disclosing any of them it may be said that there is no difficulty whatever in providing a steam cooling system which will give a mean jacket temperature of 160 deg. Fahr. or even less if desired.

The Rushmore system differs materially from other systems in the same class. In it the jacket design is unchanged and a very small positive pump of gear or piston type is substituted for the centrifugal. Like the other systems, it uses an empty radiator, but the outlet from the cylinder jacket goes to the *bottom* tank instead of to the top. At starting the cylinder jacket is full of water and also the bottom tank; the radiator core and the top tank are empty.

How Rushmore System Operates

Suppose the top of the radiator open to the air. The warming up will occur quickly, water circulating from the bottom tank, through the jacket, back to the tank and round again. As soon as steam begins to form it has only one outlet, since it cannot back up against the water being continuously forced in at the bottom of the jacket. Hence a mixture of water and steam is driven down the outlet pipe to the bottom tank. Within this tank is a cross tube pierced with many small holes above and below. In this the steam and water separate, the steam emerging in bubbles or jets from the upper holes. Immediately on its escape this steam comes in contact with the empty radiator core into which it will rise until the cold metal has condensed it, whereupon the water will trickle back to the tank and return to the jacket to be reboiled.

Remembering that the top tank is assumed to be open, it follows that the steam rising into the core from the bottom will easily drive the air ahead of it. Actually normal running may call for about one-fourth of the total radiator capacity to condense the steam formed and operating under this condition; the bottom quarter of the radiator will be working as the condenser and the remaining three-quarters will be cold and full of air, the air having no tendency to mingle with the steam. The steam displaces air till enough of the radiator is cleared.

Under such conditions boiling will, of course, take place at 212 deg., the amount of the radiator in use

varying with the power output. As stated in an earlier article, on a passenger car average running will heat about 25 per cent of the total available surface, the remainder being in reserve for automatic requisition for hill climbing.

In this system the formation of large steam pockets is prevented by the forced water flow and the continuous separation of steam from water. Judging from the operation of engines on the road the temperature conditions within the cylinder are comparable to those obtaining with a water system controlled to 189 deg. Fahr. outlet. There is no evidence whatever of the existence of the hot spots in the cylinders always noticeable in a water system when boiling.

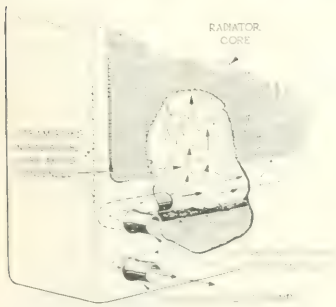


Diagram showing flow of water and steam in the base of radiator used in the Rushmore system

This was the earliest stage of the Rushmore system. Actually it is not open freely to the atmosphere, but the top tank is supplied with a relief valve blowing off at 4 or 5 lb. pressure. This gives a boiling point slightly above 212 deg. Fahr., but the effect of the valve is more than that. Starting up with the normal quantity of water and with the radiator filled with air, no cooling will occur until the steam begins to force air out through the valve. The system will operate at approximately 220 deg. Fahr. consistently until all the air is displaced, which will not happen unless a hill or some other call for full power brings nearly all the radiator surface into play.

On reducing power after such a condition there will be a radiator filled with steam instead of air. The steam condenses promptly and so reduces the pressure; as the valve is a blow-off of the non-return type. From that point onward, till air is again deliberately or accidentally let in, the vacuum will vary and the boiling point with it. In actual practice the jacket temperature fluctuates from a minimum of a few degrees under 212 up to a maximum of about 220 deg. Fahr.

Smaller Radiators Possible

There are some peculiar advantages in the Rushmore system which deserve particular mention. Firstly, the high temperature of whatever part of the radiator is working, means maximum heat transfer. With water cooling and a mean radiator temperature of 160 deg. Fahr., with air at 80 deg. Fahr., the mean difference is 80 deg. With Rushmore's system the working surface is never cooler than 210, which means a difference of 130 deg. Fahr. and a consequent increase in radiator efficiency of over 60 per cent. Second, if alcohol is added in winter to prevent freezing, it will be condensed automatically. The alcohol will boil out of the water before steam forms, of course, but it will act precisely like the steam, being condensed in the radiator and recirculated. Since the system is closed there is no loss of alcohol by evaporation.

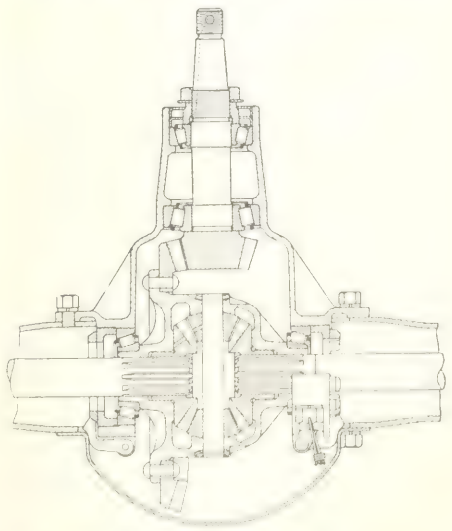
But perhaps the most important feature of all is that the admission of steam at the *bottom* of the radiator makes the air displacement automatic so that the system needs only one very simple and small pump. Also the high average radiator temperature and high rate of transfer means a small radiator and consequent economy in first cost. Finally, the smaller radiator and the small pump economize both weight and power. One advantage of the bottom admission also is that the water has no greater distance to trickle back than the steam rises within the core, so that even in the coldest weather, there is no possibility of the water freezing after it is condensed, so long as the engine is running.

It may be added that the Rushmore system can be arranged with a water filler actually on the bottom tank, but that the customary top cap can be used since, if too much water is put in, it is merely blown out just as the air is ejected.

Steam systems appear really likely to show perceptible economies in weight and in power required to operate them, while also providing a nearly perfect constant temperature control of fully automatic sort, with an extremely simple release valve as their most intricate part. They are so simple that their principle can be grasped at once by the least intelligent of operators. When closed, as in the type described, loss of water is less likely than with a water system and when the water *is* too low the effects are precisely similar to the conventional system.

Considering everything the steam system has all the earmarks of a better article for slightly lower cost and as such should be worthy of very serious consideration indeed.

Star Axle Drawing Correction



HEREWITH is shown the sectional view of the axle used in the Star car. This will correct the error made in AUTOMOTIVE INDUSTRIES for July 27, which due to an artist's error showed ball bearings in place of the new Timken short series tapered roller bearings, which are used for the pinion shaft, differential and wheels.

Automotive Industries
September 14, 1922

Lower Power Losses in Cord Tires Account for Longer Life

Relative importance of factors governing the loss of power in tires are here given. The loss is much less in the cord than in the fabric type. It increases with increase in load on the tire and with decrease in inflation pressure and is proportional to speed.

By W. L. Holt and P. L. Wormeley*

THE Bureau of Standards has undertaken a general investigation of automobile tires and inner tubes, and in connection with this work a rather comprehensive program has been laid out for dynamometer tests, to study among other things the power losses or energy dissipated as heat in tires operated under different conditions of axle load, inflation pressure, speed, temperature, and tractive effort. Preliminary tests have been made to determine the influence of these factors, which, aside from matters of design, are the principal items affecting the power loss in a tire. A continuation of the work will involve problems of design and construction, the influence of "over size" tires and of "cord tires" on power losses, mileage, and general efficiency of operation. An investigation will be made of inflation pressures as affecting the efficiency and economy of tire operation. Tests will be made to determine the effects of tire fillers, shields, puncture-proof tubes, etc., and the properties of cushion tires will be studied.

DATA given in this article should be of much interest to engineers in the automotive industry. They tend in general to confirm the results of earlier tests made by Prof E. C. Lockwood (See Automotive Industries, issue of June 8, 1922, p. 1236-38) and others, but gives additional information on some points which have not formerly been covered, such, for example as the difference in the loss as between a tire which is only rolling and one which is driving or transmitting power.

* * *

The decreased loss in cord as compared to fabric tires accounts in large part for the longer life of the cord type. It also makes a car equipped with cord tires easier rolling than one with fabric tires and this difference is reflected in an appreciable saving in fuel—a fact which might well be used more than it has been in promoting the sale of cord tires.

The equipment used included two Sprague electrical absorption dynamometers having a capacity of 20 hp. at 600 r.p.m. and 10 hp. at 150 r.p.m. One dynamometer is operated as a motor carrying on its shaft a wheel and the tire to be tested. The other dynamometer is operated as a generator carrying on its shaft a smooth straight face iron drum 40 in. in diameter. The motor is mounted on a movable carriage, the arrangement being such that by the application of weights to a bell-crank lever the tire is forced against the drum with a pressure corresponding to the desired axle load. In this way the tire and drum constitute a friction drive by means of which the motor drives the generator.

The revolution counters are so designed that they can be read to the nearest one-tenth revolution of the tire or drum.

The inflation pressure is measured or changed while the tire is running, as follows: The tire valve, with the inside parts removed, is connected by a small tube to an attachment on the hub which communicates through a gland with a stationary chamber. This chamber is provided with a needle valve for closing the air passage leading from the tire, a standard tire valve for inflating or deflating the tire, and a connection for a tube leading to a pressure gage.

The correction for windage of the wheel and tire is determined by noting the scale reading at various speeds with the tire out of contact with the drum. This is a minus correction. The correction for windage of the drum is determined by running the generator element as a motor and noting the scale reading at various speeds. This is a plus correction. The value of the windage corrections is very small. For example, the average corrections for a 33 x 4 tire run at 25 m.p.h., including both motor and generator, are equivalent to about 0.03 hp.

The power loss in a tire is given by the equation:

$$HP_1 - HP_2 = \frac{T_1N_1 - T_2N_2}{4000} \text{(horsepower)} \quad \ldots\ldots\ldots\ldots (1)$$

where T_1 = scale reading of motor element in pounds (corrected for windage),

T_2 = scale reading of generator element in pounds (corrected for windage),

N_1 = r.p.m. of tire,

N_2 = r.p.m. of drum.

Length of dynamometer arms = 15.756 in.

This loss is due partly to deformation of the tire and partly to slip. The part due to deformation represents

*The authors are connected with the Bureau of Standards. This article is slightly condensed from a report issued by the Bureau in the form of Technologic Paper No. 218.

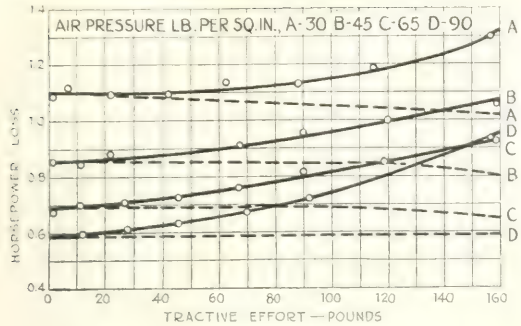


Fig. 1—Influence of tractive effort on power loss in a 33 x 4 in. cord tire, running at a speed of 25 m.p.h. and carrying an axle load of 885 lb. Inflation pressure is shown by figures on the respective curves. Total power loss is shown in full lines while dotted lines show the loss corrected for creep and slip as computed from equation (4)

heat developed in the tire, and the part due to slip represents heat developed at the surface of contact between tire and drum. The loss due to deformation of the tire may be viewed as consisting of two parts: (1) That due to a radial force (axle load) and (2) that due to a tangential force (tractive effort). The loss resulting from axle load is indicated by rolling resistance, which is defined as the resistance to turning (measured at the drum surface) which the tire would offer if there were no tractive effort. An approximate value for this loss is obtained by substituting in equation (1) values of T_1, T_2, N_1, and N_2 observed when running the tire with no load on the generator.

When there is a tractive effort, the tangential component of the drum's reaction against the tire acts as a drag on the tread rubber. This tangential force has the double effect of compressing the tread rubber circumferentially just before it comes in contact with the drum and of producing a shearing action between the tread and carcass, with a corresponding circumferential or angular deformation of the carcass. This circumferential deformation of the tire produces creep in a manner similar to the creep of a belt on a pulley, since the material of the tire approaches the point of contact with the drum under compression and leaves it under tension. Portions of this surface of the tire are slipping on the drum, but it is probable that this slipping is confined to the ends of the surface of contact. The difference between the circumferential speed of the tire and drum is therefore more in the nature of a "creep" than what is ordinarily considered a "slip." If the tractive effort were increased sufficiently to produce "spinning" of the tire, the effect could more properly be called a "slip." The cushion forms an elastic bond between the tread and carcass and has its effect in producing creep, although this effect is not susceptible of measurement separately.

It is impossible to measure separately the losses due to creep and slip, but the sum of these losses may be approximated as follows: The pitch circle of the tire is defined as that circle which has the same linear velocity as that of the drum's surface when there is no tractive effort. We have therefore the relation—

$$\frac{r_1}{r_2} = \frac{n}{n} \qquad \ldots\ldots\ldots\ldots\ldots\ldots (2)$$

where r_1 = pitch radius of tire in feet,
r_2 = radius of drum in feet,
n_1 = r.p.m. of the tire,
n_2 = r.p.m. of the drum.

This equation is true, assuming that the slight tractive

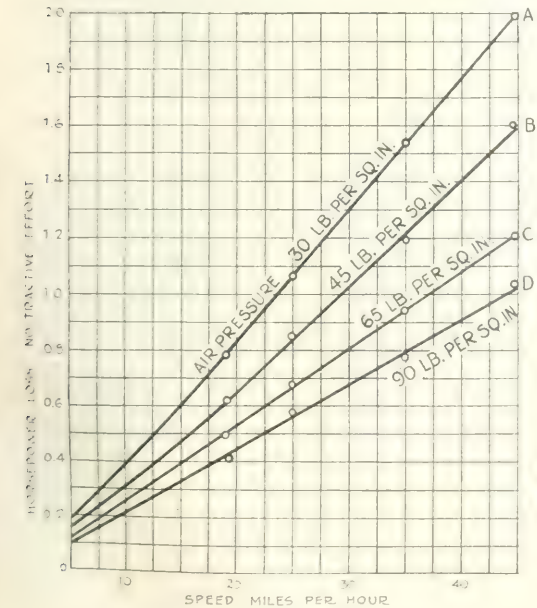


Fig. 2—Relation between power loss (rolling only) and speed in a 33 x 4 in. cord tire with 885 lb. axle load inflated to the pressure indicated

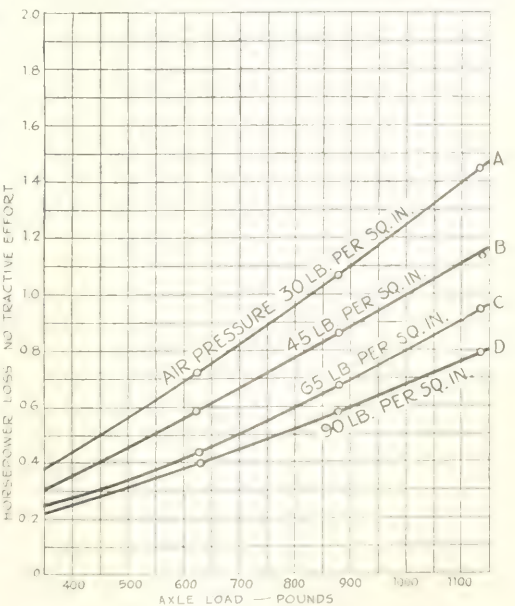


Fig. 3—Influence of axle load on power loss at 25 m.p.h. in a 33 x 4 in. cord tire inflated to pressure shown

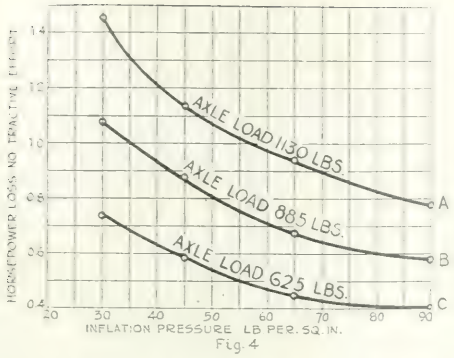


Fig. 4

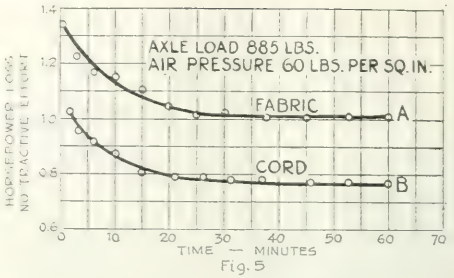


Fig. 5

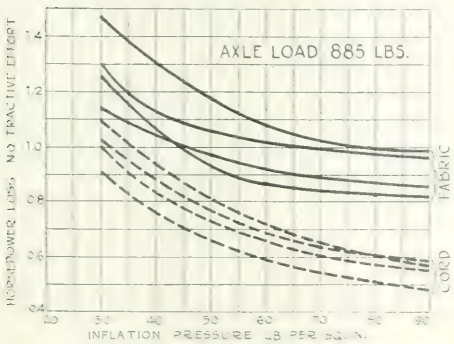


Fig. 7

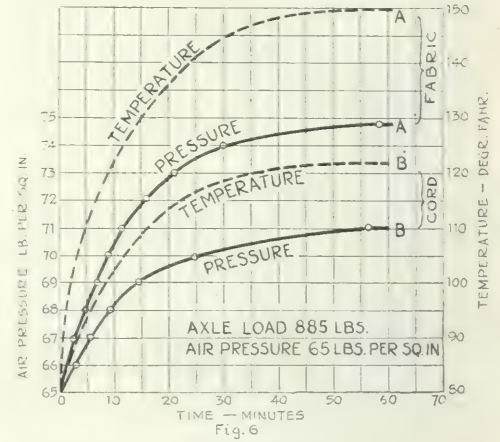


Fig. 6

Fig. 4—Effect of inflation pressure on power loss at 25 m.p.h. at axle loads noted on curves
Fig. 5—Influence of temperature on power loss. The loss decreases as the tire becomes heated but assumes a constant minimum value when the temperature becomes constant
Fig. 6—Rate and amount of temperature and pressure increase in 33 x 4 in. tires running at 25 m.p.h. and carrying 885 lb. axle load
Fig. 7—Comparative power losses at different inflation pressures in four cord and four fabric tires, all 33 x 4 in. size, running at 25 m.p.h. with an axle load of 885 lb. The loss in the fabric type is about 40 per cent higher than in the cord type

effort (about 2 lb.) which is introduced by friction in the generator is not appreciable.

If the observed speed of the drum is n_1 r.p.m. when the tire is run under traction at a speed of n_2 r.p.m., we have

$$\text{Creep and slip} = 2\pi \frac{(r_1 n_1 - r_2 n_2)}{2\pi r_2}$$

$$= n_1 \frac{r}{r_2} - n_2 \text{ (r.p.m. of the drum)} \ldots (3)$$

The corresponding power loss due to creep and slip is

$$HP_s = \frac{T}{4000}\left(n_1 \frac{r_1}{r_2} - n_2 \right) \text{horsepower} \ldots (4)$$

Results of Tests

Fig. 1 shows the effect of tractive effort on the power loss at different inflation pressures. (This tractive effort is taken as the resistance at the drum surface as calculated from the generator scale reading) The total power loss as computed from equation (1) is shown in full lines. The dotted lines show the loss corrected for creep and slip as computed from equation (4). The sum of the creep and slip and the resulting power loss increase with the tractive effort, the rate of increase becoming greater as the tractive effort becomes greater.

It appears that for a well-inflated tire the loss corrected for creep and slip, as shown in curve D, is constant, that is, independent of the tractive effort and is equal to the loss due to rolling resistance as measured under no tractive effort. The total loss, as would be expected, increases with the tractive effort. The results at lower inflation pressures as shown in curves A, B and C, follow the same general trend except that the corrected loss decreases as the tractive effort increases. This decrease under increased tractive effort results from a circumferential shearing deformation of the carcass (which is negligible under high inflation pressure), causing an appreciable increase of creep. Hence, the correction for creep and slip includes a part of the carcass loss.

Fig. 2 shows the effect of speed on power loss at four different air pressures when a tire is run under constant axle load. The loss is nearly proportional to the speed, the rate of increase being greater as the air pressure decreases.

Fig. 3 shows the effect of axle load on power loss under four different air pressures when a tire is run at a constant speed. In this case also the loss is about proportional to the load, the rate of increase being greater as the air pressure decreases.

Fig. 4 shows the effect of inflation pressure on power loss under three different axle loads when a tire is run

at constant speed. In these cases there is a rapid increase in power loss under low air pressures. Under high air pressures the loss approaches a constant value.

Fig. 5 shows the influence of temperature on power loss. Tires were started at room temperature in each case, in which condition the losses are comparatively high. The pressure was kept constant, and at the end of about 30 minutes tires had become warm and losses had decreased to a normal figure and remained constant.

Fig. 6 shows one of the results of the power loss, an increase in temperature and pressure in the tire. The curves showing temperature rise are based on the assumption that the volume of air in the tire remains constant, and that the capacity of the connecting tubes and the gage are negligible. The initial temperature and pressure having been measured, the temperature at any time during the run is computed from the equation:

$$t = T \frac{P_2}{P_1} - 460 \quad \ldots\ldots\ldots\ldots (5)$$

where t = temperature in tire in deg. Fahr.,
T = absolute temperature in tire at beginning of run,
P_1 = absolute pressure in tire at beginning of run,
P_2 = absolute pressure in tire corresponding to the temperature t.

Fig. 7 is similar to Fig. 4, except that it shows a comparison of eight tires of different makes. The greater power loss in fabric tires shows up very plainly.

The question may arise as to the practical value of determining power losses in tires. These losses represent the energy absorbed by the tire and dissipated as heat while transmitting power from the axle to the road. They are due principally to internal strains in the tire, largely in the carcass. A large power loss results in (1) a correspondingly high fuel consumption, (2) quicker deterioration of the rubber and fabric on account of increased strains and increased temperature.

As examples of the association of power loss with the life of tires, the loss in a 4 in. fabric tire is in the neighborhood of 40 per cent higher than in a cord tire, even where both are the same size. Based on the ordinary mileage guarantees, the life of a fabric tire is about 40 per cent less than that of a cord tire. A 35 x 5 cord tire was found in which the power loss was abnormally high. A subsequent examination of the tire showed that although it was constructed in the usual way and with proper materials, the coats of rubber between the plies were very thin, a feature which would have resulted in a short life. Hence, the fact that the tire was not up to the proper standard was determined in the laboratory within a very short time without injury to the tire.

One point which should be recognized is that the power loss alone does not show the value of a tire from the standpoint of service, but, other things being equal, it should aid in determining the quality. For instance, the tire could be built with a reduced number of plies, which, with proper proportioning of rubber, might give a lower power loss. However, in service the tire would probably not be sufficiently rugged to withstand the ordinary blows to which a tire is subjected. A tire could be built of a very hard material, such as steel, which would result in a very small loss. The cushioning properties, however, would be entirely lacking. But, if we take two tires of the same general design, the one having the materials and construction so co-ordinated as to give a lowest power loss should have a lower life.

Aside from the question of design of tires, the power losses under different loads and air pressures indicate the proper conditions under which a tire should be run. In case of changes in these conditions the effect on the life of the tire is at least indicated by the corresponding change in power loss.

These preliminary results on power losses in tires show that, in general, the loss increases directly with an increase in speed or axle load and that it increases quite rapidly with decrease in air pressure below the standard. Tractive effort has a comparatively small effect on the power loss. There is a wide variation in the power loss in different tires run under the same conditions. Some makes of tires show a larger power loss than others, and fabric tires as a class show a considerably greater loss than cord tires.

New Highway Tests Devised at Bureau of Roads

SOMETHING new in tests for highway materials has been undertaken by the Bureau of Public Roads with a new mechanical device. The series of tests consists of 120 concrete slabs ranging from 4 to 10 inches in thickness and from lean to rich mixtures.

In line with the bureau's policy of cheapening the cost of road construction by the use of local material wherever possible a circular track for a wear test on concrete has been completed. Sixty-one sections of concrete have been placed. The aggregates used vary in kind and quality, ranging from hard to soft, and there is variation in the amount of mixing water and time of mixing. In order to eliminate the effect of differences in the subgrade the sections are of reinforced T-beam construction, the slab being 4 feet wide, 10 inches deep with the T-beam in the middle of the slab. The traffic test on these sections will begin soon and the load on the pavement will be made to represent the rubber-tired rear wheel of a $3\frac{1}{2}$ or 5-ton truck moving at a speed of 15 to 20 miles per hour. Specimens of concrete for beam strength and compression tests have been made from each mix and are being cured under the same conditions as the corresponding sections.

Results of this wear test, representing modern traffic conditions, together with the beam strength and compression tests which will be made for this investigation and on a similar set made in connection with the impact investigation and which will serve to tie the two together, will furnish a sound basis for the consideration of suggested changes in specifications for concrete road aggregates.

Airplane Factories Being Built in Japan

THE demand for airplanes for commercial and other purposes is becoming so large that several airplane factories are now being built in Japan, according to the July issue of *Far Eastern Motors*. One factory in the neighborhood of Nagoya will be completed at the end of this year and will have a capacity of 50 planes a month. Another nearing completion in Gifu prefecture will employ 500 workmen. The national research laboratory at Osaka has discovered an incombustible paint, the main feature of the invention being a fiber treated by acetic acid dissolved in acetone. When this mixture is spread on the plane the acetone evaporates and the fiber is left as a film covering the body. This film is incombustible.

What Are the Essentials of a Good Ignition System?

Reliability, longevity and effect on engine performance are important, but engine manufacturer should consider ability of system to fire plugs under adverse conditions and the igniting quality of the spark. Engine builders should take greater interest.

By C. H. Kindl*

THE object of this sketch is to touch briefly on some of the problems connected with high tension ignition which are of interest to automotive engine manufacturers.

During the past five or six years the gas engine has progressed through considerable development, and exceptional improvements have been made as a result of refinement in design. The decrease in volatile properties of the present day fuels has led to a wealth of ingenuity being spent on carbureter designs. Numerous investigations are being conducted in an endeavor to determine what constitutes the process of combustion.

However, comparatively little research work has been attempted on the subject of electric spark ignition, although the utilization of high tension ignition has been largely responsible for the remarkable development of the automobile. Perhaps the lack of scientific investigation on the important subject of ignition is due to the apparent satisfaction the engine builders have obtained with the



Fig. 1—Diagrammatic secondary circuit of a high tension ignition system. Fig. 2—An hydraulic circuit that is analagous to the electrical one in Fig. 1

products of ignition manufacturers. In addition, the refinements in design have kept pace with other engine equipments to the extent that the number of engine failures which are attributed to improper ignition are to-day about 30 per cent, while a few years ago the unreliability of electric ignition was responsible for at least 80 per cent of engine failures on the road.

With the progress along parallel lines has come the necessity for automobile manufacturers to investigate more carefully the ignition apparatus used on their product. The important items, aside from cost, may be stated as follows: Reliability, length of life without replacement, ability to fire the spark plugs under adverse conditions, the effect on engine performance, and the igniting quality of the spark.

The reliability and length of life are at present usually considered when various ignition systems are compared. In order that the remaining qualities of ignition may be logically understood, it is necessary to discuss the character of the spark.

The voltage obtained at the spark plugs is generated by the collapse of the magnetic lines of force set up through an iron core by current from the battery flowing through wire wound around the iron core. When the breaker contacts open, the lines of force collapse in accordance with the constants of the circuit, and by cutting the turns of the secondary winding, generate the voltage necessary to produce a spark at the plugs.

AS the voltage rises a slight current flows and charges the high tension leads until a value is reached which breaks across the spark plug gap and releases the energy stored in the high tension leads, at the same time draining the energy from the coil as the magnetic field collapses still further or oscillates. There are thus two distinct portions of the process; namely, the capacity (leads, etc.) and the inductive (magnetic) discharge. The first part has been known to take place in less than one thirty-thousandth of a second after the breaker points separate. This first part usually requires the smaller part of the total energy delivered by the coil, but its value is very nearly constant at various speeds. The inductive discharge that follows varies with the amount of energy available in the coil and becomes small at high speeds in a battery system, while with a magneto this portion becomes larger at the high speeds.

The following hydraulic analogy may give a clearer physical conception of the phenomena involved. Fig. 1 illustrates a diagrammatic secondary circuit of the usual high tension ignition system. Fig. 2 shows a comparative water circuit, in which a hydraulic pump represents the ignition coil and *D* is a diaphragm to prevent the flow of water into the lower chamber. The small diameter section of pipe at the pump limits the flow of water in a manner similar to the resistance of the winding in the spark coil. The large section of pipe leading to the diaphragm corresponds to the comparatively low resistance leads and cables used in the electrical case. Suppose the pump is operated by a limited source of power in a similar manner in which the electrical value is limited by the character of the coil. Assume the pump to operate and gradually fill the pipe *P*.

*Automotive Engineering Dept., Westinghouse Electric & Manufacturing Co.

The diaphragm D prevents further movement of water and the pressure on the diaphragm begins to rise until a value is reached at which the diaphragm breaks and the water rapidly discharges into the lower portion. This first discharge results from the water stored in the pipe P at a high pressure, and when this amount is exhausted the pump continues to supply water, flowing out of the pipe at a much smaller rate, until the source of energy at the pump is exhausted.

Fig. 3 gives an oscillograph record of the current flowing across the plug points. The current from a to b represents the capacity component. This value changes only slightly

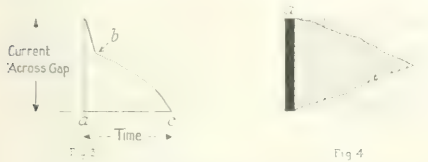


Fig. 3 Fig. 4

Fig. 3—Oscillogram of current across plug points. Fig. 4—What the spark looks like in a rotating mirror. The portion a corresponds to the capacity discharge

with speed, while the portion from b to c becomes smaller as the total energy in the coil is decreased.

The capacitance component of the energy may be represented by $\frac{1}{2} CV^2$, where C = electrostatic capacity of the secondary windings, leads, and spark plug, and V = the sparking voltage, while the total energy in the coil = $\frac{1}{2} Li^2$, where L = inductance of the primary windings and i is the primary current at the time the contacts open. The electrostatic portion of the spark is distinct and has different properties than the remaining inductive discharge. If the spark is examined in a rotating mirror, or is observed in a rotating gap such as used for determining automatic spark advance, a bright spark is observed at the start, followed by a flame colored discharge. The first luminous spark represents the electrostatic portion, and the flame component is due to the remaining inductive discharge. Fig. 4 represents the appearance of the spark when observed in a rotating mirror. The portion a corresponds to the capacity discharge and is a white bright color. The remaining series of lines show the inductive discharge, and from the appearance of the distinct and individual lines, many investigators have concluded that there is actually a series of separate sparks resulting from an oscillatory discharge. However, rigid tests demonstrate that the current across the plug points is continuous until the spark is extinguished. When the drawn out spark is investigated with a spectroscope, the bright portion is shown to be of the surrounding gases, while the flame part contains vapors of the spark gap electrodes.

Combustion Not Due to Spark "Fatness"

It has been concluded from the results of numerous tests and investigations that the ignition of the mixture is accomplished by the electrostatic part of the spark, and if this portion is unsuccessful in producing ignition, the following inductive spark will usually have no effect. It is possible to obtain a spark in which the capacity component is small and produce ignition by the heat of the following discharge. However, this condition rarely occurs in practice, and it has been found that under such circumstances the ignition does not operate regularly. This means that the total energy or "fatness" of a spark has little value as a means for determining the igniting properties. In spite of substantial evidence which proves that the combustion of the mixture is not due to the "fatness" of the spark, there are very few who have given up the practical man's love for a "fat spark with whiskers."

The foregoing is not meant to convey the impression that the energy component of the spark is of no importance. It will be shown later why the high energy is of considerable value for insuring the passage of a spark at the plug, but the igniting value of the spark is not in general increased by the flame portion of the discharge. That the capacity component or initial discharge has a greater igniting value may be demonstrated by inserting resistance into the primary circuit of a magneto or battery coil until the engine fires irregularly. If a condenser of correct capacity is then connected across the high tension circuit, firing will again become regular. The actual energy delivered to the plug gap is slightly smaller when the condenser is used, although the nature of the spark is changed to become more suitable for ignition.

Paterson and Campbell* have used rather elaborate experimental apparatus whereby the energy of the spark could be accurately controlled and they have experimentally obtained curves, Fig. 8, whereby it is shown that the minimum energy required to ignite various mixtures depends to a great extent upon the voltage required to jump the plug gaps. Other investigators have found a similar result and in addition have discovered that the capacity across the plug cap also affects the igniting value of the spark, although not to as great a degree as the voltage.

Electrostatic Component of the Spark

One naturally believes that it seems logical to increase the electrostatic component of the spark. Since this energy is represented by $\frac{1}{2} CV^2$, the value can be increased by enlarging either the capacity or the sparking voltage. The sparking voltage depends upon the distance between the plug electrodes, and as the voltage enters into the energy as the square, considerable increase in igniting power is obtained by enlarging the gap. Anyone who has had experience with high tension ignition knows that imperfect firing may result from too small a gap, although in this case the flame portion of the spark is greatly increased. Of course, the gap cannot be increased indefinitely or a sparking voltage may be reached, which is not obtainable with the conventional coil and no spark will pass between the plug points. There are also limits on the electrostatic capacity that may be used in the high tension circuit, since the energy for charging this circuit must be obtained from

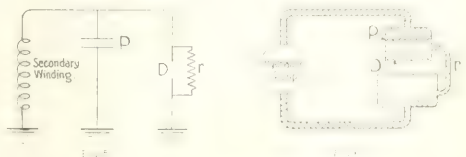


Fig. 5—Diagrammatic secondary circuit with a leaky plug. Fig. 6—Hydraulic circuit that is analagous to electrical circuit in Fig. 5

the coil. That is, the electrostatic energy = $\frac{1}{2} CV^2$ or $V^2 = \frac{2E}{C}$, and if E is the energy in the coil, a value of C may be obtained whereby the voltage is smaller than that required to jump the plug gap. In this respect the energy and the voltage supplied by the coil are important.

The energy available in the coil is also extremely important when considering the operation of an ignition system with fouled spark plugs. The ohmic resistance of spark plugs decreases rapidly as the temperature increases, and deposits of carbon products on the insulating portion of

*"The Philosophical," vol. xxxl.

the plug may result in the elimination of the spark between the electrodes. A conception of what takes place may be obtained from a study of an hydraulic analogy. Figs. 5 and 6 are comparative from the electrical and hydraulic standpoint. In Fig. 5 the resistance r corresponds to the leaky portion of the plug caused by a sooty deposit or a leaky insulator. In Fig. 6 a pipe of small cross section r leading from the main pipe allows a small amount of water to leak away. As in the former analogy, the pump generates an increasing pressure in the pipe, but if the leak r is sufficiently great, the water will drain away, with



Fig. 7 — Indicator diagrams for single cylinder engine. The difference in the two cards was effected by changing the character of the spark

the result that the pressure may not become large enough to break the diaphragm. In the electrical case, the voltage builds up but current is constantly passing across the resistance r and may drain the source of energy to the extent that the voltage may not become great enough to produce a spark across the plug points. However, if the pump in the hydraulic case or the coil in the electrical case supplies energy rapidly enough, the leak may not be sufficient to prevent breaking of the diaphragm, or, in the latter case, prevent a spark. Such conditions are normal in engine operation, and it is for this reason that ignition systems are designed to produce many times more energy than is necessary for ignition under ideal conditions. *However, it should be remembered that great energy is desirable for insuring a spark under adverse conditions, but the actual energy in the spark is not a direct measure of its ignitive power.*

It was previously stated that the sparking voltage depends upon the distance between the spark plug electrodes. However, with a fixed distance between points, the shape of the gap and the characteristics of the coil voltage also determine the sparking voltage. Most spark plugs have the electrodes of two wires arranged so that spark jumps from the end of one to the side of the other, with the result that there is little variation in the sparking voltage between different makes of plugs.

Voltage Wave Front

On the other hand, the rapidity with which the voltage rises in the secondary windings, influences the sparking voltage considerably. This quality is commonly spoken of as the steepness of the voltage wave front. Thus various ignition systems will require totally different sparking voltages on the same plug, and, in general, the steeper the voltage wave front, the greater is the sparking voltage. This feature is extremely difficult to measure and can be neglected without much loss as to the value of an ignition system.

Numerous investigations have been made in an endeavor to determine whether the type of spark has any effect on engine performance. Several investigators have concluded that if the spark is of sufficient value to produce ignition, no change in operation can be obtained by varying the type of spark. However, there is sound evidence that the character of the spark influences the rate of combustion to some extent.

An experiment described by Burgess and Wheeler* consisted in igniting in a glass enclosure a mixture of ethane and air. When ignition was obtained by means of the ordinary induction coil, the gas burned rapidly, although the flame propagation could be followed by the eye. When a Wehnelt spark was used for ignition the mixture exploded violently, shattering the enclosure. Although the two types of sparks used differed widely in their characteristics, there is no doubt that at least in this case the nature of the spark affects the rate of combustion and the pressures obtained. The above phenomenon is probably due to the pressure wave caused by a spark discharge in a gas. Such an action may be observed by applying the conventional ignition spark to the closed end of a glass U tube partly filled with water, the other end of the U tube being open. At each passage of the spark there is a quick movement of the liquid as though it had been struck by a blow. J. J. Thomson** mentions the high local pressures that can be obtained by electric sparks. Referring to the work of Haschek and Mache, it is stated that these investigators have calculated from experiments that a spark 3 mm. long in air produced a pressure of 51.7 atmospheres.

Fig. 7 shows an indicator card taken on a single cylinder engine. The dotted and the solid lines illustrate the effects of two different sparks. In this case there was no change in the power developed by the engine, but smoother operation was obtained with the spark giving the dotted line. The apparatus was arranged for obtaining the two effects by the movement of a switch, so that the engine was not stopped and no change in the timing or the mixture was produced.

HOWEVER, several investigators have been unable to find any effect of the nature of the spark on the combustion of the mixture, but the possibilities involved are great enough to demand serious study.

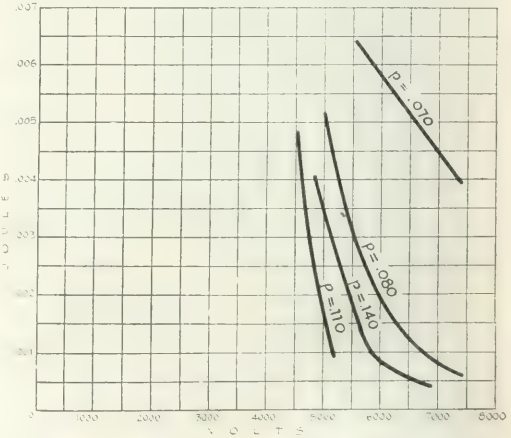


Fig. 8—Curves showing the relation between energy and voltages for different mixtures of petrol and air. P equals the mixture ratio by weight

From the designer's standpoint, many difficulties are involved in attempting to produce the ideal ignition system. To utilize the desirable features of an ignition spark without sacrificing the life and reliability of the

*The Lower Limit of Inflammation of Mixtures of Paraffin Hydrocarbons with Air—Trans. Chem. Soc. 1911.
**Conduction of Electricity Through Gases.

contacts is the designer's problem, which is usually solved by compromising. It is the engine builder's problem to determine what make of ignition has the best combination of the necessary features. The essential features may be summarized as follows: Reliability, length of life without replacement, the effect on engine performance, ability to fire the spark plugs under adverse conditions, and the igniting quality of the spark.

The first three of the foregoing divisions are at the present time considered by most automobile manufacturers. The ability to fire plugs under adverse conditions is rarely taken into account, but is highly important. For this purpose a convenient test for determining the relative performances of ignition units is to connect the high tension lead of the coil to a 3, 16-in. spark gap in air and connect a high resistance circuit in parallel with the gap. This resistance may be of the water type and is decreased in value until missing occurs at the gap. The test should be repeated with various ignition units and the one which can operate with the lowest value of resistance will predominate in actual operation on an engine. An energy test of the spark will also have some bearing on the above point.

The igniting value of a spark is difficult to determine, especially in view of the diversity of opinion regarding points of merit. Any testing for this quality involves the use of elaborate instruments which are beyond the scope of the engine builder. However, the maximum sparking distance in air is of importance in the igniting quality of a spark, but with tests of this nature the three-point spark gap or the spherical gap must be used to obtain consistent results.

The engine builder cannot know too much regarding the subject of ignition, but the problems are so specialized that the average person is content with a general knowledge of the fundamentals. It is the duty of engine builders to show more interest in the qualities of an ignition system, and their endeavors would produce a greater activity from ignition manufacturers in an attempt to obtain the ideal ignition.

Formulate Standard Method for Rating Tractors

O. W. SJOGREN, a Subdivision of one appointed to formulate a report on Tractor Ratings, has transmitted the following report of the Subcommittee on Tractor Ratings of the American Society of Agricultural Engineers, for the consideration of the Agricultural Power Equipment Division:

The object of this report is to recommend a standard method or code for rating tractors, by which either new or old models can be accurately rated. The rating is to cover (*a*) brake horsepower delivered to the pulley on the machine driven and (*b*) horsepower delivered to the drawbar at plowing speeds.

Brake-Horsepower Rating

The following tests shall be conducted on each tractor selected by the board of engineers in charge of the tests:

1—"Limbering-Up" Test

The object of this test is to eliminate the stiffness likely to be found in a new machine. In this run tractors will be used to pull harrows, packers, or anything that will furnish a suitable drawbar-load.

The loads to be pulled will be (*a*) approximately one-third load for 4 hr., (*b*) approximately two-thirds load for 4 hr., and (*c*) approximately full load for 4 hr.

If the tractor manufacturer believes that a 12-hr. run is not sufficient to limber-up the tractor, reasonable additional time will be allowed.

2—Brake-Horsepower Test at Maximum Load

The object of this test is to determine the greatest load the tractor engine will carry on the belt with the governor set for rated speed and the carbureter set for maximum power. The brake-load will be increased until the horsepower developed is the greatest.

The rated speed is to be considered the speed of the engine under load.

This test should begin after the temperature of the cooling fluid has become constant.

The duration of the test shall be 1 hr. without interruption or change in load or tractor adjustment.

If the speed should change during the test enough to indicate that conditions had not become constant when the test was started, the test will be repeated with the necessary change in load.

3—Brake-Horsepower Test at 80 per cent of the Maximum Load Recorded in Test 2

The object of this test is to show whether the engine will carry continuously its rated load on the belt and to show the fuel consumption at the rated load. The governor is to be set to run the engine at rated speed.

The test will commence after the temperature of the cooling fluid has become constant.

The duration of the test will be 2 hr. without interruption or change in load or engine adjustments.

After tests 2 and 3 shall have been conducted to the satisfaction of the board of engineers in charge of the tests, the nearest whole number to the load carried in test 3 is to be considered the brake-horsepower rating of the tractor.

4—Brake-Horsepower Test at Varying Load

The object of this test is to show fuel consumption and governor control when the load varies.

All adjustments are as in test 3.

The time and the load are as follows:

10 min. at rated load or load carried in test 3
10 min. at maximum load
10 min. at no load
10 min. at one-fourth rated load
10 min. at one-half rated load
10 min. at three-fourths rated load

The total running time is 1 hr. and the test is to be conducted without stopping the engine or changing its adjustments. If load changes make readjustments necessary, the final report of the test shall state the fact.

The variation in speed from the rated speed shall not be more than 10 per cent.

5—Nebraska Results May Be Accepted

In lieu of tests 1, 2, 3 and 4, the board of engineers may accept the results of similar tests on the same model of tractor conducted by and under the rules of the State of Nebraska for tractor tests. The brake-horsepower rating, however, is to be only 80 per cent of the maximum horsepower determined by Nebraska tractor tests.

Stopshok Wheel

IN our issue of Aug. 3, 1922, appeared a description of the Stopshok truck wheel which was incorrect in certain particulars. We therefore make the following correction:

The web of the wheel is not armored wood, but of hollow corrugated steel construction, forming a bridge-like structure which is said to carry the load throughout its circumference regardless of the point of application.

The wheel can deflect 1½ in. in any direction in a plane parallel to disks, or a distance of 3 in. between extremes.

Once adjusted the spring which holds the wheel in place requires no further adjustment with change in load on the wheel, but automatically cares for load variation.

Using a Single Locating Point in Differential Carrier Production

Method of location confined to pinion bearing bore. Massive structure of machines secures rigidity. Axles for high priced car produced by this method at rate of one every nine minutes.

By J. Edward Schipper

THE necessity for extremely accurate work on differential carriers was pointed out in AUTOMOTIVE INDUSTRIES of Aug. 31. In connection with this, a description was furnished of the layout in a modern plant in which all of the machines were tuned up to secure an ideal in accuracy which, not many years ago, would have been considered almost impossible in this unit. Up-to-date men in the automotive manufacturing field, however, now realize that almost without exception the need for accuracy in this unit is as great as in units which perform a more spectacular part in the performance of the automobile. When it is considered that accuracy in this part is responsible for proper location of the bearing and even of the proper engagement of the gear teeth, it may be clearly realized that without extreme care in the manufacture of the differential carrier, the efforts expended in securing accurate cutting of the gear teeth are wasted.

The plant described here is that of the Eaton Axle Co. of Cleveland. In following the detail description of the various operations through, the point which should be particularly borne in mind is how accuracy is secured through the use of only one main locating point for practically every operation. The production manager has realized that the only real way in which accuracy can be secured is to avoid jumping from one point of location to another. He has adhered to the plan of confining the method of location to the pinion bearing bore, which establishes a center and a proper relationship for all parts of the carrier.

Sixty Axles Per Day

All of the operations are tuned for a 60-per-day output of this particular piece. The Eaton axle plant manufactures several types of axles and the carrier described herewith is used in a high-priced high quality car. The axle output as described in the operations noted herewith are all based on a speed which will very closely approximate an average output of 60 for a 9-hour day, or, in other words, 1 axle every 9 min.

The first machine operation is handled on a Potter & Johnson, which chucks the malleable casting for the carrier against the wide flange, the location being from the outside diameter of this flange. The casting is drawn back against a plate for end location, the pinion carrier face is milled off and the small end of the malleable casting is bored for the pinion carrier bearing.

For the second operation, the casting is reversed and in another Potter & Johnson the large flange is faced off as is also the surface for the bearing cap. The location for this operation is from the bore for the pinion carrier bearing, which was secured in the first operation. All the other operations, as will be seen, are located from this bore where it is at all possible to do so. The two first operations which are similar in character and handled by similar types of machines are run by one man. These operations are illustrated in Figs. 1 and 2. An interesting feature which is brought out by these illustrations is that, due to the large diameter for the pinion shaft bearing bore, a very substantial pilot can be used for location, which makes the possibility of misalignment very remote in these operations.

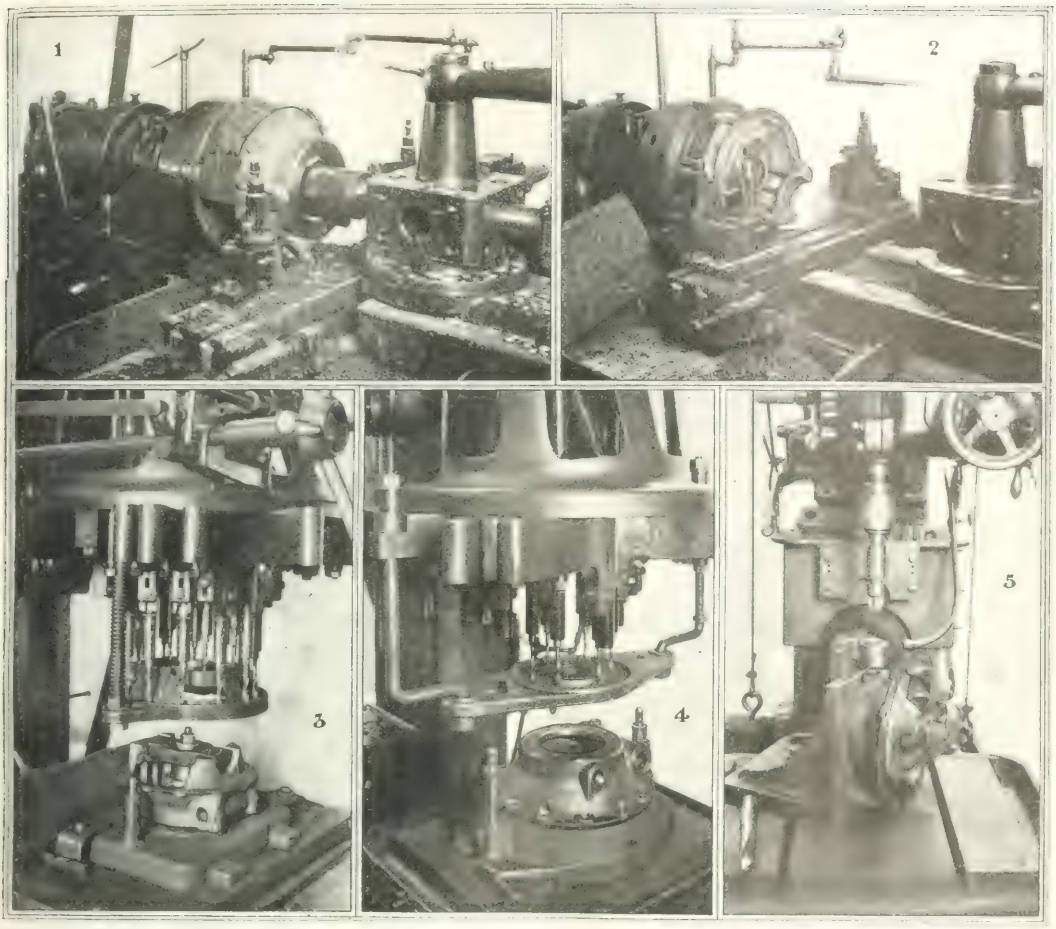
Drilling Operation

All of the holes in the large flange are drilled simultaneously on a Fox multiple spindle drill, as shown in Fig. 3. This machine not only takes care of these twelve holes, but also the four bearing cap holes simultaneously. The same location, namely, that of the pinion bearing bore, is utilized and in addition a V-block is clamped down into the cross-bore for the differential carrier. A feature which may also be noted in the illustration is that the part of the fixture which lowers with the drill is piloted on the lower portion which holds the work. This assures proper alignment and at the same time is noteworthy for its simplicity.

Following a spot-facing operation on a single spindle Barnes machine, another Fox drill is employed as shown in Fig. 4, for the pinion carrier face. This machine has six spindles and the work is located from the pinion carrier bore and by dowels through two holes in the large flange.

A Minster drill is employed for the hole in the upper part of the housing. The same machine is used for drilling and tapping, the shift from the drill to the tap being made by means of the Magic chuck. This is a 1 3/16-in. pipe thread to take a plug which closes this hole. Location is from the pinion bore as usual, there being a pilot on the fixture for this purpose and the clamp which holds the work against the face plate of the fixture rests in the cross-bore which locates the work circumferentially. This operation is shown in Fig. 5. For tapping the pinion carrier face holes, a Barnes machine is employed. This is a self-centering operation and requires no elaborate jig or fixture for the work.

The set-up for the next series of operations is very interesting from a production standpoint, as it allows



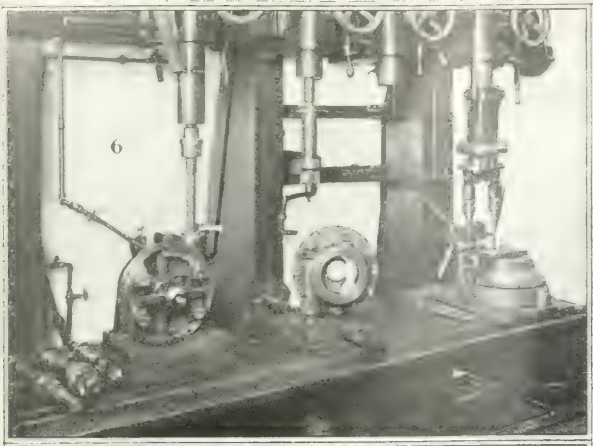
1—Facing pinion carrier face on Potter & Johnson machine. This is the first operation on the Eaton differential carrier, which is a malleable casting. 2—Facing the large flange and the surface for the bearing cap, the work being located from the pinion carrier bore. 3—Drilling the large flange and also the bearing cap boss holes on a Fox multiple spindle drill. 4—Drilling the holes in the pinion carrier face with a six-spindle Fox drill. 5—Drilling and tapping peep holes in the differential carrier on a Minster drill

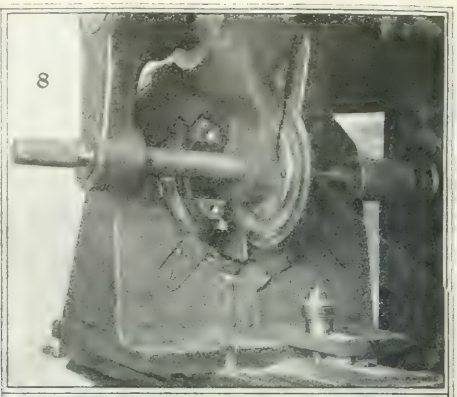
of a minimum number of operators and permits full advantage to be taken of the possibilities of the Magic chuck for quick tool changes. The machine used is a Foote-Burt No. 4½ four-spindle drill. The first operation shown at the right of the machine is the drilling of the clamp bolt hole for the torque arm pin. Location of this is from the pinion bearing bore and by dowel pins through two holes in the large flange. Other operations shown on this machine are the drilling, reaming and spot facing for the torque pin hole. This is a 1¾-in. diameter hole on which there is a plus and minus limit of .0005 in. Location for this work is also from the pinion bore with a pilot on the fixture.

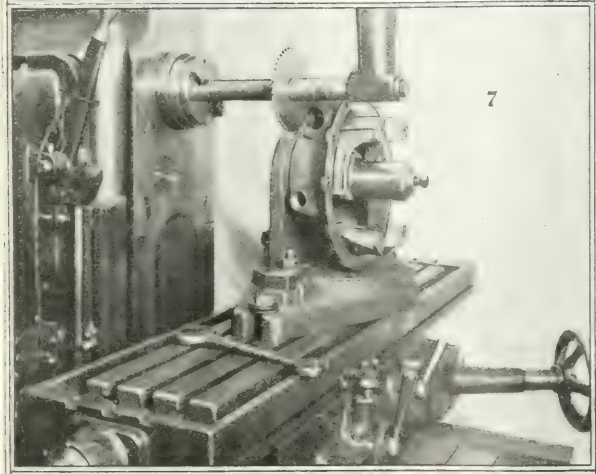
The saw cut for the two clamp bolts through the torque pin boss is performed on a Cincinnati miller, as shown in Fig. 7. In this instance the location is from the pinion carrier face. The carrier is also piloted through the bore as illustrated. The dowel pin hole for the torque pin thrust washer is drilled on a high speed drill, the location for the drill hole being from the saw cut and the reamed bore.

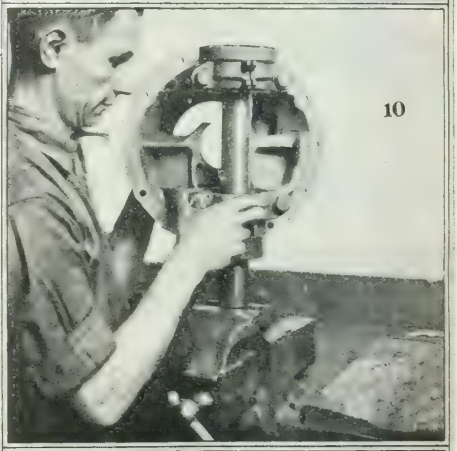
Another saw cut made on the casting is for the clearance for the ring gear. This cut is through the pinion bearing the carrier. The work is performed on a Kempsmith milling machine. In this instance the location is from the large flange and from two drilled holes in this flange over dowels in the fixture. This operation is shown in Fig. 8.

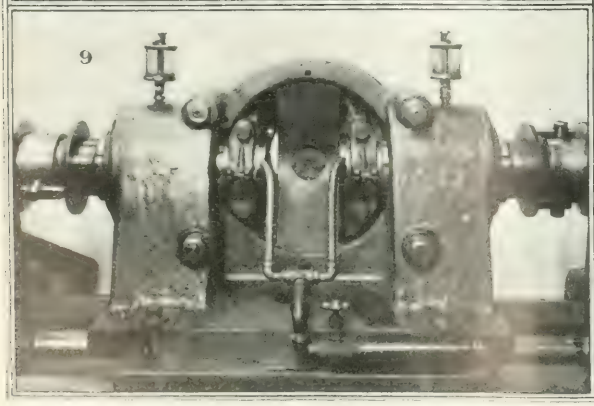
To secure accuracy, the four bearing cap holes are hand tapped after they are machine tapped. After these bearing cap bolt holes have been carefully checked over, the bearing caps are put on and bolted in place. These bearing caps have previously been milled on the contact face and drilled for the bolt holes. There has also been a spot facing operation for the bolt hole clearance. They have also been machined for the lock which holds the bolt in place. This consists of milling for the lock finger, drilling for the cotter pin and rivet to hold the

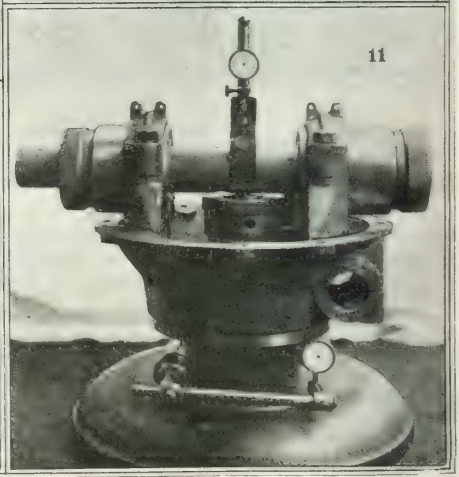




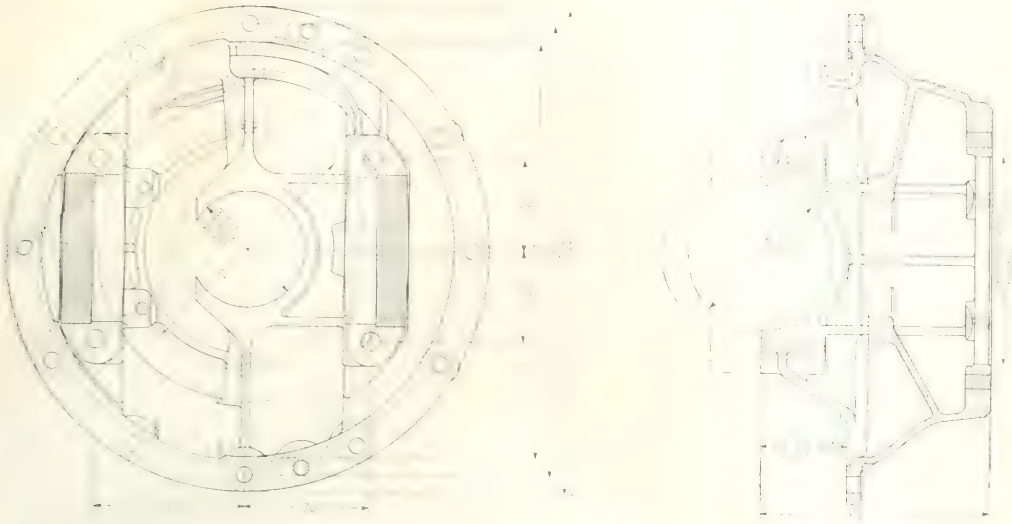








6—Foote-Burt No. 4½ four spindle drill which drills the clamp bolt holes for the torque arm pin, taps them and also drills, reams and spot faces the torque pin hole. 7—Saw cut made for the two clamp bolts in the torque pin boss. This work is handled by a Cincinnati miller. 8—Making the saw cut clearance for the ring gear on the rear pinion bearing in the carrier. This is a Kempsmith milling machine. 9—Cross-boring the differential carrier on a National two-way lathe. The work is located from the small pinion bore and by the large flange through two dowels in the drilled holes. 10—Checking the alignment of the cross bore. 11—Gage used for checking alignment, squareness and off-center for the differential carrier



Views of differential carrier used in Eaton axle

lock finger. The caps are put on with .002-in. paper shims between the cap and the carrier. The cap screws are tightened with an air tightening arrangement consisting of an air drill fitted with a slipping clutch so as to secure uniform tightness on all of the cap screws.

The cross boring operation for the differential carrier is performed on a National two-way lathe. The operation is located from the small pinion bearing bore as in the previous operation and also from the large flange in the casting over the two dowels in drilled holes. The machine bores, reams and taps both sides at once. In mounting the differential casting for this operation, which is done with a high degree of accuracy, care is used to burr all the pieces where necessary so as not to spoil the alignment and to prevent any possibility of cocking of the work on the fixture. As an extra safeguard for accuracy, the cross-bore is hand reamed. This hand reamer is a special reamer so arranged that the reamer pilots on one side while reaming through the other. The limits on this reamed hole are plus and minus .0005 in. The work is first done on one side and then reversed and performed on the other in the same manner.

Following this hand reaming, the piece receives a 100 per cent inspection. Figs. 10 and 11 indicate some of the special respective jigs and gages used for this work. The limits against off-center are plus or minus .001 in. For squareness of the pin bore with the differential bore, which, along with other tests, is gaged, as shown in Fig. 11, is plus or minus .001 in. As will be noted, amplifying gages are used for checking squareness and misalignments. In spite of the fact that these are rigid inspections on work as large as this, the rejections after completion have been reduced to a point where they are negligible.

A FEATURE to be noted in scanning the operations described and illustrated herewith is the rigidity of the machines secured by massiveness of construction as well as by proper piloting arrangements. The machines are also noteworthy because of the fact that they are adapted to handling other than the work described herewith. The Eaton Axle Co. manufactures several different types of axles and the tool equipment herewith is capable of handling axle designs which differ widely at material points. The machines are all stock and only in a very few instances has it been necessary to re-design or rebuild any of them. The jigs and fixtures are also noteworthy for their simplicity. The shape of the casting is such that it is fairly simple to use the center bore as a location in an axial direction while the drilled holes in the large flange provide an opportunity of locating the work circumferentially.

THE cross-bore, which must be positively at right angles to the bore for the pinion shaft, also affords an opportunity for radial location which is taken advantage of in operations where the large flange could not be conveniently employed. Parallelism between the two faces of the casting is secured by first turning one face, that being at the smaller opening adjacent to the pinion bearing, then locating the center bore from this face and the large flange from the center bore. Both faces being square with the center bore are consequently square with each other. For that reason it is perfectly logical to use both the center bore and any point on the large flange for location. This method is followed successfully.



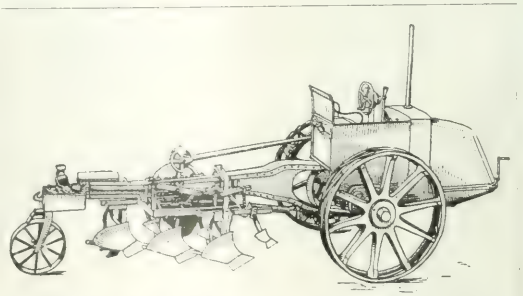
Elwell-Parker industrial crane capable of lifting 3000 lbs. at a 6 ft. and 1000 lbs. at a 12 ft. radius without outriggers. Stacks 12 ft. high with boom set to 3000 lbs. at 6 ft. radius. Load capacity, 1½ tons; total loaded weight, 8500 9000 lbs.

Germans Develop New Motor Plow Designs

Recent agricultural show has 17 motor plow exhibits. Large motor plows compete with steam plows. Korting Bros. make very small 12 hp. plow with two driving wheels. Unique features in anchor tractor produced by Arlt. Much attention given to design.

MOTOR plow design and construction has received considerable attention in Germany during recent years. Some novel designs have been brought out and in certain cases have been quite successful. At the first important exhibition held since the war by the German Agricultural Society, an unusually large amount of space was devoted to exhibits of agricultural machinery. An examination of the motor plows shown at this exhibition gives an excellent idea of the progress that has been made in these units by the Germans.

Dr. Gustav Fischer, writing in the *Zeitschrift des Vereines Deutscher Ingenieure*, says the many new designs exhibited indicate that the needs of mechanical tillage have not yet been satisfactorily met. He goes on to say that although many of the new machines are quite similar to older designs, some entirely new departures have been made. For a while it seemed as though the tractor would oust the motor plow completely, but at the show at Leipzig there were still seventeen motor plows as compared with twenty-four tractors, and in citing these figures it is only fair to state that of the tractors several were intended more for hauling trailers than for tilling operations. Cable plows too are still being manufactured, and among the latter the Ergomobilplow of Kuers, built by Borsig, has been in use the longest among German machines. It has a rating of 35-40 hp., and because no power is lost in moving the heavy machine over the field it has about the same working capacity as a tractor rated at 60 or 65 hp. The two-machine cable plow of the Pohl Works, with its 80-hp. engines, is practically on a par with the smallest steam cable plows of which J. Kemna of Breslau turns out one with a 50- to 70-hp. rating. A machine of far greater capacity is the cable plow of Benz & Cie., whose engine with its six cylinders delivers from 100 to 120 hp., and can be run on either gasoline, benzol or crude oil. As in most steam plows, the cable drum here is located under the engine frame on a vertical shaft. The engines run at 450 to 500 r.p.m., and their speed can be adjusted by means of the governor and temporarily also by hand, in order to permit of starting and stopping the plow gradually. Dr. Fischer considers it questionable whether such a large motor cable plow can compete with a steam plow, for the less expensive delivery of the smaller quantities of fuel and water required and the ability to start instantly are balanced by the high price of hydro-carbon fuels, the low reserve power of the motors and especially the sensitiveness to faulty operation. Besides, the first cost of the motor plow is much higher than that of a steam plow of equal capacity.



Motor plow built by the Mann Truck Works

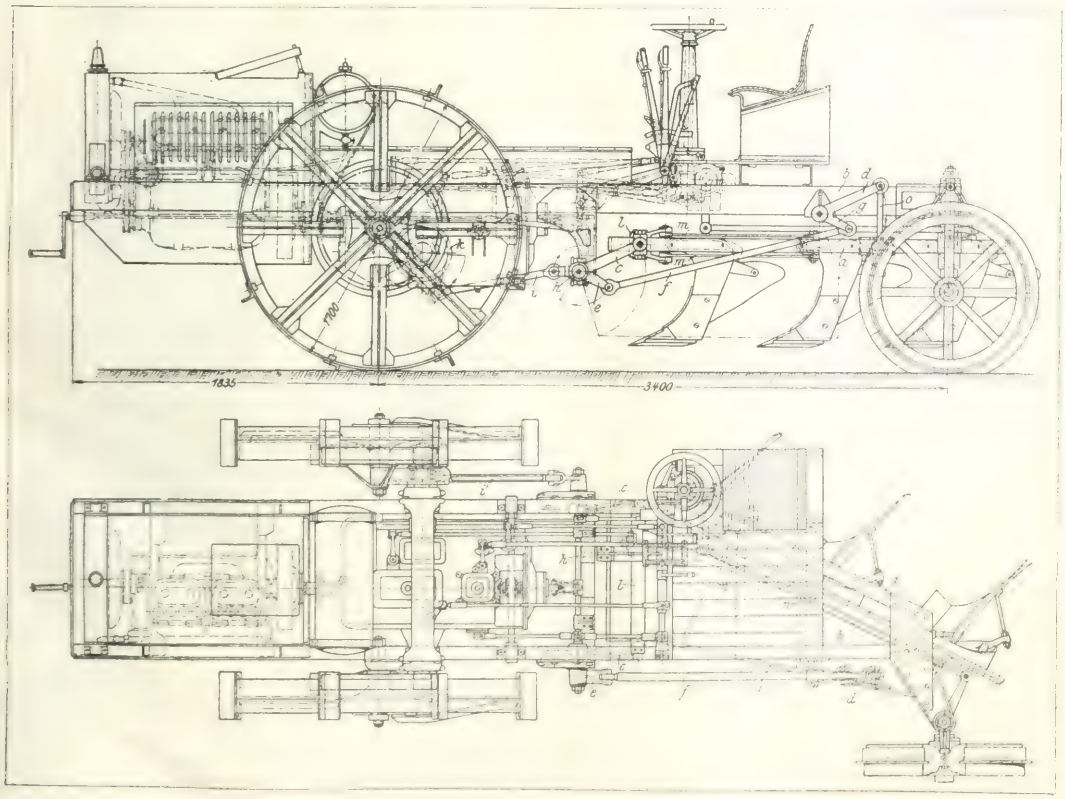
In the small steam plow of Kemna the engine is located on top of the boiler and the transmission to one side, as customary. The cable drum is located on the rear axle, which makes it possible to place the drive for this drum symmetrical with that of the rear axle. This cheapens the cost of construction for the reason that the wheels, shafts, bearings and connections for both drives are alike. The boiler is provided with a Schmidt smoke box super-heater. From the countershaft, located in front of the crankshaft, the cable drum and the rear axle are operated through roller chains, and the location of the countershaft in front of the crankshaft insures a sufficient distance between chain wheels. The speed of the engine can be raised to 400 r.p.m.; for operating a separator it is reduced to 220 r.p.m., at which speed the engine, it is said, still develops 25 hp.

Motor plows can compete with tractors chiefly because as unit machines they are easy to handle and can be backed up without the driver going into contortions. The smaller motor plows therefore can be operated by one man. With the early machines, difficulties were experienced on account of the rigid construction, especially in hilly territory or in soil of varying hardness, in that the depth of plowing would not be constant. The Stock Motor Plow Company still continues the rigid connection of the plow with the frame in its new small motor plow, which permits great rigidity and a simple adjustment of the depth of plowing, but in this it now stands practically alone. Other manufacturers endeavor to free the plow frame from the motions of the wheel frame by providing the "through"

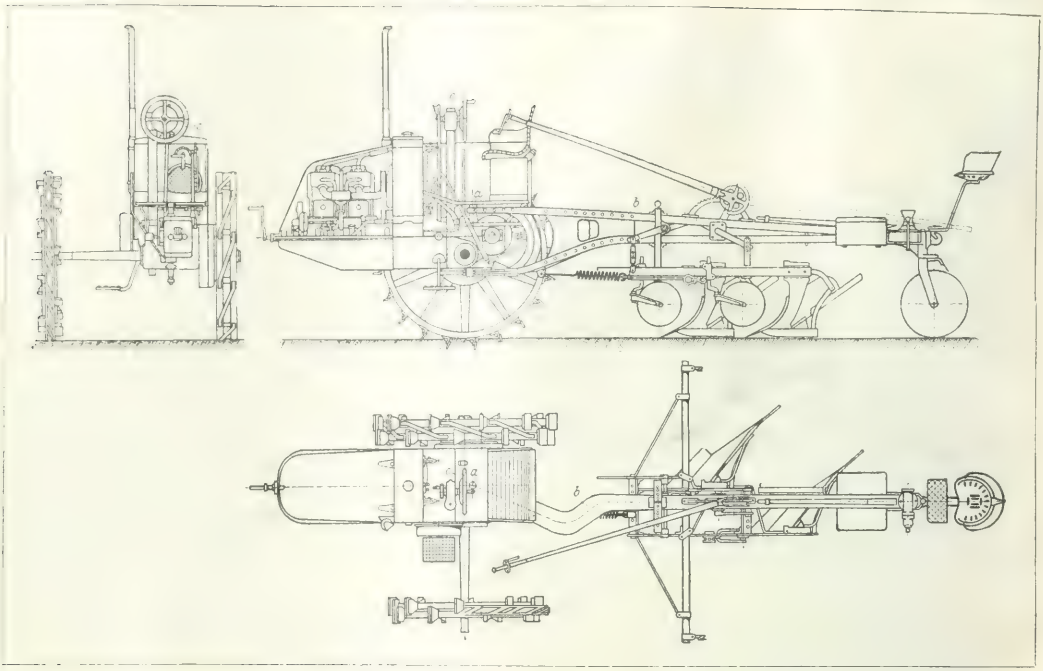
frame with a linkage or making it a wheel frame pure and simple, relative to which the plow frame is movable. In the majority of cases of larger motor plows modifications of the special plow frame introduced by Wendeler-Dohrn have been adopted. In the motor plows of the Lenaria Co. in Berlin, of E. C. Flader in Joehstadt and of Pfannhauser in Vienna the plow frames are movable in the horizontal direction also.

THE Alfa motor flow of Pfannhauser, illustrated on this page, carries three or six plow bottoms on a frame *a*, which is adjustable relative to the wheel frame *b* not only vertically but also laterally. The depth adjustment is made by means of a swinging lever *c* in front and a swinging lever *d* parallel to it in the rear, which are connected by a linkage *e*, *f*, *g*. The shaft *h* of the swinging levers is turned by means of rod *i* from the driving mechanism *k*, which at the same time causes a change in the settling of the right-hand wheel running in the furrow. The frame *a* is capable of moving sideways relative to the depth adjustment mechanism. The levers *c* do not carry the frame directly, but through a cross piece *l* with a shiftable lock which is connected through a pull rod *m* with the block *n*, adjustably mounted on the plow frame. The pull rod is adjusted in accordance with the width of plowing and the soil resistance. Minor changes in the resistance cause the plow to swing slightly, play for this swinging motion is provided by the suspension rod *o* between the near part of the frame and the swinging lever *d*. The purpose of this arrangement is to equalize the torsional moments to which the plow frame is subjected and to ensure that the moldboards either do not press at all or at most only lightly against the side of the furrow. This makes steering easier, which is otherwise rather tiring. For this reason it is also claimed to be unnecessary on level soil to provide the steering wheel with angle lugs. The machine is claimed to work with three bottoms 41.5 in. wide in deep plowing and with six bottoms 60 in. wide in turning under stubble. With a rating of 38 to 40 hp. the machine belongs to the larger class.

THE motor plow of P. Stumpf in Breslau, manufactured by the Prussian Mining Office Malapane, has a rating of 35-40 hp., and a plowing width of 40 in. The moldboards *a* are carried swingingly on parallel levers *bb* and can be adjusted by means of the air pressure cylinder *c*. In operation they are loaded by air pressure of about four atmospheres above the piston *d*, but by further compressing the air they can yield backward—each moldboard individually, as there is one air cylinder for each moldboard. The air cylinders therefore provide an elastic cushion, protecting the frame and the engine against overloading, and besides the plow can be lifted and let down by means of compressed air more quickly than by mechanical means. The plow bottoms also yield well before rocks. The compressed air installation is furnished by the Knorr Air Brake Works, who have had long experience in this line. Of course the installation works under less



Sectional views of the Pfannhauser motor plow



Sectional views of the Man motor plows

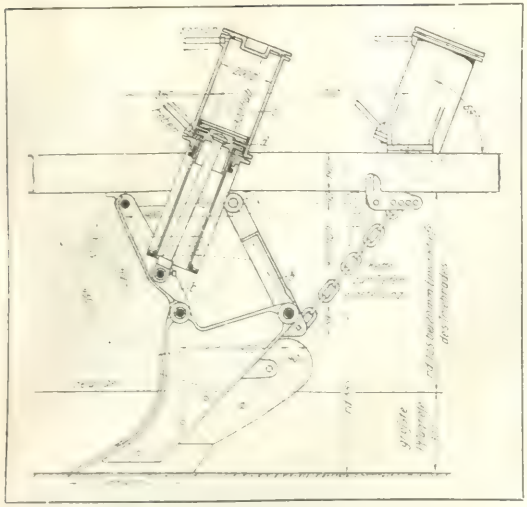
favorable conditions on the motor plow than in railroad work, on account of the constant pressure in the cylinder and the dirt, so that only extended experience can show conclusively whether it is practical, especially as regards the durability of the guiding and packing of the pistons. The depth of plowing is fixed in a very simple manner by the length of the chain between the frame and the mold board. When the plow is being lifted the top of the mold board abuts against the frame. In this position the edge of the plowshare is about 4 in. out of the soil. The machine is provided with a drive wheel of 75 in. diameter behind the engine at the right and a drive wheel 71 in. in diameter at the left, while at the rear end of the frame there is a steering wheel 32 in. in diameter. All wheels run on unplowed ground, and the moldboards are placed so far to the right of the axis of the machine that the resultant of the plowing resistances lies to the right of the center of the driving wheel.

The Man Motor Plow

Under the patents of Dr. Bernstein the Man Truck Works have built a motor plow of 25 hp. rating, as illustrated herewith. In this machine the front part with the engine, the transmission and the drive wheels, and the rear part with the mold boards are completely separated. They are connected by means of a vertical pivot pin *a* which is displaced to the right from the longitudinal axis, toward the furrow wheel. In order to make it possible to turn in a short radius, the plow frame *b*, which consists merely of a steel beam set on edge, is offset laterally, and the operator may free the steering wheel so that it operates as a caster wheel. The differential gear has different reductions and transmits to the furrow wheel more power than to the land wheel, so that the latter may be moved far out from the furrow without creating any side draft. Drive wheel brakes are provided in order to facilitate steering and the application of these is controlled by means of a differential gear from the steering wheel in such a manner that when the wheel is turned in one direction the brake on one driving wheel is automatically applied, and when turned in the other direction the other brake is applied. The frame of the front part is formed by the transmission housing which also carries the engine, and above and below the steering pins for the rear part. In this rigid frame housing all of the propelling elements from the engine to the drive wheels are safely encased. As yet this plow has not been thoroughly proven in practice, but it must be admitted, Professor Fischer says, that it embodies many ideas which seem to be thoroughly practical for small motor plows.

THE motor plow of E. C. Flader, which is built under the patents of Hans Kaufmann, is rated at 20-22 hp., and therefore has about the same capacity. It makes use of the same plan for steering as the Stock plow, with two driving wheels in front and one steering wheel in the rear. But since the plow frame may swing between the wheels around a pivot joint at its forward end, the rear wheel is almost completely relieved of lateral pressure and can be swung directly by means of a hand lever *a*. In order that this lever may be moved through a large arc without an excessive range of motion of the driver's hand, it is provided with a segmental handle so that the driver can change his hold.

The mold board, together with the pull rod extending from the front end of the wheel frame, constitutes a bell crank, which is under tension when the plow is lifted out of the ground and under pressure when the plow is lowered. For lifting the plow, use is made of the hand wheel *b* with a threaded shank and a nut *c* from which the rod *d* leads to the pivot of the bell crank. The depth of plowing is adjusted by varying the height of the plow



Depth adjustment on plow built by P. Stumpf

beam front end, the same as with a horse plow. When lifting the plow, the nut *c* travels upward and pulls a steel cable *e* leading over pulleys thereby also raising the rear end of the plow. This operation is facilitated by the counterweight *f* at the other end *g* of the cable. When the bell crank is close to the position of release, the component of the cable pull in the direction of the lifting rod *d* is quite large; therefore, the counterbalancing effect is great, whereas in the working position the weight of the plow is almost completely effective because the counterbalancing action is small. The cable allows the plow free play upward so that it may move out of the way of rocks. The bow *h*, which is provided with foot rests, guides the plow beam. This motor plow, also the forward part of the frame, constitutes the housing for the transmission and the drive wheel bearings, which carries the engine, but in this case the rear part of the frame, built up of rolled steel, is rigidly connected to the forward part. The engine is arranged transversely to the longitudinal axis of the machine, and in order to be able, in spite of this arrangement of the engine, to conveniently apply the starting crank, cranking of the engine is effected through the reversing gear. The inclined lugs on the driving wheels overhang the wheel rims and are stiffened at the outer ends by means of a ring which serves as a tire when the machine is being operated on public roads. The lugs on the land wheel consist of an angle iron.. Those on the furrow wheel of flat iron, so that when the machine is driven on the road the two wheels are of approximately the same diameter. For different kinds of agricultural work plow beams with 1, 2, 3, or 5 mold boards are changed.

A very small motor plow is being manufactured by Korting Bros. Co. It is a two-bottom machine with two driving wheels and an engine rated at 12 hp. At its forward end the plow frame is pivoted to the wheel frame and its rear end is adjustable in a guide on the wheel frame. At the rear end the plow frame rests on a small wheel, which runs in the last furrow. The operator can walk behind the plow, the same as with a horse plow, and guide by means of the plow handles, but there is also a seat provided for him at the rear.

Rather unique features are embodied in the anchor tractor manufactured by J. F. Arlt, Rubolstadt. At the rear there are two driving wheels and in front a single steering wheel, latter which naturally can be swung around its axis with less effort than a two-wheeled steering axle. In order that the front wheel may not get stalled dropping into a hole in the ground, nor get into the furrow as the result of faulty steering, steadying rollers of a slightly smaller diameter are located on both sides of it, upon which the tractor can rest. Below the tractor frame there lies a carrier with the draw bar hitch. Owing to the low position of this hitch there is said to be no danger of the tractor overturning, in spite of the small amount of weight on the front wheel. The lugs of the driving wheels are substantially radially adjustable and their spindles can be turned comparatively easily by means of a ratchet brace. Ordinarily all three wheels are to run on unplowed ground, but the right driving wheel may also run in the furrow if desired. In that case it is mounted in a slide and can be lowered eight inches. If the tractor runs with one wheel in the furrow the drawer pull is in line with the plow resistance and all side-draft is obviated.

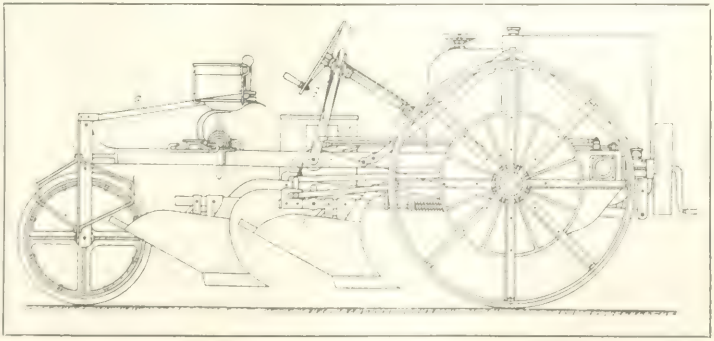
Cable Control from Tractor to Plow

The engine in the Arlt plow delivers from 35 to 38 hp. A steel cable control is provided between the tractor and the plow, which is claimed to enable the driver to control the tractor while seated on the plow. In order that it may be possible to steer the tractor without backlash when one of the cables is slack, as, for instance, in turning, the cables are surrounded by flexible but non-extensible wire sheathings. Only practice can show whether the arrangement is reliable.

LAST year's import of cars was only 287, compared with 816 in 1920. Imports of trucks fell from 109 to 29, and of chassis from 65 to 47. Of the cars imported last year, 30 came from Italy and ten from Germany.

The motor-car is fast becoming a business necessity all over the country. The conservative Ceylonese landowners of the interior also own numerous Fords and use them extensively. The import of petrol has risen from 988,427 gallons in 1920 to 1,381,671 gallons last year.

The horse-drawn vehicle is fast going out of fashion. The import of horses from India, Australia and England dropped to 188 animals last year from 317 in the preceding year.



E. C. Flader motor plow

Korea Will Buy from 200 to 400 Cars Each Year

Over 4000 miles of roads already built, with 3000 more in prospect. Manufacturers should have direct representation in Korea, as Japanese agents are usually inadequate. Touring cars selling for less than $1,500 in demand. Truck market increasing.

By William R. Irvine *

NINETY per cent of the 800 motor vehicles in Korea are low-priced American makes and 75 per cent of these are used as motor buses in supplementing the railways of the country. The government recognizes the value of motor vehicles in developing the resources of Korea, and as rapidly as roads are opened bus lines operate over them under franchises granted by the government at fixed tariffs. Most of the remaining motor vehicles are used by missionaries—hardly more than a dozen Koreans owning cars for private use.

Practically all the roads in the country are under the supervision of the Government General which makes for uniformity in construction and supervision. Construction is now being carried on under a 20-year program which calls for 7706 miles of highway. When this program was inaugurated in 1912 there were but 583 miles of road in the country. Fifty-three per cent or 4060 miles of the program were already completed in 1920. These roads are unmetaled and about 25 feet wide. Motorists experience no difficulty in their use except during the rainy season during July and August, even though many of the new roads require repairs, the government concentrating its road appropriations on new construction. Streets in Seoul, the capital, and Fusan, the principal seaport, are wide and unsurfaced and during the greater part of the year permit driving without undue hardship.

Market Improving

The sale of motor vehicles in Korea is at present seriously handicapped by poor business conditions, but indications are that the market will soon improve despite the recent imposition of heavy import duties, due to the steady increase in road mileage noted above and the value of automotive transportation which is apparent in those sections where road conditions permit the use of motor vehicles. The market is further limited at the present time because the small wealthy class of Koreans have not yet overcome the fear that to show wealth means greater taxation by the government.

The automotive market in Korea, which is gaged by the crops—the country being almost entirely agricultural—will be limited for a number of years to motor vehicles falling within the $1,500 margin, due to low buying power of the people, which however is increasing with the introduction of scientific methods of farming. However this demand should be steady for the next few years for between 200 and 400 vehicles per year for both new cars and replacements, the latter being based on the average life of a motor vehicle of about four years under present operating conditions.

There are few artificial handicaps to the sale of motor vehicles in Korea and the recent increase in taxes and import duties are offset by the lowering prices of American makes. Present stocks of cars bought at high prices are very low and these were also imported under the old duties. Taxes are 120 yen per year regardless of horsepower or size, as compared with the old figure of 50 yen. Import duties are 35 per cent on passenger cars and trucks, 25 per cent on parts and a flat rate of 100 yen for motor cycles regardless of cost.

Business Practices

Dealers come into direct contact with the buyers. The chauffeur-evil which is so prevalent in Japan is not tolerated by automotive dealers in Korea. It is the general practice to demand cash sales with Koreans, although credit terms are sometimes given to foreigners, usually missionaries who require cars to get over their territory. Prices are generally in keeping with laid down costs and average about 75 per cent above the sales price in the United States.

Dealers do not maintain separate service stations for repairs, although some carry spare parts. Repairs are made by a machine shop in Seoul which has a fairly adequate supply of machine tools and is quite capable of making major repairs and in emergencies making essential parts. Very little advertising is done by dealers owing to the high rates demanded by the Japanese newspapers. Occasional announcements of new representations are made, but dealers prefer to circularize small folders. English advertising literature has a very limited use and it is suggested that advertising allowances be given to dealers on condition that it be expended on circular matter in Korean or Japanese script.

The center of motor vehicle distribution is at Seoul, where all the dealers and repair facilities are located. At the present time there are less than a half dozen dealers interested in the sale of motor vehicles in Korea although many more are supposed to be acting as representatives. American manufacturers make a mistake in granting Japanese representatives the territory of

* U. S. Trade Commissioner. *Released by courtesy of Automotive Division, Bureau of Foreign and Domestic Commerce.*

Korea unless the Japanese company can actually prove that it is represented in the country.

Credit terms would undoubtedly have to be given in the event that direct representation were placed in Korea, as the men in that country who are interested in automotive products have but limited capital. Dealers at present are paying from 10 to 11 per cent interest on loans. Terms granted in other lines are 90 days sight draft, with documents delivered on acceptance.

There are no regular steamship lines giving direct service between American ports and the Korean ports of entry, Fusan and Chemulpo (Jinsen). As goods imported through Japan must pay an additional 8 per cent duty, unless shipped in bond, it would be best to send them direct to Seoul by a bill of lading calling for transshipment at Kobe, Japan. Automotive vehicles should be carefully packed and specially braced when intended for direct shipment to Korea, as the unloading facilities at the above ports are very bad.

The accessory market is limited to utility articles. The tire market, formerly controlled by British goods, is now in the hands of Americans; there is a steady demand for tires and tubes, as the tires commonly last less than 3000 miles. Dealers are advocating the use of oversize cords.

Types of Motor Vehicles in Demand

The demand for passenger cars is limited to touring types, including chassis and body. The local body building is limited to special touring-bus bodies for a light, popular-priced American car. The demand for trucks is chiefly for those of 1 and $1\frac{1}{2}$-ton capacities, owing to the frail bridges of the country.

Most of the trucks in use are owned by the Government and the railroad. Merchants and minor manufacturers are beginning to use light trucks in the towns. The market for motor cycles will not increase to any extent as former owners have found them too uncomfortable over the rather rough gravel roads and are going in for cars.

Future of American Automotive Exports to Chile Depends On Manufacturers

THE stagnation which the Chilean automotive trade has suffered for nearly two years will perhaps never reach a lower ebb than has been experienced during the past few months, but it would be venturesome to say that any great improvement is yet in sight, according to reports received from Commercial Attache McQueen at Santiago. However, the nitrate industry has shown steady improvement for several months and better prices are being offered for Chilean copper. If these conditions continue, the general prosperity which will bring about real activity in automotive trade will undoubtedly follow.

Prior to 1913 Chilean purchases of motor vehicles were negligible because of the lack of good roads and modern pavements. The war prosperity, however, brought about a change which would have taken years of gradual development under normal conditions. The contrast between conditions in 1913, when probably not more than 200 motor vehicles were in use, and those in 1920, when the automotive census was estimated at 8000, shows the rapidity of this change. The degree of stagnation can be seen from the fact that only 14 motor vehicles were imported during the first five months of 1922 and but 219 during the same period of 1921 as compared with imports during 1920 valued at over $1,200,000.

Future Demand for American Cars

The present stock of unsold cars on the market will number nearly 100, however, although it may appear rather large just now, this number will not greatly affect importations if a period of prosperity should set in. Nearly every agency still has a few cars on hand, the enclosed cars being the hardest to dispose of on account of their high price.

Some observers state that automotive imports will be small for several years, until the stocks are reduced to proportions more compatible with the normal purchasing ability of the country. This opinion is supported by the fact that cars generally see comparatively light service, since the radius of driving in the cities is small and the price of gasoline (about 50 cents per gallon) conduces to sparing use. Weather conditions are not adverse and were skillful mechanics available, the life of a car in Chile would be much longer than in most countries.

There are no signs of competition which will deprive American manufacturers of any large share in the trade. European cars will no doubt reappear on the market and will be purchased by a few wealthy Europeans on the appeal of novelty and exclusiveness, the bulk of sales, however, will be among American low and medium priced cars which are able to negotiate the rough surfaces encountered away from the principal downtown streets of the cities.

Manufacturers Should Cooperate with Agents

Chilean automotive importers have had a difficult and unprofitable time for more than a year and their statements regarding the business are bitter, or at least regretful. Good agents, properly equipped and with adequate sales forces and service facilities, are very difficult to find or to replace if their interest wanes. The immediate future of American automotive exports to Chile rests largely with the American manufacturers who have maintained their organizations despite the dull times and it rests with them to go to some trouble to indicate their sympathy with their agents and offer some form of cooperation that will instil a spirit of optimism for the future. The lack of reliable and efficient representatives is illustrated by the fact that one very prominent American make is at present unrepresented in Santiago.

THE interest in Argentine oil reserves is increasing daily. Besides the Argentine government works at Comodoro Rivadavia and Plaza Huincul, eighteen companies are engaged either in investigations or actual exploitation. One of the more recent developments is the organization of a large company in Santiago, Chile, to exploit concessions near Challacó (Neuquen territory.) Up to date, no large new developments have taken place in the refining of gasoline but the plants in operation at Campana are gradually forging ahead with plans for greater things in this industry.

Motorless Flight Impossible as Transportation Means

Air sailing or gliding promises significant developments in aeronautics. Skilled pilots with thorough knowledge of air currents and ability to use them to advantage are essential for successful soaring flight. European competitions are described.

By Edward P. Warner

THE author of this article, who is Professor of Aeronautics at the Massachusetts Institute of Technology, has just returned to this country after witnessing the remarkable motorless flight contests held last month in France and Germany. He is believed to be the only American aeronautical engineer who has had this experience. The article is authoritative and free from the unscientific statements which have characterized many earlier reports.

Another article by Professor Warner dealing in an engineering way with motorless flight and closely related subjects, and written exclusively for Automotive Industries, is being prepared for publication in an early issue.

DESPITE the fanciful stories written by some of the correspondents concerning air-sailing, there is absolutely no outlook for motorless flight as a practical means of transport. But the remarkable achievements of this summer point to very significant developments in aircraft. In the first place, soaring and gliding flight will provide better pilots; it will enable them to keep in practice and will make them more skilled. In the second place, it will provide a quick and economical method of trying out new designs and forms of construction under actual flight conditions. Finally, it offers a means for the study and charting of air currents, at present practically unknown. Study of atmospheric conditions means more economical and safer flight. The great desire of commercial aviation is to carry a bigger pay load per horsepower of engine. At present a wide excess of power is necessary for reserve in case the craft meets unfavorable wind conditions. If conditions are known approximately it is evident this reserve can be very materially reduced. Again, many of the most spectacular and costly accidents, particularly in this country, have occurred while flying over regions subject to sudden storms or where the atmospheric conditions were likely to be bad without warning. It will be possible, by means of study from soaring planes, to learn more accurately the normal and abnormal conditions and thus match our airway on the ground with a literally charted airway above the ground.

The French competitions were held at Clermont-Ferrand, Aug. 6 to 20. France, Switzerland and the United States were represented. There were 49 entries. With the exception of the final three days, most of the flights were made from La Taupe, which is 3500 feet above sea level, but which has an actual drop of only about 200 feet. For the first five days of the meet the American entry, sponsored by the students of the Massachusetts Institute of Technology, and flown by Edmund T. Allen, attracted most of the attention and was uniformly the most successful. Allen altogether made about fifteen flights, the longest 1 minute, 47 seconds duration. In taking off his machine was so damaged that he found it necessary to put his reserve craft into commission, but as this was not officially recognized by the French he could not remain in the competition. Trial flights with the new glider were nearly 2 minutes duration.

The most successful French entrant was Bossoutrot, chief test pilot for the Farmans, who, on the day previous to the meet had placed in commission a four-engine Goliath, weighing 20,000 pounds, relinquishing it to pilot a glider with a total weight, including himself, of only 200 pounds. Bossoutrot made a sustained flight of 5 minutes, 18 seconds, which was the recognized French record. Later another Frenchman, Douchy, took off from a neighboring peak, Puy de Dome, 4700 feet above sea level, and with a straight drop of 1500 feet. He remained up 9 minutes.

The German competitions were from Aug. 9 to 24, from Wasserkuppe, the highest peak in the Rhone Mountains, with an elevation of 3100 feet. The most successful entrant (all were Germans, except two Dutch entries) was Hentzen, who flew the Hanover Technical School monoplane 'Vampyr,' remaining up for 3 hours, 10 minutes. The next successful was Hackmack, in the Darmstadt Technical School monoplane, whose time was 1 hour and 46 minutes. The two gliders were much alike, except that the Vampyr was controlled by warping the wings and the Darmstadt by ailerons.

The Germans have been experimenting with soaring flight ever since 1912, although, of course, there was an interruption during the war. I was amazed to observe the extent to which the Germans had studied atmospheric conditions around Wasserkuppe. The long flights were

the product of the exceptional terrain, excellent machines, good piloting, and knowledge of the wind currents. There was no magic. Most of the German fliers had been studying motorless flight for a considerable period. Hentzen, the leader, was a war pilot of great reputation. Martens, who also flew the Vampyr, had applied himself to gliding for three years.

As a general thing, most of the German machines were designed by aeronautical students at technical schools, though the manufacture in some instances was done in commercial plants. Most of the craft were monoplanes. The French craft varied in type and the rest were essentially sport machines, without motors. Contrary to popular belief, light wing-loading was proved not absolutely essential for efficiency. The French and German gliders ranged from 1½ to 2½ lb. per sq. ft. The most successful German glider had a wing-loading of 2.4 lb.

All the longest flights were made in a west wind, which blows up along broad slope. Hentzen, Martens and Hackmack made their records by taking advantage of rising currents of the same sort as utilized by Orville Wright, in October, 1911, when he returned to Kitty Hawk, N. C., to carry on further gliding experiments. Mr. Wright soared for 10 minutes and 1 second at that early date, an American achievement which has generally been forgotten. Whereas Mr. Wright took advantage of a wind flowing up the face of the hill at a speed equal to his flying speed, and thus was enabled to hover, the Germans did better by gliding into a wind flowing up the hill at a speed less than the flying speed of their craft. Hentzen took off in a 25-mile-an-hour wind, which was about his flying speed, but, on his two hour flight he remained aloft successfully even though the wind had by that time diminished to 15 miles an hour, or 10 miles less than his normal flying speed.

The Germans took advantage of the ascending current of wind to take off and then worked back and forth in figures of eight, but generally staying over the original slope and in the ascending current. Hentzen remained for most of this period in the air over the general locality he started from. Then having an altitude 500 feet higher than his starting point, and his machine possessing a very flat gliding angle, he glided down the valley of the Fulda for seven miles, in order to comply with the terms of the competition that he land at least five kilometers from his starting point. It was impressive that Hentzen, on his three-hour flight, actually soared 1150 feet above the point from which he took off.

As to the present position of soaring flight, the status, in my own opinion and that of most of the well-informed persons with whom I talked, is briefly this: The problem can be divided into three parts. The first and simplest is the utilization of ascending currents, which has been accomplished. All that remains in that direction is to devise means for detecting more accurately the presence and location of these currents. The second is to sail in winds of varying velocity. As Professor Langley, the American scientist, showed in 1898, it is theoretically impossible to take advantage of the "internal work of the wind" and of rapidly fluctuating wind speeds to support a bird or aircraft without loss of altitude or direct expenditure of energy, the necessary energy being drawn from the wind itself.

The problem of soaring flight, as it is commonly interpreted, may be said to have been solved only when flight without power in fluctuating winds and without use of ascending currents has been realized. The third and final stage is flight without power when the wind varies its speed at different altitudes.

Curtiss Glider a Flying Boat Adaptation

FOR two periods of thirty seconds each, Glen Hammond Curtiss recently remained aloft in his new sailplane, constructed of silk, wood and duralumin. In this test the sailplane was towed on the water but Curtiss believes that eventually it will rise without motive power from the surface of the water. The tests were experimental and preliminary to further, continued tests. Great satisfaction was expressed, however, in the manner in which the craft handled. This was the first time in five years that Curtiss has piloted a plane.

The test conducted off Plum Beach, Port Washington, Long Island is the result of long continued experiments carried on in the Curtiss research laboratory at Garden City, Long Island with the conviction that the flying boat could be adapted to sailing thereby lessening the horse-power and decreasing the cost of operation.

The sailplane was towed by a speed boat. Due to the excessive calm, difficulty was experienced with the towing cord, which snapped several times. On the third trial, Curtiss cast loose at a height of 20 or 30 ft. and in spite of the dead air sailed for half a minute.

On the trip back from the test while being towed, a cross breeze arose and for half the distance the sailplane floated in the air, held by the cord. At the end Curtiss cut loose and sailed to the hangar. A second test held more recently with slightly more favorable wind conditions resulted in approximately the same flight duration.

The Curtiss sailplane is a miniature N.C. boat, which may be remembered first crossed the Atlantic. Its dimensions are: weight (empty) 150 lb.; loaded (one man) 310 lb.; span 28 ft.; chord 60 in.; gap 54 in.; length-over-all, 22 ft. 11 in.; wing area, 267.5 sq. ft.; hull



The Curtiss sailplane

13 ft. 2½ in. long, 30 in. beam. The hull is made of duralumin and the glider is designed to fly at 20 m.p.h.

The shoulder system of control used in the sailplane dates back to Curtiss's earliest flying days, for it was connected with the Aerial Experiment Association, which included such prominent men as Alexander Graham Bell and Lt. Selfredge, that he developed the aileron and shoulder yoke systems of control. Incidentally it was during this period of development work by the Association (1907-1909) that Curtiss carried on experimental work with his first glider at Hammondsport, N. Y.

It is now generally realized that flight performance does not depend solely on engine power and hence sailplane experimentation may have far reaching effects.

Handling Truck Sales and Service in the Small Town

Analysis of typical town of 7500 inhabitants proves market too small for exclusive truck dealer. Large portion of truck sales possibilities lie in such places. Fleet owner buying comprises only 10 to 15 per cent of total possibilities. Service must be given.

By Harry Tipper

THE distribution of commercial vehicles requires a thorough consideration of the buying potentiality of each section of the market and the methods of buying usually adopted by the business houses operating in those groups.

This includes the sale of the vehicles and the service necessary to maintain them after they are sold. No method of sale which neglects the element of service will prove of permanent benefit. The two functions, however, do not coincide and cannot be worked out in a way that will be found valuable in the passenger car work. To illustrate this difference take a town of 7500 inhabitants located about ten miles from a city of 100,000. This town has no manufacturing, it is simply a trading center. There are about 1200 automobiles and there are nine successful retail automobile establishments, selling cars, supplies, storing and servicing; one exclusive repair shop in addition, and two tire shops. Three of these establishments sell commercial vehicles. The market for commercial vehicles in this town is confined to

1 Laundry
4 Drug stores
6 Markets
3 Hardware stores
2 Delicatessen stores
2 Candy shops
1 Shoe store
2 Millinery stores
2 Toy, newspaper, etc., stores
5 Tailor shops
2 Lumber and building material retailers
3 Stone, gravel, etc., retailers—general contractors
3 Building contractors
2 Coal dealers
3 Express and moving

The present ownership of commercial vehicles among these various concerns is as follows:

Drug stores—4 speed trucks
Markets—5 speed trucks
Hardware—1 speed truck
Tailor shops—4 speed trucks
Lumber—4 trucks
General contractors—12 trucks
Building—3 trucks
Coal dealers—6 trucks
Moving and express—6 trucks

The total number of commercial vehicles is 49 against a car ownership of 1200. The speed trucks are small and mostly Fords or similar types. The trucks vary from 2-ton to 7-ton in size. None of the trucks owned by the moving concerns are less than 5 tons and the general contractors seem to prefer equally heavy loads for their work.

None of these owners of commercial vehicles have garage and repair equipment of their own. Therefore the service on these vehicles must be taken care of in the town through the medium of the present retail establishments servicing automobiles.

The requirements of new vehicles in this town for commercial purposes does not exceed five or six in the year for the present owners, and there is a possibility of increase of one or two more.

It will be seen at once that this locality with a requirement for commercial vehicles of a small amount does not offer a profit for the exclusive truck dealer, particularly as a number of the trucks in use are speed trucks and can be taken care of through the ordinary automobile passenger car distribution. The sales, therefore, must be made either through the retail establishments already in this locality, or from the larger city near which the town is situated.

This is the story of only one small town, but it is indicative of the condition in many others and illustrates the widespread possibility of the market for commercial vehicles where a concern can own only one or two. In many of these small communities, however, there is no possibility of conducting sales from a nearby larger center of population because of the distances.

The market for future commercial vehicles depends, of course, very greatly upon the service facilities available in the locality for keeping these vehicles moving. This leads to the conclusion that for many areas in the United States, in the majority of smaller towns, retail distribution and the sale of commercial vehicles is necessary to the covering of the market; and to the further conclusion that in a large number of these small towns the possibility of truck sales in any given year is not sufficient to enable a retailer to specialize exclusively upon that development.

In the last article on this subject it was stated that there were over a million retailers of which about 300,000 represented retail establishments with a maximum limit of approximately one delivery vehicle and about 300,000 representing a maximum delivery requirement of from one to three vehicles, and approximately 10,000 concerns with a delivery requirement of five or more.

To reach a large number of these retailers and local

concerns, it is necessary that the service point be within the local area because the commercial vehicle must be maintained in shape to continue its way through the working day. Service must be rendered so that the driver can put the car in the service garage and take it out without any loss of time necessary for the business operations.

The number of truck sales to be made in any given sales period, such as a year, with such a local area, is not sufficient to permit the specialized effort dealing only with those sales, unless such sales are made by a salesman from a distance without the possibility of demonstration and with the limited contact to be secured in that way.

Such methods would probably prove uneconomical in a final analysis, bringing the manufacturer back to the retail establishment, not exclusively maintained for commercial vehicles, in order to reach the market in smaller towns and cities. The market provided by the 10,000 retailers who are in a position to use five trucks or more, and the additional market provided by the industrial concerns and commercial haulers also capable of using fleets of five or more, must be tackled in a different manner.

Most large retailers, such as department stores and most industrial concerns having large delivery problems, or haulage problems, are accustomed to buy direct from the manufacturer in all their business transactions involving any considerable expenditure.

This method of buying obtains a good deal at present in connection with the buying of commercial vehicles and it is likely to continue because the investment in commercial vehicles is an item of sufficient importance to demand attention and specialized consideration is developing in all cases of this kind.

The system of retail distribution required for the smaller cities and towns and for the ordinary demand for commercial vehicles will not fulfill the purpose in connection with this part of the market so that other methods of distribution must be considered.

There are a number of towns in the United States of between 10,000 and 100,000 inhabitants with two or three department stores, a number of building contractors, coal dealers, general contractors, moving, express and warehouse concerns, who are able to use a number of trucks. These concerns do not necessarily buy from the manufacturer unless their requirements in any particular purchase are unusually large.

Their buying will tend to concentrate more and more within the local area, provided the retail establishments serving the automotive business within that area are capable of supplying their needs and rendering the service which they cannot render in their own garage and service stations.

Commercial haulers having terminals in such cities—if they are successful—will have a sufficient requirement for trucks and the truck will be a sufficiently important part of their total investment, to demand direct consideration from the manufacturers in most cases.

In larger cities, the industrial buyers of trucks and commercial vehicles with considerable requirements, their own system of garage and repair, and extensive systems of delivery; the big retail companies, big contracting companies and similar organizations—will continue the method of buying direct, especially where they have adequate service facilities of their own, including repair shops.

This very brief consideration of the distribution does not take into account the rural market which must be served, of course, from the trading centers situated in the rural area, and through the retail establishments capable of selling and servicing the automotive vehicles within the trading area.

It is estimated that there are in the United States 15,000 concerns who are fleet owners; that is, who own five or more vehicles. The total ownership in this group does not represent more than 10 to 20 per cent of the total number of commercial vehicles in use in the United States at the present time. There are no reliable estimates as to the use of commercial vehicles in various lines of business. There are in use approximately 1,500,000 vehicles devoted to commercial purposes in addition to the passenger car vehicles required for business. The general retail field, comprising all kinds of retailers, uses about 500,000 of these or 30 per cent of the total market. This is an approximate figure secured from the best possible estimates of a fragmentary kind that have been made from various sources. It is probable that the requirement of commercial vehicles for concerns in all parts of the United States outside of the farm market for one to three vehicles per concern represents a much larger proportion of the market than the total market represented by the concerns whose delivery requirements necessitate the use of five or more.

For this reason, consideration has been given in the present article to the necessity for retail distribution from the present distributing facilities and service facilities in the smaller towns and cities.

The next article on this subject will go into detail in considering distribution development and systems required for the market represented in the larger cities and in the specific industries.

Aircraft Activities Decrease

WASHINGTON, Sept. 2—Lessened activity in the aircraft industry is illustrated in the report of the Bureau of Census showing a decrease in the total value of products amounting to 54 per cent in 1921 as compared with 1919. There were 31 establishments in operation in 1919 producing aircraft products to the value of $14,372,643 as against 19 establishments producing aircraft products valued at $6,616,988.

In 1921 as compared with 1919, there was a decrease of 148 or 34.3 per cent, in the number of airplanes manufactured, but there was an increase of $332,888, or 9.6 per cent in their total value. For seaplanes there were decreases during this period both in their number and value, 222, or 96.5 per cent, and $4,269,948, or 93 per cent, respectively.

The combined output of all establishments was approximately 27.6 per cent of the maximum capacity, based upon a demand requiring full running time. The percentage of output of individual establishments ranged from 5 to 75 per cent of their maximum capacity.

The detailed record of production shows that 284 airplanes valued at $3,799,340 were produced, in 1921, and 8 seaplanes valued at $310,068. The records show that 369 planes were under construction in 1921 having a value of $959,567. The total value of airplane engines produced amounted to $22,590 and of parts the value was $778,111.

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Good Crops Mean Car Sales

ESTIMATES of the Department of Agriculture, that the important farm crops will be worth $1,250,000,000 more this year than they were last, made pleasant reading for the automotive industry. It was conclusive proof, if further evidence was needed, that the farm market for motor vehicles will be gratifyingly good for the coming twelve months. Agriculture is much better off at this time than seemed possible even six months ago.

Rural demand for any manufactured product naturally is more or less "spotted." It depends to a certain extent on local conditions. Weather freaks are responsible in large measure for good or bad crops and nothing in the universe is more freakish than a meteorological map. As a consequence harvests may be good in one county, which was skipped by a devastating storm, and bad in the counties on either side which were hit by it.

For this reason, if no other, automotive manufacturers must analyze rural markets carefully and their studies should be accompanied by frequent reference to crop reports from each county in the state they are considering. There is a certain amount of sameness about these reports, to be sure, and they scarcely would be selected for light summer reading, but they tell a mighty interesting business story.

Here are the estimated values of the three principal crops:

Corn, $1,801,000,000, an increase of $496,000,000 over last year; cotton (exclusive of seed), $1,064,000,000, an increase of $389,000,000; wheat, $720,600,000.

It needs no argument to prove that the districts which raised these crops, leaving their other products out of consideration entirely, will offer splendid markets.

Secondary Inflation

THERE are a good many persons who assert that price cuts demoralize the motor car market and that they prove the industry is engaged in a price war. These conclusions are based on false premises. The extraordinary sales of the past six months demonstrate that the market has not been demoralized and the profits shown by the manufacturing companies prove that they are not taking part in a ruinous price war.

The reason that the automotive industry is in a stronger position to-day than any other is that it has deflated itself and made a thorough job of that painful process. It has passed its economies on to the ultimate consumer who is showing his appreciation by buying liberally.

This policy, in the face of an insatiable demand for cars, is in marked contrast to that of other industries whose price lists have been barometers reflecting the almost daily rise and fall in demand. Automobile prices, in the main, have gone steadily in one direction and that has been down. They have not been lower one day and higher the next. Prices have been lowered in spite of slowly rising manufacturing costs. Profits have been made by increasing production instead of prices and that is the rock on which sound business is built.

Bankers in all sections of the country are beginning to express concern over the inflationary tendencies of industry as a whole. It was economically inevitable that there should be a secondary period of inflation and it is equally inevitable that it will bring grief in its wake just as did the period of inflation which followed the war. Fortunately for our own industry it is not involved at this time.

Discussing this inflationary tendency in its relation to the rail and coal strikes, the Cleveland Federal Reserve Bank sounds this badly needed warning:

"Some lines of business were only needing an encouraging excuse to return to former inflationary tendencies; evidences are beginning to be seen that

the coal and rail strikes are furnishing those encouragements. Two months ago we pointed out certain disturbing under-currents whose unchecked tendencies would hinder our return to business readjustment. The first of these was a growing tendency of increased cost of production paralleling increased production. The second element was that the larger facilities occasioned by war-time expansion was a constant encouragement to over-production.

"The third element mentioned at that time was the persistent report of labor shortage, together with the returning evils of bonuses and the offering of premiums. The first and third of these tendencies have not been checked; in fact, they are rapidly growing. The evidences now are that the manufacturers we had in mind at the time have seen the danger of overproduction and are protecting themselves.

"We should not be carried away or deceived by the rush of increased business activity that will follow the temporary settlement of the coal and rail strikes. Such activity will be uneconomic; it will be as the inrush of air filling a vacuum caused artificially by an air pump. Business has been artificially interrupted, and the effort to readjust itself to where it would normally have been at this season of the year might well deceive the unthinking."

What Makes 'Em Shimmy?

AMONG the puzzling problems which arise in service work to-day is that involved in remedying the phenomenon to which certain cars are subject and which is popularly known as "shimmying." When this trouble occurs the whole front end of the car takes on a violent transverse oscillation, which, it would seem, is sufficiently severe in some cases to well-nigh shake the car to pieces and perhaps put it out of control in respect to steering.

The trouble occurs, or at least starts, when the car passes over a rough or especially a corrugated strip of road, but is entirely distinct from the up-and-down motion which such a road may cause. The driver instinctively grabs the wheel tightly, endeavoring to hold the car to its course, whereupon the shake increases in violence unless the brakes are applied and the car brought almost to rest. If, however, the driver allows the wheel to go free the shake ceases almost at once, at least in some instances.

This fault is not confined to any one make of car, nor is it common so far as we have heard to any large number of cars of some particular model. If it is due to some structural weakness, it apparently is not the same one in all cases. It may be due to slight differences in fit or assembly or to faulty design. In one case which came to our notice the trouble was rendered less severe, but not entirely stopped by slightly altering the angle or fore and aft tilt of the axis of the knuckle pivots. The upper end of these was further aft than the lower end both before and after the change, but more nearly vertical in the better position.

Various hypotheses have been advanced to explain the trouble. It is said to be due to wear in certain instances, but it is probably due to structural faults in other cases. What are these faults and how can they be avoided, or remedied, when and if they are inherent in a given design?

It would be interesting to know the basic cause of the phenomenon or why it is set up, once the conditions which accompany its occurrence are established. The subject was discussed at some length in an article by A. Ludlow Clayden, which appeared in these columns on Aug. 26, 1920. This article was later supplemented by a letter in the issue of Oct. 6, 1921. We shall be pleased to receive, preferably for use in the Forum, further authoritative discussions of this subject, especially particulars concerning any practical experiences which have led to a solution of the trouble in particular cases.

"Orphans"

DON'T dump old discontinued car and truck models into foreign markets.

Provide adequate service for all vehicles shipped abroad.

Don't ship vehicles to foreign countries without sending a reasonable number of parts with them.

Take care of "orphans" in the foreign field.

THESE are a few of the axioms for automotive manufacturers that can be drawn from some recent experiences of the Automotive Division of the Bureau of Foreign and Domestic Commerce. The division is making strenuous efforts to make every foreign owner of an American car or truck feel that he can secure spare parts through the assistance of government representatives if the regular channels fail him. The Automotive Division has already done considerable service of this character. It places the requests in the hands of appropriate manufacturers or in the hands of parts makers when the particular manufacturer has gone out of business.

This work is done to strengthen the prestige of American automotive products in foreign countries. It is certain to have a definitely favorable effect. That effect can be heightened by the co-operation of manufacturers. An excellent example of how co-operation can be extended is given by a recent instance. A certain truck company temporarily suspended operations some time ago due to financial troubles with the result that the owner of one of these trucks in England was unable to secure spare parts from any distributor in that country. The assistance of the local consul was employed with the result that the parts were immediately secured through the present reorganized company. In writing to the Automotive Division, the truck company added, "We wish to thank you for bringing this case to our attention and to assure you that we are putting forth every effort to supply all ——— owners with the best service possible."

This is the spirit of constructive co-operation which must permeate sales and service activities in foreign fields if American automotive exports are to continue to grow and to make a profit for our manufacturers.

August Production Totaled 272,000

Exceeded July Mark; Came Close to June

Ranks Second in History of Industry—1,003,000 Four Months' Aggregate

NEW YORK, Sept. 12—August production of motor vehicles totaled 272,000, according to reports to the National Automobile Chamber of Commerce. This total gives August, 1922, the honor of being the second greatest production month in the history of the industry and 12 per cent over July, 1922, which had ranked second to June, 1922, the record holder.

This report makes the fourth consecutive month that the production record has been smashed and places May, June, July and August, 1922, in positions of honor at the top of the record list. June heads the list with 289,000; August is second with 272,000; May is third with 256,000 and July, fourth with 246,000. The total production for the four months is 1,063,000, more cars and trucks than the industry every manufactured in any one year up to 1916, when the million mark first was reached.

Compared with August, 1921, the latter month looks like a pygmy, for this year's August is 53 per cent greater than the one 12 months ago.

These figures are more complete than usual, for nearly 99 per cent of the shipping statements were in when this estimate of production was compiled by the N. A. C. C.

George P. Smith Chosen Head of Mercer Motors

NEW YORK, Sept. 7—At a meeting of the board of directors of the Mercer Motors Co., Trenton, N. J., George P. Smith of Smith & Gallatin, brokers of New York City, was elected president to fill a vacancy which has existed since the company severed relations with Hares Motors.

R. W. Barnum was chosen vice-president in charge of production and finance to succeed H. E. Barthel, resigned. Barnum was formerly vice-president and general manager of the Barnum-Richardson Co., iron manufacturer of Lime Rock and East Canaan, Conn., and for the last three years has served as general manager of the body department of Mercer Motors in New Haven.

W. A. Smith was elected vice-president in charge of sales and service. He has been connected with the company in various capacities for the last 12 years, and for the last year and a half has served as general sales manager.

Business in Brief

Taking the July reports as a basis for their optimism, financiers predict that the railroads will be able to meet the fall crisis in transportation. It is felt that the carriers met the test of the strike, the proof of it being that July showed unexpected earnings, despite the handicap of reduced shop forces. The usual congestion of traffic in the middle of October is expected.

Analysis of the weather, crop and trade reports shows general sentiment is better. Jobbing and retail trade have survived the hot weather in certain sections, although prices are uncertain. Buying is conservative, with business improving in the coal regions.

Corn has been affected by the heat and drought and cotton, by the boll weevil. Cotton is lower but future sales are not strong. Grain prices show a slight improvement.

Some of the New England cotton mills have speeded up production but are hampered by price uncertainties in both raw and manufactured material. Buying of textiles lags.

Soft coal prices have eased in some places and quotations are $1.50 per ton lower at some of the leading ports and $2 to $3 below two weeks ago. Anthracite quotations are nominal. Coke is $3 to $4 below a month ago, but triple the figures of a year ago.

Pig iron factories are showing a tendency to get back to normal, while the steel plants are improving their output. Uncertain deliveries have affected buying generally, except perhaps in structural material.

Car loadings for the week totaled 890,838 cars, an increase of 24,619 over the previous week. This was the largest number of cars loaded during any week since Oct. 1, 1921.

Bank clearings were favorable, the week ending Sept. 7 showing an aggregate of $5,762,866,000 against $5,637,969,000 last week and $4,782,065,000 in this week last year.

No Seasonal Slump As Midsummer Ends

Surplus Stocks Absent—Sales in Rural Districts Have Exceeded Expectations

By JAMES DALTON

NEW YORK, Sept. 12. — Midsummer is gone and it brought no seasonal slump in the sale of automobiles. The coming of September has been attended by no curtailment of output. August production was really sensational and closely approached the level of June, which established a new high mark for the industry with 289,000. Specifications given parts makers for this month by passenger car manufacturers in all price classes are larger than they were for August.

With a record of more than 1,000,000 motor vehicles made in four months it is scarcely to be wondered at that the public is considerably mystified as to what has become of them. The simple fact is that they have been sold. No surplus stocks have been accumulated either in warehouses or on dealers' floors. Some slight allowance was made last month by manufacturers for the delays incident to the rail strike and freight congestion so that dealers would be able to have a few cars on hand but practically all of them had been sold by the time they were received.

Material Orders to Jan. 1

It is possible, also, that the imminence of a severe freight car shortage has been accountable for some material orders placed for delivery this month, but by far the larger part of them are for use to meet current demand. Most manufacturers have made commitments running through October and November and a good many up to Jan. 1. There is not the slightest reason to think, however, that the industry is running wild and turning out products for which a market is not in sight.

Sales in rural districts have been larger than was expected and have practically counterbalanced any falling off in urban centers. Prospects are that the farm market will grow steadily stronger for the next three months. Farmers generally are finding them-

(*Continued on page* 545)

Detroit Makers Add to Plant Facilities

Many New Buildings Under Way to Provide for Greater Production Capacity

DETROIT, Sept. 11—Many millions in new buildings will be made ready for the industry in the remaining months of this year and the early spring of 1923. With the announcement by Dodge Brothers of a new eight-story body and assembly building, practically every large maker in the middle class or low class field is now definitely committed to the expansion of plant facilities. Though the expansions are largely to permit of increased closed body production, they likewise mean that general production capacity will be larger.

Hupp Increases 50 Per Cent

Besides Dodge Brothers, the Hupp Motor Car Co. has recently announced the addition of a new manufacturing building which will give it about 50 per cent added production space. The Ford Motor Co. is contemplating the erection of assembly plants at Jacksonville, Fla., and Minneapolis in the United States, and at Tampico, Mexico. The Canadian plant capacity is to be doubled by 1923 through additional factory buildings, and the Manchester and Cork plants in the British Isles are being extended.

Work has been started on a one-story addition at the Lincoln Motor Co. plant, which will be 1600 feet long and will be used for general production. No formal statement has been made by Ford officials as to the extent Lincoln production will be increased, but the size of the building under way would indicate that Ford is beginning to put into effect plans which will place the Lincoln on a larger production basis.

Columbia Motors, with the acquisition of the former Saxon plant, is in a position to triple its former production. Wills Sainte Claire is adding factory space for the special painting and finishing of its cars. The Buick Motor Co., with the addition of the former Scripps-Booth plant, has doubled its former production capacity. A new body plant is being built at Flint by the Chevrolet Motor Co., which it will lease to the Fisher Body Co., for the exclusive production of Chevrolet body work.

Durant Program Biggest

The Durant building program in the district is the largest of all. In Flint, the buildings to be constructed for the Flint Motor Car Co. alone will cost approximately $1,500,000 and will cover, when complete, 37 acres of ground. In Lansing, the buildings for the Star and Durant four are nearing the point where production will begin, giving capacity for about 300 daily of the former and 150 daily of the latter.

The Gray Motor Co. has started the erection of an additional assembly building in Detroit which will give it capacity in this district of about 200 daily. Similar assembly plants in Oakland, Cal., and Albany, N. Y., planned for operation before the season of 1923, will give a production capacity of about 100 daily in each plant. Philadelphia also has been mentioned as the site for an assembly plant which may be started this year.

There has been no expansion of truck manufacturing facilities in this section, because most of the plants were built to meet war time conditions. Truck business is showing steady gains, however, and makers are optimistic over the possibilities of putting most of their plant space into operation by the spring of 1923.

Aside from the building movement in the car plants, there have been large additions in the body field, many of which are now in construction, notably the Wilson and Fisher plants. In the parts field expansion has been held to a minimum, the most noteworthy exception being the increase in plant space at the Muskegon factory of Continental Motors.

Muzzy Lyon Co., manufacturer of bearings and babbitt alloys, has moved into a larger factory in Detroit, the fourth time since its founding in 1899. The new factory covers 36,000 sq. ft., and, with new equipment, will give the company double capacity. Even with additional space, the company is compelled to run night shifts in some departments to keep up with business.

Inventories of Material and Supplies Should Be Built Up Now to Last to Feb. 1.

By J. H. MAIN,
Director, Purchase Section, General Motors Corp.

Detroit, Sept. 12.

THE winter months of this year will probably present many difficulties in obtaining deliveries of material and it is important that a sufficient inventory of material and supplies be built up at once to carry through the factory until at least Feb. 1.

At present, though there is much difficulty in getting deliveries, it is possible to maintain an even balance of stock by ordering early and keeping after the railroads until the material is placed upon the factory siding. Companies which are doing this are not encountering shortages.

With the coming of cold weather and snow the railroad situation will become very acute and, with the burdens already imposed by the strike, it will be extremely difficult for the railroads to make satisfactory deliveries. To meet this condition it is necessary to make provision now if uninterrupted operation of the automobile factories is to be expected.

Manufacturers should determine upon a schedule of winter operation based upon actual sales requirements and build up an inventory between now and Nov. 1 which will carry them through on this schedule until February. It would be unwise to stock up beyond the actual sales requirements but it is almost certain that unless they build up a required stock they will not be able to operate continuously.

Prices may be expected to advance slowly but steadily so that no anticipation need be felt over possible declines. General Motors at the present time is buying on a four months' basis, and in some special cases on a five and six months' basis. This time is necessary to give the parts maker an opportunity to acquire his material and manufacture his product. Normally a six months' buying basis is the most satisfactory arrangement, with definite commitments made by the car maker every month. There is no reason why the industry should ever order on a longer time basis than six months.

There is no shortage of coal for ordinary power purposes now and prices have started to fall. There is a shortage of the better grades of coal for the production of coke, and with coke short it becomes difficult to obtain pig iron and steel. In spite of these shortages, manufacturers who have ordered early are being taken care of and there is no serious problem to consider.

Ford Plants Abroad Gained During July

DETROIT, Sept. 9—Four of the six foreign plants of the Ford Motor Co. showed increases in output in July in comparison with June. The most notable gain was in the ease of the Cadiz plant which built 753 cars and trucks in July as compared with 486 in June. This is the highest output mark of this plant this year and three times higher than any month in 1921.

Production at Bordeaux jumped from 1141 cars and trucks in June to 1266 in July. Sao Paulo, Brazil, showed a small increase and set a new high mark for the year. Manchester built 2409 cars and trucks in July, leading all foreign plants. Buenos Aires built 572 cars and trucks as compared to 496 in the previous month.

A new daily output mark for tractors was made on Aug. 11 when 520 were built at River Rouge. In July, 9657 tractors were built for a new monthly high mark.

FLINT UNIT UNDER WAY

DETROIT, Sept. 8—The first unit of the new Flint Motor Car Co., organized by W. C. Durant, is now under way and should be completed, according to contract, by July 1, 1923. This unit will be 900 feet by 80.

Rates on Shipments of Bodies Reduced

Efforts of Associations Bring Change Ranging from 20 to 67 Per Cent

NEW YORK, Sept. 11—A substantial reduction in freight rates on automobile bodies, ranging from 20 to 67 per cent, is announced by the Consolidated Freight Classification, representing all of the railroads of the country. The new rates are effective about Nov. 15.

These reductions are the result of 18 months effort on the part of the Motor and Accessory Manufacturers Association, the National Automobile Chamber of Commerce and the Automobile Body Builders' Association to convince the railroads that automobile bodies should take the same ratings as horse drawn vehicles. Representing the traffic department of the Motor and Accessories Manufacturers Association, Herman Deuster appeared before the classification committee four times before the contention of the automotive industry was approved and his perseverance rewarded.

Considerable Saving to Dealers

Automobile dealers who sell chassis and fit special bodies will be financially affected for the new rates will mean a considerable saving. For instance, a San Francisco dealer selling a Ford chassis and ordering a sport body from a body factory at Owensboro, Ky., would have to pay $96.20 freight under the present classification. Under the new rate the charge would be $32.10. In the case of special bodies there would be no saving unless the dealer filled the car; then he would save 20 per cent.

There are three divisions of railroad territory represented in the rate classification. "Official" represents all of the carriers east of the Mississippi and north of the Ohio river and the Mason and Dixon line. "Southern" is everything east of the Mississippi and south of "Official," while "Western" is everything west of the Mississippi.

Various Classifications

The following table shows the percentage of reductions in the various classifications:

	Official	Southern	Western
In boxes, or crates, see Note: Packages exceeding 54 in. in height, actual weight, but not less than 1,000 lbs. each, L. C. L.	*....	*....	20%
Packages exceeding 44 in. but not exceeding 54 in. in height, actual weight, but not less than 1,000 lbs. each L. C. L.	25%	33⅓%	33⅓%
Packages exceeding 36 in. but not exceeding 44 in. in height, L. C. L.	50%	50%	50%
Packages exceeding 34 in. but not exceeding 36 in. in height, L. C. L.	33⅓%	50%	50%
Packages not exceeding 34 in. in height, L. C. L....	50%	66.7%	66.7%
Loose or in packages, C. L., min. wt. 10,000 lbs. subject to Rule 34.....	†20%	†20%	†20%

NOTE—The height measurement of the package, or of the body if shipped loose, is to be taken with the body in its natural upright position.

*No change.
†Estimate.

THREE NATIONS OFFER GLIDER TEST PRIZES

NEW YORK, Sept. 12—Three countries have now offered prizes for glider competition flights. These countries are England, France and Germany.

The British prize of 1,000 pounds this year and 5,000 pounds next year is offered by the *Daily Mail*. Oct. 16-21 is the date set for this year's contest. The prize is for the longest duration of gliding flight of not less than 30 min. duration, to be made at a specific place not yet divulged.

In France, André Michelin has offered a 15,000 franc prize. Among conditions laid down are: Flight must be of 12½ miles distance and the angle of descent of the glider must be less than one in 12.

The German *Tageblatt* has offered a prize of 100,000 marks for the longest distance flown cross-country in a glider by a German pilot in a German built machine. The offer remains open until Sept. 1, 1923.

Cleveland Production May Be 10,000 in 1922

CLEVELAND, Sept. 11—For the first seven months of the year the Cleveland Automobile Co. shipped about 6600 cars and for the past two months shipments have been at the rate of 275 a week. It is expected that the total production for the year will total 10,000 cars.

After inventory adjustments and other charges were deducted, net profits for the first seven months are reported to be in excess of $1,000,000. With business continuing as anticipated for the balance of the year it is expected the company will earn $2,000,000 for 1922, equivalent after preferred dividends to nearly $7 a share on the 280,000 shares of no par common stock outstanding.

ROLLS-ROYCE BODY PLANT

SPRINGFIELD, MASS., Sept 12—Rolls-Royce of America, Inc., now has its new plant for the manufacture of bodies in full operation, it was announced to-day. As a result, the company finds its production of cars facilitated, and it is said that the output for September will be in excess of August figures. S. deB. Keim, general sales manager, has left for an extended tour of the West.

Dunlop Tire May Sell $10,000,000 in Bonds

Issue Would Be Guaranteed by British Company—May Operate Buffalo Plant

NEW YORK, Sept. 12—The Dunlop Rubber Co., of London, announces that, following its policy of financing its foreign plants first with British capital and later opening the way for investors of the country where the branch plants are located, it may offer a bond issue of $10,000,000 or more in the United States before the end of the year.

The bond issue in question likely would be a first mortgage on the Buffalo plant, but, in addition, would be guaranteed by the British company. In order to make proper provision for this guarantee the English company has canvassed the holders of its £3,000,000 of debenture stock, which now is on deposit with British bankers as collateral for loans which, it is understood, were made principally to finance the construction of the American plant at Buffalo.

The plan is to have this debenture stock remain on deposit as collateral for the American bond issue. A bonus of 1½ per cent in cash would be paid holders of these debentures in the event the stock was used for any other purpose for which it now is deposited.

From this it is assumed that the Dunlop company is considering operating the big plant at Buffalo which was built at Buffalo two years ago at a cost of $20,000,000 and which has never been in production because of the poor condition of the tire business at the time of the shut down.

Barling Bomber Plane Soon to Have Try Out

WASHINGTON, Sept. 11—The W. E. Barling bomber plane, now in course of construction, soon will be tried out at Fairfield, Ohio. It is the largest airplane built in the United States. The work is being done by the Whittemann Aircraft Co., Hasbrouck Heights, N. J.

The bomber is a triplane with a wing spread of 127 ft. and carrying six Liberty motors, totaling 2400 hp. It will have an estimated speed of 100 m.p.h. and a carrying load of 20,000 lbs. The six motors are set in three pairs, with one puller and one pusher in each group. The total weight of the machine, including the carrying load, will be 30,000 lbs. A cruising radius of 1300 mi. is called for in the specifications.

GOOD HUDSON-ESSEX AUGUST

DETROIT, Sept. 11—August was a good month for Hudson and Essex, the company having shipped 7100 cars. It is estimated that the final results for 1922 will show about $7 a share earned on the capital stock against $2 a share now being paid.

11 Chassis Comprise British Maker's Line

Wolseley Announces Engines of 6 Different Sizes—36 Variations of Body Work

LONDON, Aug. 28 (*By Mail*)—The 1923 program of Wolseley Motors, Birmingham, one of the half dozen largest motor manufacturers in England, just issued, is claimed to be unparalleled in its range. It includes eleven distinct chassis with engines of six different sizes (7, 10, 14, 15, 20 and 24 hp.), 36 variations of body work and optional equipments accounting for 41 different list prices.

And beyond all this the various types of bodies, with a few exceptions, are to be made available in any one of a range of color finish.

Prices throughout show big drops. The 15 hp. as a four passenger is to be £660 on Sept. 1 as against £795 to-day; as a sedan, £895 as compared with £1025. Either of these can be had on a 52 in. or a 56½ in. track, the latter at a higher price. The 20 hp. six, five-passenger drops from £1,200 to £995 and the sedan from £1,500 to £1,300.

An entirely new model is the 14 hp., though it differs mainly from the 15 hp. in having an L head engine instead of an overhead camshaft; the bore and stroke are the same. The price of the four passenger is £525, at which figure it has good prospects of becoming the most popular Wolseley model and, further, will cut seriously into the market of the four-passenger light car makers.

All-Steel Business Sedan Being Produced by Dodge

DETROIT, Sept. 11—A new all-steel business sedan is announced by Dodge Brothers. It will sell for $1,195, or $250 under the price of the previous sedan model which it replaces. The feature of the new body model is the use of steel for the entire body construction with the exception of the roof, which is of fabric construction not subject to rumble.

The finish is baked enamel instead of that obtained by the 18 hand rubbing and painting operations formerly used, and this making it possible to mature the jobs in five days instead of ten. The upholstery is leather.

The rear seat cushion, rear side and back cushions are separate units, covering the entire rear section of the car into a spacious carrying compartment.

The front seat tilts forward, affording clearance through the rear doors. This gives a door opening large enough to admit a trunk or parcel 22 in. wide by 48 in. high. The plate glass window in the rear is unusually large, being 16 by 28 in. The rear quarter windows are 20 by 23 in., while the rear doors have a window opening of approximately 19 by 21 in. The front doors have an opening of 19 by 20 in.

The car is fitted with artillery wheels, cord tires, window regulators, windshield cleaner, dome light, heater, Yale door locks and the usual closed car equipment. The Yale lock operates with a thumb turn on the inside and a key on the outside.

Plant Addition for New Bodies

DETROIT, Sept. 9—The new addition to the Dodge Brothers plant is designed primarily to facilitate the construction and finishing of the company's new all-steel bodies, which it is adapting to its closed cars. The building will be eight stories high, will provide 440,000 feet of floor space and will cost $1,500,000.

Needed space for the assembly, enameling and storage of the all-steel bodies will be provided. Many large presses and large electrically heated enameling ovens will be installed. With the addition of the new building the production capacity of the plant will be increased to about 1,000 cars daily.

TRACTOR SALE GAIN REPORTED IN SOUTH

ATLANTA, Sept. 13—According to a compilation of sales reports from seven of the largest wholesale distributors of power farming equipment in the Southeast by the Federal Reserve Bank of Atlanta, sales during July of this year were 158.6 per cent better than July, 1921, though 7.4 per cent lower than June, 1922.

While definite sales figures for August are not yet available, sales are expected to exceed those of July, and be about 160 per cent better than Aug., 1921. This report includes all farm implements, but the increases are due to greater tractor sales principally.

Davis Adds Refinements to Phaeton and Sedan

RICHMOND, IND., Sept. 11—Added refinements and extra equipment, which will be standard for the Davis model 71 phaeton and model 74 sedan in the future, have been announced by the George W. Davis Motor Car Co. of this city. There will be no increase in the price of these models.

The phaeton is finished in either midnight blue or royal blue, at the option of the buyer and equipped with either aluminum military steps and skirt fenders, or with regular runningboards. Snubbers, both front and rear, polished aluminum luggage rods on the rear body panel, front bumper and brown Spanish leather upholstery are now standard on this model.

The sedan is equipped with snubbers, front and rear, and front bumper.

General Will Double Production Capacity

Now Making 2200 Tires Daily—Plans Rearrangement of Equipment at Plant

AKRON, Sept. 11—The General Tire & Rubber Co., which is doing more business to-day than ever before in its five years of existence, will double its present production capacity so as to keep output apace with orders, according to William O'Neil, vice-president and general manager. General now is making 2200 tires a day. The company plans to spend nearly $200,000 on new buildings and new equipment

By employment of unique business methods the General company was one of the few companies in the tire industry which did not suffer severely from the automotive slump and which did not temporarily abate dividends. Stressing dealer business in preference to original equipment business, and not permitting its dealers to over stock with tires, the company did not have any big surplus of tires on hand and was able to liquidate its finished goods inventory without materially cutting production.

To-day the company has over $600,000 in cash and securities, a surplus of $800,000, no indebtedness and in addition has met all its dividends.

General sales for the first three quarters of the company's current fiscal year will run between $5,500,000 and $6,000,000.

Doubling the present plant capacity will be accomplished largely through rearrangement of present equipment and installation of some new equipment.

National Axle Begins Making 8-Wheeled Bus

SAN FRANCISCO, Sept. 11—The National Axle Corp. of San Jose, Cal., is beginning the manufacture of eight-wheeled motor buses, railcars and trucks under contract with the Eight Wheel Motor Vehicle Co. of this city.

The bus is intended for interurban service and is designed for 24 passengers. The street car will have 31 passenger capacity and the trucks 4-tons and 7-tons, respectively. The experimental bus, built a year ago, is said to have demonstrated the advantage of eight-wheel construction, having run 13,000 miles over mountain roads. The four front wheels all steer while all four rear wheels are driven.

NEW DOSS TIRE

ATLANTA, Sept. 12—The Doss Rubber & Tube Co. announces the addition of a new standard size cord tire to its line, the factory now being in production on this tire. The Atlanta plant has been operating through August both day and night shifts.

Big Balance Shown by Lincoln Receiver

Reports That $5,176,119 Is Remaining Awaiting Outcome of Federal Inquiry

DETROIT, Sept. 12—The report of the Detroit Trust Co., receiver for the Lincoln Motor Co., for the period dating from its appointment Nov. 8, 1921, to Aug. 1 this year, shows a balance of $5,176,119 remaining in its hands awaiting the outcome of the investigation of the United States Department of Justice into the affairs of the original Lincoln Motor Co.

The report, filed in Federal Court, this city, states that the investigators of the department of justice have been housed in one of the Detroit office buildings so that there might be no interference with the operation of the Lincoln company by the Ford interests through their presence at the Lincoln offices.

Entire Period Covered

Two divisions are made in the report, one showing the activities of the receiver from the time the plant was taken over on Nov. 8 to the time of the sale, Feb. 4; the other showing activities since the sale to Aug. 1. While the plant was in the hands of the receiver there is shown a net loss of $76,584, owing, it is stated, "to the necessarily limited production in order that business good will might be preserved and sold as a going concern."

Receipts of the receiver during the period of operation of the plant are shown as $501,686, of which $35,273 was taken over from the Lincoln Motor Co., $61,280 collected on its accounts, and $405,132 made as a result of receiver's operation. Payments on liabilities as of Nov. 8 were $4,612 due to workmen, and a total of $379,430 was paid out in the operation of the plant, leaving a cash balance of $117,643 as a result of the receiver's operation.

Receipts since the sale of the plant, due to administration of ancillary receiverships and other activities, netted $133,824, and disbursements were $93,996, leaving a balance of $157,471 from all sources independent of the amount received from the sale of the plant to the Ford interests.

Cash received and disbursements, and balance on hand Aug. 1 from the sale of the plant and assets to H. H. Emmons, representing Ford, is as follows: Received, $8,097,401; disbursements, $2,921,282, leaving a balance from this source of $5,176,119, which is deposited at interest of 3 per cent pending the outcome of the government investigation. The principal disbursements made under order of the court from funds received from the sale of the plant were $1,951,747 to meet mortgage obligations, and $610,274 to the department of internal revenue.

Automobiles Recovered

The report, as part of its detail, shows the activity of the receiver in recovering automobiles which had been shipped to distributors in several sections of the country, who were financially unable to make payment for the cars. These led to ancillary receiverships in these sections, in which the cars were taken over and sold and the receipts handed to the receiver here.

Holmes Financing Action Deferred Until Sept. 16

CANTON, OHIO, Sept. 9—Stockholders of the Holmes Automobile Co., after a brief session this week, postponed action on the refinancing plans until Sept. 19, when another meeting will be held. The plan will be completed at that time, it is expected.

The stockholders will be asked to take action on the proposed sale of first mortgage refunding bonds to the amount of $500,000 and on the proposed issue of 200,000 shares of capital stock, without par, to be exchanged for present outstanding stock.

Toledo Parts Plants Working Night Shifts

Nine Companies There Have Begun to Make Deliveries on New "Star" Contracts

TOLEDO, Sept. 11—With local automobile manufacturers working up to capacity, many of the subsidiary parts plants have had to put on night shifts to take care of outside business.

Nine Toledo industries making parts have begun to deliver on contracts for the new Star car being assembled by Durant Motors, Inc. Most of the plants here have contracts calling for delivery of 200,000 units by the first of the year.

The Toledo firms now at work on Durant contracts are: Electric Auto-Lite Co., starting and lighting systems; Tillotson Carburetor Co., carburetors; Nagel Electric Co., ammeters and oil gages; Landers Brothers' Co., webbing and upholstery materials; Edward Ford Plate Glass Co., windshields and glass for closed models; Mountain Varnish Co., finishes and varnishes; Acklin Stamping Co., sheet metal stampings; Doehler Die Castings Co., die castings, and Burt Foundry Co., castings.

Universal Machine Co., Bowling Green, and Adams Axle Co., Findlay, near here, also have large orders for parts.

Coal shortage has not yet affected the schedules of any of the Toledo motor plants. Most of them are dependent upon the Toledo Edison Co., which has been able to keep a small supply ahead, having contracts with West Virginia mines for a year's supply.

Bonus System Stimulates Greater Packard Output

DETROIT, Sept. 11—Packard announces that it still is far behind its orders, but with the factory working at top speed there has been an increase in production to the point where the August schedule for open cars now is being met in the total number of cars produced, although it is somewhat behind schedule in the number of closed cars. Full production of the various types of closed jobs should be reached by the latter part of September.

The new bonus system which gives added pay to all the members of each department in direct ratio to added production is given credit by the company for a big part in the increase in production that has been obtained. This increase has eased the situation in deliveries somewhat.

CADILLAC CLOSED CAR WEEK

DETROIT, Sept. 12—A national closed car week will be held by Cadillac distributors and dealers the week of Sept. 17 to 23. The idea for the closed car week was advanced by H. H. Rice, president of the Cadillac Motor Car Co. at the distributors' meeting held at the factory in the past week.

34,845 *DURANTS PRODUCED IN 12 MONTHS, HALF OF THEM AT LONG ISLAND CITY PLANT*

NEW YORK, Sept. 12—Production figures for the first 12 months of its existence show that Durant Motors turned out 34,845 Durant fours and sixes from August, 1921, to the end of August, 1922. This represents the work of five plants, with Long Island City accounting for half the product. The California plant began producing last month and since then 350 cars have been manufactured there.

June was the banner month, July showing a slump through the inability to get delivery on certain necessary parts.

The production table follows:

1921	Total	New York	Michigan	Canada	Indiana	California
August	14	14	..	..	..	..
September	64	64	..	..	..	..
October	288	288	..	..	..	..
November	661	661	..	..	..	..
December	1,477	1,296	176	..	5	..
1922						
January	2,510	1,624	877	..	9	..
February	1,618	1,093	424	..	101	..
March	3,099	1,663	767	150	519	..
April	3,737	1,836	851	436	614	..
May	5,104	1,967	1,878	525	734	..
June	5,886	2,587	2,191	341	767	..
July	4,789	2,224	1,931	173	461	..
August	5,598	2,657	2,148	153	290	350
Total	34,845	17,974	11,243	1,778	3,500	350

Associated Motors Assets, $9,564,555

Balance Sheet Places Current Liabilities July 15, 1922 as $1,210,060

CHICAGO, Sept. 11—A condensed balance sheet of the Associated Motor Industries as of July 15, 1922, shows this holding company to have current assets of $9,564,555 as compared with current liabilities of $1,210,060. Cash is given at $1,365,939.

The Associated Motor Industries was formed to effect the consolidation of approximately 20 companies active in the automotive or associated industries. These companies have been divided into three groups. The first group is made up of eight companies: National Motor Car & Vehicle Corp., Indianapolis; Traffic Motor Truck Corp., St. Louis; Recording and Computing Machines Co., Dayton, Ohio; Covert Gear Co., Lockport, N. Y.; Kentucky Wagon Manufacturing Co., Louisville, Ky.; Jackson Motors Corp., Jackson, Mich.; Saginaw Sheet Metal Works, Saginaw, Mich.; M. & T. Corp., Atlantic, Mass.

The identity of the companies included in the other two groups will be announced later. When all conveyances are completed, the Associated Motor Industries states that the combined assets will aggregate approximately $80,000,000.

The aggregate depreciated value of the fixed assets derived from appraisal is given at $10,135,378.

BALANCE SHEET OF EIGHT MERGED COMPANIES SHOWS STANDING AS OF JULY 15, 1922

CHICAGO, Sept. 11—Associated Motor Industries has issued its condensed balance sheet as of July 15, 1922, showing the following current assets and current liabilities:

ASSETS		
CURRENT ASSETS:		
Cash	$1,365,939.50	
Accounts Receivable	922,719.89	
Notes, Acceptances and Drafts	83,737.66	
Investments	418,251.00	
Inventories	6,773,907.17	
TOTAL CURRENT ASSETS		$9,564,555.22
FIXED ASSETS:		
Land, Buildings, Machinery and Equipment	$13,515,848.35	
Less: Depreciation	3,380,469.82	
TOTAL FIXED ASSETS		10,135,378.53
PREPAID AND DEFERRED ASSETS:		
Insurance, Interest, Taxes, Etc	$28,546.66	
Supplies	75,540.06	
Underwriting and Organization Expense (to be amortized)	450,000.00	
TOTAL PREPAID AND DEFERRED ASSETS		554,086.72
GOOD WILL AND PATENTS		1.00
TOTAL ASSETS		$20,254,021.47
LIABILITIES		
CURRENT LIABILITIES:		
Open Accounts Payable	$897,060.86	
Notes Due 1/15/23	313,000.00	
TOTAL CURRENT LIABILITIES		$1,210,060.86
10-YEAR 7½ PER CENT FIRST MORTGAGE BONDS		3,000,000.00
DEFERRED LIABILITIES:		
10-Year Collateral Trust Gold Notes	$2,700,000.00	
Notes Due 7/1/23	762,036.08	
Dealers' Deposits	80,102.50	
TOTAL DEFERRED LIABILITIES		3,542,138.58
RESERVE FOR CONTINGENCIES		75,000.00
CAPITAL:		
Preferred 8 Per Cent Stock, 96,266 Shares, at $100	$9,626,600.00	
Surplus Available for 181,732 Common No-par Value Shares	2,800,222.03	
TOTAL		12,426,822.03
TOTAL LIABILITIES		$20,254,021.47

Rickenbacker Organizes Company to Finance Sales

DETROIT, Sept. 11—Rickenbacker Co., Inc., has been formed as a financing company for the Rickenbacker Motor Car Co. and will handle all financial business of the manufacturing company. This, according to B. F. Everitt, president of the manufacturing company, applies to the handling of sales and such other business as may arise from time to time.

The capital stock of the financing company is $100,000 at $10 a share; $10,000 paid in cash. Stockholders are E. V. Rickenbacker, 260 shares; B. F. Everitt, 260 shares; R. M. Chambers, 160 shares; R. H. Hood, 160 shares and H. L. Cunningham, 160 shares.

FORD SHOW BRINGS ORDERS

ATLANTA, Sept. 11—The Atlanta branch of the Ford Motor Co. advises that actual gross sales at the Southeastern Fordson Industrial Exposition held here recently exceeded $100,000 in signed orders obtained by dealers. Of this amount about 55 to 60 per cent represented Fordson tractors sold to industrial concerns; about 15 to 20 per cent sales for agricultural use, and about 25 to 30 per cent sales of other power farming machinery by southern distributors who had displays in connection with the exposition.

Anti-Truck Propaganda May Rouse Roads Bureau

WASHINGTON, Sept. 12—It is expected that the Bureau of Public Roads will call upon the various state highway commissions and good road organizations throughout the country to combat propaganda against motor truck transportation. Both manufacturers and owners of motor vehicles, especially trucks, are making vigorous protests against the methods adopted by electric railways to secure freight traffic which is now transported over the highways.

HENDEE REPORTS INCREASE

SPRINGFIELD, MASS., Sept. 11—Of the factory schedule of 20,000 motorcycles for the fiscal year ending Aug. 31, 1923, 22 per cent has been taken up in orders booked for the first month of this fiscal period, the Hendee Manufacturing Co. reports. There has been a sharp increase in new business and the company has booked orders for 2000 motorcycles and side cars for domestic use, while orders have been received for 1200 for Australia and 1000 for South Africa.

National Airplane Races to Feature Aero Congress

DETROIT, Sept. 12—More than 50 entries have been confirmed for the National airplane races to be held here Oct. 7, 12, 13 and 14. Pilots in the Army, Navy, Marine Corps and civil aviation will participate.

The races are a part of the Second National Aero Congress which will convene in Detroit on Oct. 12, 13 and 14 for the purpose of creating a permanent national aeronautic association. The feature will be the Pulitzer trophy event.

To date the Navy Bureau of Aeronautics has entered eleven seaplanes in the Curtiss Marine Trophy Race which will be held Oct. 7. The prize consists of a silver trophy donated by Glen Curtiss with accompanying cash prizes of $1,200 for first, $600 for second, and $200 for third place.

The slogan at the Detroit congress and races is "Help Make America First In The Air."

MORE CADILLAC CLOSED CARS

DETROIT, Sept. 11—Statistics made public by the Cadillac Motor Car Co. show that in the last eight years Cadillac production of closed cars has increased from 7 per cent of the total to more than 54 per cent of the total.

Closed Type Demand Starts in Australia

Will Necessitate Imports—Farmers Entering Local Market on Large Scale

NEW YORK, Sept. 12—General business in Australia, has been on the increase since October, 1921, when the low point of the depression was reached. Since then the Australian farmer has come into the market, proving a greater factor in the buying movement than have the farmers in America, according to Peter McIntosh, managing director of McIntosh & Sons, Ltd., Sydney, distributor of Buick cars for the State of New South Wales who is spending a month in the United States and Canada on his tenth trip across the Pacific.

McIntosh says that his company is selling 60 per cent of its cars to farmers and that his monthly sales now are greater than during any other period since he entered the business.

America Holding Its Own

The American car is holding its own in New South Wales and Australia in general, the five and seven-passenger types being the large sellers with the five the leader. Only a few European makes are prominent on the market.

A recent development in the Australian automobile trade is the starting of a demand for closed types such as the sedan. This brings a new aspect into the Australian business in that while the local body-building concerns have produced practically all of the open bodies for the importer, none of them has built closed types. The limousines and other closed cars sold have been imported complete with the body. McIntosh believes that with the growing demand for sedan types it will be necessary to import these bodies for some time until the Australian body manufacturers get into production. In order to develop its body-building industry a duty of approximately $375 on a five-passenger car was imposed, which made importation of bodies prohibitive except on the high priced cars.

Conditions Are Better

The present very pronounced improvement in car sales in Australia is largely due to the general betterment of conditions which largely depend on such staples as wool, wheat, meats, dairy products and minerals. The merino wool industry, which stands first, has made rapid advances. The good clip of 1921, together with higher prices has furnished ready money to the sheep raiser. Merino wool prices are as high as at any time in recent years, with the exception of the boom season caused by the war. The wool clip is generally moved between November and March and is invariably followed by a perceptible seasonal advance in business. The wheat crop was good and the price of approximately $1.43 per bushel was most satisfactory, as previous to the war New South Wales wheat had not brought more than $1.

Conditions improved very materially in the dairy field, production being larger than in previous years. Business in the meat field has not been so good. The improvement in copper, zinc, and silver mines has assisted materially. This, coupled with the fact that money rates have come down, has greatly assisted in the financing of general business.

Good headway has been made in the introduction of motor buses not only in cities like Sydney and Melbourne but also over inter-city routes radiating from 12 to 20 miles out of the larger centers. British and European chassis are favorites in this field.

Road Improvement Would Help

Highway improvement will stimulate the use of motor buses as well as trucks, but unfortunately there is not what might be described a federal highway system for the Commonwealth. Present road-building laws turn the construction and maintenance over to municipalities, which means a general lack of broad planning. In spite of this, good macadam roads are being built each year from Sydney to Brisbane, a distance of 600 miles. Most of the highway is macadam and the remainder, gravel. From Sydney to Melbourne, 500 miles, there are about 300 miles of macadam and the balance gravel and bush roads. Approximately four other roads radiate from Sydney to interior points. From Sydney to Adelaide, 1200 miles, the highway is being improved in many sections.

The sale of motor trucks is not going ahead as might be expected, this being particularly true of the larger capacity vehicles. The present depression in the truck business is more or less due to high operating cost, gasoline selling at 60 cents an American gallon.

Although the truck business is slow, the farm tractor business is still slower, and the tractor is not taking hold of

(*Continued on page* 546)

Haynes Resumes Policy of Meetings of Dealers

KOKOMO, IND., Sept. 7—The new Haynes body models were exhibited here to-day at the first dealers' meeting held by this company in recent years. Dealer meetings are announced as a part of the policy of G. U. Radoye, who recently was placed in charge of both sales and advertising for the Haynes Automobile Co.

The morning session was devoted to the national advertising policy. Opportunities for connecting local sales situations with the national advertising were discussed at considerable length.

The economics of the present national crop manufacturing situation were considered, the conclusion being drawn that as a result of the third bumper crop in successive years and the recent rise in prices, the money is in the country and the dealers should be able to continue the present high rate of sales with less than the usual seasonal drops.

Plants Still Need Skilled Mechanics

Government Report Shows Shortage in Michigan—Factories Work Overtime

DETROIT GAINED 1094 IN WEEK

DETROIT, Sept. 9—A gain of 1094 for the week ended Sept 6 is reported by the Employers' Association, as against a loss of 5719 the preceding week. Total employment of the association members number 177,374, compared with 115,500 the same week last year.

WASHINGTON, Sept. 9—Though a slight decrease has been noted in the number employed in the automobile industry, the survey of industrial conditions for August as conducted by the United States Employment Service shows that there has been relatively little slowing up of manufacturing processes in the automobile industry.

There is a general shortage of skilled mechanics in the automotive industry in Michigan.

At Flint two automobile plants are working night shifts and in Kalamazoo automobile body factories are working overtime. Similar conditions prevail in Saginaw with several automobile plants.

Federal employment agents in Wisconsin report a slight decrease in employment in the automotive industry in Kenosha.

In Ohio, the automotive equipment industry has improved considerably. In Columbus one automotive plant now employs 700 men as against 230, six months ago.

Cleveland Employment Better

CLEVELAND, Sept. 12—Neither the rail nor coal strike has halted the activities of Cleveland industries.

The labor relations committee of the Cleveland Chamber of Commerce has reported to the Federal labor department that local factories increased their number of employees during August. They progressed steadily in production since the strikes began.

The strike of rail workers has helped motor transportation companies in the Cleveland district, particularly those handling freight.

During August the number of employees in Cleveland factories increased 5 per cent over July. Most of the increase was reported by the iron and steel factories and by those making metals and metal products other than iron and steel.

The automobile concerns here reduced their employees one-half of one per cent during August, which is said to be far below the usual seasonal falling off with the companies.

Men of the Industry and What They Are Doing

Sail to Attend Foreign Shows

The Paris and London automobile shows are calling to Europe a party of General Motors officials who have booked passage on the Olympic, sailing from New York Sept. 23. H. H. Rice, president of the Cadillac Motor Car Co., is one of the party, which also includes D. A. Laing, sales manager of the General Motors Export Corp.; G. A. DeWater of the Buick Motor Co.; E. A. Seaholm of the Cadillac; Charles R. Short, a General Motors research engineer; W. O. Kennington, of Delco-Remy, Ltd., of England, who is returning after a long visit in this country; and W. S. Gurley of the General Motors Acceptance Corp., who is being transferred from the New York office to the English branch.

Dixon and Oliver Join Quaker

J. M. Dixon and N. E. Oliver have been appointed directors of the Quaker City Rubber Co., Philadelphia. Dixon is president of the Tobacco Products Co. and a director in other corporations. Oliver, who has been identified with the rubber industry for 25 years, was formerly associated as a director with the Diamond Rubber Co. and later became general manager of the B. F. Goodrich Co. of New York, where he had charge of practically all of the eastern states.

Phelps Joins Barley

William Elliott Phelps has been appointed general sales manager for the Barley Motor Car Co. Until Aug. 1 he served as general sales manager of the Haynes Automobile Co.

F. D. Schulte Resigns

F. D. Schulte has resigned as body engineer and designer of the Stephens Motor Car Co., Freeport, Ill. He will take a three or four months' vacation trip to Europe. His plans after he returns home have not been announced.

Bassett Goes With Hyatt

A. F. Bassett has been appointed assistant sales manager of the motor bearings division of the Hyatt Roller Bearing Co. Bassett is a graduate of Yale Sheffield School and has been connected with the sales and engineering divisions of the company. Recently he has been sales engineer for the Detroit territory.

Rankin Appoints Barnes

Claire L. Barnes has been appointed director of merchandising for the Wilson H. Rankin advertising agency. For some years he was secretary and sales manager of the Detroit Steel Products Co., a position which he left to become sales manager for the Billings & Spencer Co. of Hartford, Conn. Later he founded the Claire L. Barnes & Co. Sales Corp. Relinquishing this enterprise, Barnes joined the Willys-Overland Co. as assistant to the president, John N. Willys, and then organized the Barnes Foundry & Manufacturing Co. of Detroit, for the manufacture of automobile accessories and parts. More recently he has been president of the Merchants Underwriting Corp. of New York, where his interests have been entirely taken up with industrial refinancing.

Lindsley Does Double Duty

A. M. Lindsley, engineer with the Alvord Reamer & Tool Co., Millersburg, Pa., has been placed in charge of the advertising department of that company. He will continue his work as engineer. Lindsley was formerly identified with the Cincinnati Milling Machine Co. of Cincinnati.

Williams Manages Autocar Branch

S. M. Williams, who for several years was in charge of the work of the Federal Highway Council in Washington, D. C., and who joined the Autocar Co., Ardmore, Pa., when the Federal Highway Council was abandoned, has been appointed manager of the company's New York City branch.

Brightman Appoints Dods

John P. Dods, for years associated with the Automobile Blue Book Publishing Co., has been appointed general manager of the Brightman Manufacturing Co., South Columbus, Ohio.

Robbins Joins Bearings Co.

A. W. Robbins, formerly of the Standard Roller Bearing Co. and the Bearings Service Co., now is associated with the Bearings Co. of America, and will travel from the Detroit offices of that concern.

Stone with Hoyt's Service

Earl B. Stone has joined the staff of Hoyt's Service, Inc., advertising agency, at its Cleveland office. Stone has had a very extensive sales and advertising experience for nine years, the last three and a half of which he spent with the Cleveland Tractor Co. as road salesman, assistant advertising manager, district sales manager and advertising manager.

LARGER WESTCOTT OUTPUT

SPRINGFIELD, OHIO, Sept. 12—Production at the plant of the Westcott Motor Car Co. will be increased the middle of September to a point that will make it the largest of any fall season in the company's history. Shipments during the past week were larger than in any week in August. Export orders were filled for Belgium, Greece, the Canary Islands and Venezuela.

Willys Returns Home After European Trip

Reports Competition Keen in England—Overland Doing Good Business Abroad

NEW YORK, Sept. 11—Returning on the Aquitania from a two months' visit to Europe, John N. Willys, president of the Willys-Overland Co., spent four days in New York, resuming contact with the American end of his business, then jumped on to the factory at Toledo. While here he denied positively the report of a new Overland to be brought out in November and expressed his satisfaction with things generally at Toledo, which reported July and August to have been two of the best months in Overland history for several years, with August producing more than 16,000 cars.

In speaking of conditions abroad, Willys said:

I found the competition keen indeed in England. Fiat is making a strong fight, while Citroen and one or two other French cars are bidding for English business. Overland is in fine shape to meet this competition in England through our plant at Manchester, where we will make 1000 cars this year for sale in Great Britain. We assemble the chassis at Manchester and fit them with English-built bodies which have been designed to fit English ideas.

We are doing nicely, too, in Belgium, Holland, Sweden, Norway, Denmark and Spain, with a small business in Switzerland. These Overlands come directly from this side.

Buying Power Increasing

Central Europe is quiet so far as the automobile business is concerned and I do not look for an improvement under present conditions. Germany seems to be getting what little business Central Europe has. The buying power of several European countries is unmistakably increasing, however. There is every indication of keen competition for the European automobile markets by European manufacturers. The retaliatory tariff policies of the various countries toward the United States is likely to make this competition a much more important factor in the export of automobiles than has generally been anticipated.

Before sailing for home, Willys was entertained at luncheon at the Hotel Cecil, London, at which many of the British dealers of Willys-Overland-Crossley, Ltd., were present. New prices for the English Overland were announced. The standard phaeton at £268 is an example of the new list.

Rhue Back From Trip

John A. Rhue, treasurer of the Indiana Truck Corp. has returned from an extended trip through Missouri, Kansas, Oklahoma and Texas. Rhue reports that he was impressed with the improvement in business and states that he anticipates a good fall and winter.

Willys Adjustment Plans Completed

May Declare 30 Per Cent Dividend on Approved Claims

TOLEDO, Sept. 11—A plan for the readjustment of the debt and capitalization of the Willys Corp., seeking to lift the final settlement out of the expensive judicial liquidation, has been received here and will probably be put into operation in the next few months.

Receiver Frank P. Kennison said that possibly a dividend on approved claims amounting to as much as 30 per cent may be declared in October.

The sale of the New Process Gear Corp. being delayed and a question of taxes arising between the Duesenberg Motors and the Government, has put back the plans for liquidation.

$13,000,000 on Hand

The receivers had approximately $13,000,000 from sales and liquid assets on hand when the receivership was put into effect. They also hold securities consisting of Fisk Rubber Co., Federal Rubber Co., Duesenberg Motors, and others, valued at $3,888,800 and 750,000 shares of Willys-Overland common and $750,000 in 4½ per cent notes given by the Willys-Overland Co., in satisfaction of claims. These assets are not to be liquidated at the present time.

The debt against the Willys Corp. totals $18,000,000, of which $10,000,000 represents indebtedness for moneys borrowed, more than $2,000,000 for liquidated claims for machinery ordered, and a sum not to exceed $1,600,000 estimated payable on claims which hold mechanics' liens. The remainder is accounted for in expenses of the receivership.

To effect the reorganization Percy H. Johnston, president of the Chemical National Bank; Howard Payne, president of the Columbia Trust Co., and Arthur W. Loesby, president of the Equitable Trust Co., all of New York, have been named a committee.

The proposed company to take over the assets enumerated above will float an issue of $6,000,000 of 7 per cent notes maturing in three years. Probably not more than $5,000,000 will be issued at the start. It will also have 200,000 shares of no par common stock.

New Stock for Claims

Mechanics' liens and expenses shall be paid in cash. Scrip dividend certificates issued on first preferred Willys Corp. stock will be taken at face value in purchase of notes or stocks purchased by holders of the old preferred.

All other claims proved will be settled by payment of $700 in cash for each $1,000 of claim and either $300 in cash or $300 in notes at 95 per cent of face and three shares of the new common stock, or a portion of cash or notes in the same relation.

Holders of the first preferred stock may purchase for $300 cash $300 face of the three-year notes and three shares of the new common stock for each $1,000 of old preferred stock. And in addition new common will be issued share for share with old first preferred. The purchase of the notes is entirely optional with the first preferred holder.

Holders of second preferred stock and common stock of the Willys Corp. will be allowed to purchase notes at the same ratio or in less amount according to their respective rights, but will not obtain any of the common stock of the new company in the distribution.

Voting Trust Named

To centralize control, the members of the reorganization committee are named a voting trust for the new common stock.

The new plan has been approved by the committees organized to protect the interests of the holders of bank and merchandise debt and representing the first preferred stockholders of the Willys Corp.

All claims will be first marshalled in the district in which they arise and then be filed with Special Master Curtice Johnson in Toledo. After approval by the local district court and ratification by each of the other districts, they will be eligible to receive the cash and securities of the new liquidating company.

The federal court here has approved the appointment of Brown, Hahn & Sanger and Cotton & Franklin, New York, as attorneys for the receivers in the dispute between the Willys-Overland and Willys Corp. settled a few weeks ago.

BRITISH MAKER HOLDS "INSPECTION RALLIES"

LONDON, Aug. 28 (By Mail)—The maker of Arrol-Johnston cars this year has instituted a series of area "inspection rallies," publicly inviting all owners of their cars, especially those in the district, to attend, at an announced avenue, take refreshment as the maker's guests and allow their cars to be inspected and tried individually by a staff of testers on the spot.

Actual repairs are not done at these rallies, but a written report is furnished as to the "tune" of each car with recommendations as to what should be done to it if anything amiss is noticed. The object is, of course, to render an additional type of service to owners, and at the same time to secure publicity in an unusual form. Whether anything tangible is gained from either aspect it is hard to say; no doubt a proportion of owners are thus enlightened as to pending derangements and enabled to avoid trouble, but while the publicity gained by the firm is considerable, it is mainly local—apart from reports in the national motor press.

M.A.M.A. Expresses Optimistic Views

Predict General Prosperity with 1923 Biggest Year in History

BUFFALO, Sept. 13—Several widely known automotive executives have sent messages to the annual convention of the Motor and Accessory Manufacturers Association in session here, expressing highly optimistic views of the future of the industry. Some of those already received follow:

R. H. Collins, president of the Peerless Motor Car Co.—"In my opinion the automobile business is the finest business in the world. Present conditions in the trade are more than satisfactory to us, and I would have no hesitancy in predicting an even greater general prosperity in the future were it not for one fatal menace which threatens the industry to-day, namely, the growing tendency of the automobile distributors and dealers to place an exorbitant value on cars accepted in trade and to overestimate their ability to dispose of these cars at these fabulous prices.

"If this condition continues, the resultant suffering must be shared by the entire trade, including motor and accessory manufacturers and dealers, as well as automobile manufacturers and distributors."

H. H. Franklin—"Trade conditions are good and the outlook is bright."

J. J. Cole—"Our August shipments were 30 per cent greater than any month since January, 1921. We believe our shipments will be normal for the balance of the year. We see no reason why 1923 will not exceed any year in our history."

C. W. Nash—"It appears to me that prophecies made more than a year ago that business would gradually but surely improve to the point of having very prosperous times, are very rapidly being brought about. Barring the railroad and coal situations, I can see nothing to prevent 1923 being a splendid year in all lines of business. This is a time when courage and foresight should be used to the limit. If this is done, nothing but good results can follow, in my judgment."

Assets of Empire Tire Bought for $1,675,000

TRENTON, N. J., Sept. 13—The assets of the Empire Tire & Rubber Corp. were sold by the receivers at a public sale to-day to Campbell, Heath & Co. of New York City for $1,675,000. It was stated that the purchasers will form a company to operate the plant, with C. Edward Murray, Jr., as head of the concern.

W. W. Pepper, a former president of the rubber company, is treasurer of the brokerage firm, while William H. Peck, president of the Third National Bank of Scranton, represented the firm in the bidding.

Warm Wave Curtails Buying in Chicago

Decline, However, Has Not Been So Marked as to Cause Any Great Depression

CHICAGO, Sept. 8—A noticeable decline in the retail sales of automobiles in Chicago came with the last two weeks of August and the first few days of this month. It was coincident with a warm wave marked by the highest sustained temperature of the summer and most dealers are of the opinion that the coming of cooler weather, expected any day, will bring an improvement in sales.

The falling off of sales, however, has not been marked enough to cause any great depression in the business. There still are dealers far behind in making deliveries and there is an increasing demand for closed cars. Truck sales seem to have suffered more than passenger car sales. Used cars also have been moving more slowly, some dealers having difficulty disposing readily of cars taken in trade during the rush season.

Figures compiled by the Central Automobile Finance Association show the trend of sales here. These figures represent the number of time payment automobile sales recorded each week in Cook County and provide an index for the business generally. For the five weeks ending July 29 these sales were 4917, but for the five weeks ending Sept. 2 they dropped to 4467, a decline of 450. The last two weeks of the period ending Sept. 2 were responsible for practically all of this decline, the sales for those two weeks being 1576 as compared with 2017 for the final two weeks of the preceding period, a decline of 441.

Expect Big Fall Sales

The new models for the 1923 season being announced are attracting a great deal of attention as soon as they appear in the salesrooms and there is every reason to believe that the fall and winter selling will be exceptional. The Star car distributor placed two models of that car in his Michigan Avenue display room this week with the result that thousands of persons inspected it daily. The dealer is taking orders for delivery in January, requiring a $25 deposit on the phaeton and $50 on the closed models with an agreement to return the deposit if purchaser is not satisfied with the car after riding in it.

Sales of accessories and supplies have been exceptionally good during the summer and are still good. Important highway improvements in Illinois and Wisconsin have encouraged greater use of their cars by owners.

BIG GARDNER DEMAND

ST. LOUIS, Sept. 9—The Gardner Motor Co. reports a large demand for its new closed models, and production has been continuing at an increasing rate through the summer. Heavy shipments have been made to the East and to the Pacific Coast. The southern market is reported just beginning to become active, with indications that the automobile business throughout the South will be better this fall than for a long time.

OUTPUT FOR AUGUST PLACES MONTH SECOND IN PRODUCTION HISTORY OF INDUSTRY

NEW YORK, Sept. 12—With the figures 99 per cent complete, the National Automobile Chamber of Commerce reports that August production of passenger cars and trucks reached a total of 272,000, an increase of 12 per cent over July and 53 per cent over August of last year.

This makes this August the second greatest production month in the history of the industry, being topped only by June, 1922, with 289,000; May, 1922, had 256,000, and July, 246,000.

The following table shows the output by months of this year and the factory shipment figures for the first eight months of 1920, 1921 and 1922:

	Output	Carloads			Driveaways			Boat		
	1922	1920	1921	1922	1920	1921	1922	1920	1921	1922
January	90,486	20,057	6,485	15,357	29,283	3,185	7,479	....	93	143
February	129,500	25,505	9,986	19,636	43,719	7,507	10,173	....	99	180
March	173,342	29,236	16,287	27,753	57,273	9,939	16,917	....	75	560
April	218,546	17,147	20,187	31,334	64,634	14,197	22,381		1,619	2,960
May	256,000	21,977	18,608	33,416	74,286	15,193	28,827	....	2,381	7,406
June	289,000	22,516	20,269	34,230	60,746	18,834	33,857	8,350	3,947	7,737
July	246,000	23,082	19,514	28,412	52,342	15,533	28,022	8,702	3,726	6,855
August	272,000	23,386	20,350	32,563	34,060	14,290	36,603	7,095	3,565	10,028

Factory shipment for the other months of 1920 and 1921 follow:

	Carloads		Driveaways		Boat	
	1920	1921	1920	1921	1920	1921
September	20,804	20,150	24,431	13,550	5,469	3,580
October	17,209	17,323	14,127	11,257	2,519	2,300
November	13,253	14,061	9,497	10,509	659	1,385
December	11,802	12,100	6,469	7,500	89	134

No Seasonal Slump as Midsummer Ends

(*Continued from page 536*)

selves with more ready cash than they had counted on and many of them are using some of it to buy much needed motor vehicles.

Few price adjustments remain to be made this year and there will be no "price war." Competition is keen but it is not likely to lead to foolish extremes. Balance sheets of car and parts makers show that they are prospering. Many companies which had suspended their dividends are resuming them and, with few exceptions, the year will show a substantial profit in the face of slowly mounting manufacturing costs.

New models have met with a cordial reception and several lines are finding it difficult to make deliveries. The closed car market continues excellent and it will be stimulated still further by the closed car shows which will begin soon.

The only cloud on the horizon for the industry at present is the freight jam which will not reach its peak for three or four weeks yet. There is no longer serious fear of being forced to curtail operations because of difficulty in obtaining coal.

Thacher Elected to Head Tire and Rim Association

HARTFORD, CONN., Sept. 13—S. P. Thacher of the United States Rubber Co. was elected president, at a meeting of the incorporators, of the Tire & Rim Association of America, Inc., which has taken over and will continue the activities of the Tire & Rim Association. The association includes in its membership representatives from the tire, rim, wheel and related parts industries.

John Younger of the Standard Parts Co. was named vice-president; C. A. Thompson, who will continue as general manager, secretary, and H. W. Kranz, treasurer. C. E. Bonnett will remain as chief rim inspector.

Directors for the association were elected as follows:

Tires—J. E. Hale, Firestone Tire & Rubber Co.; J. D. Anderson, Fisk Rubber Co.; W. A. Allen, B. F. Goodrich Co.; B. Darrow, Goodyear Tire & Rubber Co.; E. O. Fritch, Hood Rubber Co.; C. E. Offensend, Miller Rubber Co. and S. P. Thacher.

Rims—J. H. Wagonhorst, Hayes Wheel Co.; W. B. Minch, Jackson Steel Products Co.; Ford Lawrence, Kelsey Wheel Co. and John Younger.

Wheels—T. Pleiss, Budd Wheel Co.; C. C. Carlton, Motor Wheel Corp and O. J. Rohde, Wire Wheel Corp. of America.

Related Parts—W. J. Kirkpatrick, A. Schrader's Son, Inc.

PIERCE-ARROW GAINS

BUFFALO, Sept. 14—The Pierce-Arrow Motor Car Co. reports sales and shipments for last month as greater than in any previous August and three times the amount for August, 1921. The company states that it is behind in production, especially of closed cars which total more than 70 per cent of its output.

Mexico Was Biggest Purchaser in July

Brazil Came Next, with Argentina and New Zealand Showing Increases

WASHINGTON, Sept. 11—A survey of the leading export markets for American automotive equipment, as shown by the July shipments from the United States, discloses that Mexico, Brazil, Argentina and New Zealand were the only large territories that increased their purchases over the month of June. Canada, Australia, Great Britain, Belgium and British South Africa each bought passenger cars in somewhat lessened volume than during June, the result being that passenger car exports as a whole decreased 24.4 per cent in value for July, according to the Automotive Division of the Bureau of Foreign and Domestic Commerce.

The comparative figures follow:

	Units	Value
Mexico		
July, 1922	652	$382,726
June, 1922	563	369,531
July, 1921	787	532,429
Argentina		
July, 1922	217	223,994
June, 1922	113	96,128
July, 1921	3	3,000
Brazil		
July, 1922	240	201,179
June, 1922	90	91,507
July, 1921	7	12,397
New Zealand		
July, 1922	140	99,863
June, 1922	59	50,431
July, 1921	14	16,005

Unit values of the passenger cars shipped to these countries show that Argentina bought the highest priced cars, the unit value being $1,032. Unit values to the other countries were $838 for Brazil, $712 for New Zealand and $587 for Mexico.

Canadian Imports Less

Of the countries which took decreased shipments in July, Canada was the most important, reducing imports from 1807 cars in June to 891 in the latter month. Australian shipments fell from 816 to 663; Great Britain 775 to 523, and Belgium was from 699 to 522, and in South Africa from 203 to 156. The unit values to these countries were Canada $941, Australia $914, Great Britain $891, Belgium $447 and British South Africa $1,038. Shipments to British South Africa were at a higher value than to any other country, the average being $6 greater than for Argentina. Amount is not taken in these figures of the large car shipments from Canada.

The chief truck buyers were as follows:

Country	No.	Value	Unit Value
Belgium	170	$38,031	$223
Canada	117	225,697	1,929
Mexico	105	45,880	437
Japan	91	73,866	811
Brazil	58	66,915	1,153
Great Britain	49	71,973	1,468

The total passenger car shipments to all countries, as was announced last week, were 5,600, with a value of $4,395,541 and a unit value of $784. The unit value showed an increase of $42 over June. The shipments of trucks to all countries were 822, valued at $734,148 and a unit value of $893, this being an increase in unit value of $192.

A decrease of approximately 50 per cent was shown in motorcycle exports, but this was explained as being due to the fact that new models and prices are announced in early August and that consequently shipments slow down in July. A small gain was shown in the overseas sales of both airplanes and motorboats, but each of these items was small.

Closed Car Demand Starts in Australia

(*Continued from page 542*)

Australia as was anticipated. Fordson is carrying on a progressive selling campaign and one or two English makes are also pushing business.

The majority of the motor car tires used for replacement business are manufactured domestically, the three local Australian concerns producing perhaps 80 per cent. Since the advent of the cord tire most of the imported chassis are tire equipped. Australia is rapidly getting on what might be said to be a cord tire basis, and it is only a question of time until the straight side cord tire will be universal.

McIntosh has always been a strong advocate of standardization and is greatly pleased with what has been accomplished in this regard in the last few years. He feels that further standardization of small parts entering into the automobile would be a great advantage to the Australian trade, and naturally to the trade in other foreign countries. He would like to see bolts and nuts standardized to a much greater extent in the different makes of cars, thereby reducing the problem of servicing by cutting down the stocks of parts necessary to carry. Other small parts might similarly be standardized to a greater extent.

The automobile distributor in Australia has some financial problems to cope with that the American distributor is free from. One of these is that of financing time payments, there not being any large corporations in Australia which makes a specialty of this work.

WILL SELL URSUS PLANT

CHICAGO, Sept. 12—The receiver for the Ursus Motor Co. has advertised that written bids will be received until 10 a.m., Sept. 28, for the company's manufacturing plant at 6601-33 West Grand Avenue, Chicago. The plant was erected about two years ago, at a cost of $165,000 for building and 15 acre site, for the manufacture of trucks, but was never operated to any extent. The machinery and equipment already has been sold by the receiver, Jacob Goldman of Chicago.

Tariff Bill Keeps 90 Per Cent Impost

House Conferees Accept Senate Amendment—Will Check Speculators' Efforts

WASHINGTON, Sept. 12—Protection for the American automotive industry is assured in the conference tariff report as submitted to the House to-day. One of the most important features of the tariff bill is the acceptance by the House conferees of the Senate amendment imposing a duty of 90 per cent foreign value upon motor vehicles, bodies, chassis and parts exported from this country prior to Feb. 11, 1919, for use during the war. The enactment of the provision will put a check to speculators who have bought this equipment abroad from taking unfair advantage of American producers and dealers.

The House bill provides that if any country imposes a duty on motor vehicles or parts when imported from the United States in excess of the American levy, there shall be placed an equal duty on similar articles imported from that country. This duty, however, is not to exceed 50 per cent. American value.

The conferees representing the House receded from their disagreement to the amendment imposing a duty of 10 per cent, foreign value, upon motorcycle tires, which under a House paragraph was dutiable at 30 per cent, American value, as finished parts of motorcycles.

Foreign value on motorcycles fixed by the Senate amendment is retained in the tariff bill, as the House conferees receded from their paragraph imposing a duty of 30 per cent, American value.

The bill which is now before the House contains the foreign valuation plan and the provision for flexible tariff rates to be declared by the President under certain conditions.

Textile Plant Operations Expected to Aid Trucks

SPRINGFIELD, OHIO, Sept. 12—Grayson Lathrop, director of the Kelly-Springfield Motor Truck Co., is making a business trip through the East, during which he will confer with the company's representatives at Philadelphia, New York City, Boston and Portland.

General Manager F. H. Peitsch states that as a result of the textile mills resuming operations the company expects to see a brisk trade in motor trucks from the New England states. The company is speeding up for a big increase in business this fall.

WEBB SUCCEEDS MC EVOY

DETROIT, Sept. 13—Earl W. Webb has been placed in charge of the Detroit office of the legal department of General Motors Corp., succeeding James McEvoy, now in charge of the patent section.

Latin America Has Few Excess Stocks

Retail Sales Should Be Upward. Says J. D. Mooney, Back from Tour

NEW YORK, Sept. 12—J. D. Mooney, vice-president and general manager of the General Motors Export Co., arrived here yesterday on the S. S. Santa Teresa, following a trip of nearly three months through Latin-America, in which he visited the principal automotive centers of Brazil, Uruguay, Argentina, Chile and Peru. Business conditions have improved materially through all sections of these countries, he declared, and the result is an expanding sale of automobiles and other automotive equipment.

"Nearly two years have passed since the depression began and in that time the excess stocks of cars and other equipment, except for a few pools here and there, have been liquidated," he said. "With retail sales improving, we may expect quicker reflection of these sales in orders to the factories here and, although I do not anticipate any revolutionary change in the automotive development, the curve of sales should be steadily upward."

Good Distributing Machinery

Mooney was frankly surprised at the extent of the distributing machinery already built up by the automotive industry in the various parts of Latin-America. Distributors, jobbers and dealers, he said, had in operation many excellent sales and service stations and were grappling with the service problem in a manner that should command the attention of the North American manufacturers.

"I was greatly impressed by the character and the energy of the men representing the automotive industry," he declared, "also by the capital invested in their plants, many of which are as large and as well equipped as the better places here at home. This was perhaps the most significant fact of my trip and it means that the automotive industry here must work more closely in a service way with our representatives there. We have often neglected this factor but it is one that deserves our closest attention."

Favorable Business Conditions

The favorable business conditions encountered by Mooney were summed up somewhat as follows:

Brazil has been stimulated greatly by better coffee prices and by the Centennial Exposition now under way.

Argentina and Uruguay are returning to normal as a result of higher prices and better demand for wheat and other products. In recent weeks, important advances have been effected in the cattle trade and this is removing the last stumbling block to further and more widespread prosperity.

Chile has been aided materially by better demand for nitrates, copper and other native products. A similar improvement for native products has been effected in Peru.

Another point which greatly impressed Mooney concerned road development. Concerning this he said:

We have not yet realized in an automotive way the possibilities of the roads already built. In Rio de Janeiro I found many miles of good streets and pavement and the number of automobiles there is nothing like what it should be in view of this development. In São Paulo state, I drove for seven hours with scarcely a stop over the fine new road recently opened from São Paulo city to Ribeirao Preto, 263 miles into the interior. This was a good road, like many others in this section, particularly the road being built from São Paulo to Rio.

In Argentina, I found spotty road conditions, particularly near Buenos Aires. In the interior, however, although it was midwinter when I was there, we had no trouble driving anywhere we wanted to go. Chile has a difficult road problem because of the mountains, but in Peru I was much struck by the fine road from Lima to Miraflores, recently built by an American company.

Lower Motoring Costs Needed

I did not find any general campaign under way over all of Latin-America for better roads, but I was much surprised to see how many motor roads are in good condition. Many more automobiles can be used on them than are now in operation.

What we must do to help out our representatives in the most practical way is to bring the cost of motoring down to as low a point as possible. Costs represent a more serious drawback than that of the highways. Cars cost much more in these countries than here: also, they are more expensive to operate. Closer cooperation in service work is one way in which operating costs can be brought down. Otherwise, we must evolve ways and means of making the landed price of our products as low as possible. Nothing else will so aid those energetic distributors and dealers who, despite their periods of discouragement, are hard at work trying to sell and handle our products.

Mooney's trip was eventful in that he saw a part of the recent abortive uprising in Rio de Janeiro and was marooned four days at Mendoza, Argentina, waiting for the snows to be cleared away to make the trans-Andean railroad passage into Chile. Also he narrowly averted a slight earthquake off Coquimbo, on the Chilean coast above Valparaiso.

Sioux City Reporting Business on Up Grade

SIOUX CITY, Sept. 14—Automotive business is on the up-grade. Being fed from the farming section of three states—Iowa, Nebraska and South Dakota—business in the automotive lines has reacted with betterment of the farmers' condition. Some tractors are being sold, which seems to indicate that the buying power of the territory has been improved.

Light cars are finding a good market. Medium priced cars are a little slower, but sales in this class are increasing. Higher priced lines are moving very slow, but are for the most part cash sales. Sales in the lower priced cars have been mostly on the instalment plan.

Reports to N. A. C. C. Show Good August

Price Changes Stimulated Individual Sales But Retarded Total Volume

NEW YORK, Sept. 14—Dealers' reports presented at the first meeting this fall of the directors of the National Automobile Chamber of Commerce indicate that August sales generally were much better than the previous month, and from 50 to 100 per cent better than August of last year. This condition prevailed except in a few states, which, however, represented no one section of the country. Where percentages of increases were given, they ranged from 9 to 30 per cent.

There is a general feeling on the part of the dealers that the effect of price changes has been to stimulate sales of cars where there had been reductions, but that they had retarded the volume of sales as a whole.

Light trucks are in much greater demand than heavy duty vehicles.

The used car market is reported as being very irregular, with some dealers stating it to be good and others dull.

Fall Prospects Good

Excellent conditions in the agricultural and industrial fields promise fairly good prospects for fall trade, although, at the same time, it is reasonable to suppose that there may be some decline in output.

Various committees reported progress made during the summer. The foreign trade committee states that its publicity campaign abroad, conducted in co-operation with the Department of Commerce, is having good effect with the result that there is an increasing number of inquiries being received. The committee on simplified practice is actively engaged in the preparation of data looking toward standardization of parts, spark plugs, starters, bearings and brake linings. The motor truck committee advised that it was getting inquiries from milk producers relative to the adoption of trucks for use in shipping. If the producers adopt trucks in place of railroads as a means of transportation, it will mean that 10,000 additional motor vehicles will be needed.

The drawing of space for both New York and Chicago shows will take place at the N. A. C. C. rooms on Thursday, Oct. 5 at 2 o'clock.

EXPECT 56,000 MAXWELLS

DETROIT, Sept. 14—Reports by the Maxwell Motor Corp. show that the closed car output is running 50 per cent of total production. From present schedules it is very likely that the company will reach its estimate of 56,000 cars as the total output for the year. The September schedule calls for 5500 cars and the last quarter, 13,500.

Ford Denies Coal Buying; Will Close

Declares Orders on Books Warrant Continued Operation of Plant

DETROIT, Sept. 13—Henry Ford in a statement to-day branded as a lie the report circulated from Cincinnati that the Ford company had purchased 4,000,000 tons of coal, deliveries on which are to begin at once. The publication, he said, was part of propaganda designed to cause coal buyers to scramble for coal at existing prices.

Earlier in the week it had been announced here that an agreement had been entered into between the Ford Motor Co. and the American Export & Inland Coal Co. of Cincinnati, by which Ford was assured an ample fuel supply for power purposes. With the tremendous buying power of the Ford company and the amount of the tonnage involved in the agreement, which was stated to be about 4,000,000 tons, it was estimated that the price paid per ton did not exceed $4.50.

Ford failed to say anything about a reconsideration of the order closing the plants on Saturday next, and apparently the closing is to go through as scheduled. Preparations about the offices of the company and plant indicate that the closing will become effective and that the entire force of workmen will be laid off in a body.

It is reported that Ford Motor Co. has notified supply sources that it will close Saturday and remain closed two weeks.

The demand for cars is such as to warrant a continuance of operations at a normal rate, it is declared, and there will be many orders on the books when operations cease. This condition, however, is not borne out by the experience of the other companies. In the middle and low price field, which are finding a falling off in sales somewhat larger than might be termed seasonable. The other companies, however, have not begun to curtail factory operations.

Rail Situation

Failure of the fall business to hold up is declared to be wholly the result of the railroad situation. Farmers are unable to move their crops. Fruit growers have been badly hit, industrial districts are unable to get material and ship products in anything like quantities sought.

Places Million Dollar Order

DETROIT, Sept. 14—The Ford Motor Co. has placed an order for $1,000,000 worth of brass for radiator parts with a Detroit manufacturer, deliveries to begin in 30 days.

MORE PULLMAN BODIES

CHICAGO, Aug. 28—Rapid increase in its production of automobile bodies is announced by the Pullman Co., builder of Pullman sleeping cars and other railroad equipment. This company for a number of years has been building bodies on a limited scale for higher priced automobile.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Last week loans on call covered a range of 4 per cent to 4½ per cent, as compared with 3¾ per cent to 5 per cent in the previous week. Except a further slight hardening in the rates for shorter maturities, little change was noted in the time money market. Sixty and ninety days' maturities were quoted at 4½ per cent as compared with a range of 4¼ to 4½ per cent in the previous week. The rate for four, five and six months' maturities remained unchanged at 4½ per cent to 4¾ per cent. The stiffening in rates for the shorter maturities was ascribed to seasonal crop moving demands and, to a lesser extent, to preparation for September 15 tax payments. The prime commercial rate covered a range of 4 per cent to 4¼ per cent, as compared with 3¾ per cent to 4 per cent in the previous week.

Reported unfilled tonnage on the books of the United States Steel Corp. on Aug. 31 totaled 5,950,000 tons, against 5,776,000 tons on July 31, an increase for the month of 173,944 tons. Unfilled orders on June 30, 1922, totaled 5,636,000 tons; on May 31, 5,254,000, and on Aug. 31, 1921, 4,532,000 tons. The production of pig iron during August was affected by the blowing out, because of scarcity of fuel, of approximately 20 per cent of the iron furnaces previously in operation. The August output of 1,816,170 gross tons showed a decrease of 584,000 tons, slightly more than 24 per cent, from the July output and was the smallest amount produced in any month this year since February, but exceeded the August, 1921, output by 862,000 tons.

Commercial failures for the full calendar month of August, 1921, totaled 1669, the smallest number reported since September a year ago. This compares with 1568 in July and 1656 in June, which would indicate a comparative stabilization of business failures. Liabilities involved in the August failures amounted to $36,829,000, the smallest amount reported for any month since early in 1920, and compares with $42,146 000 in July, $38,413,000 in June and $50,382,000 in August, 1921. In August, 1919, failures reported for the month were 444 with liabilities at $6,126,000.

Car loadings for the week ended Aug. 26, 1922, totaled 890,838 cars, an increase of 34,619 over the previous week and was the largest number reported for any week since Oct. 1, 1921. Although the loadings for the week ended Aug. 26 exceeded the corresponding week in 1921 by 61,955, it was a decrease of 110,470 over the similar week in 1920. Of the total amount, coal loadings totaled 111,030 cars, being an increase of 29,071 over the previous week, but a decrease of 48,483 over the corresponding week a year ago.

FINANCIAL NOTES

Stromberg Carbureter Co. of America reports net profits of $192,328 for the quarter ended June 30, after charges and Federal taxes, or the equivalent of $2.56 a share on 75,000 shares of capital stock outstanding, as against $30,266 in the first quarter of the year, when earnings equal to 40 cents a share were reported. Profit and loss surplus June 30 showed $2,657,549, as against $2,465,221 for the quarter ending March 31. The consolidated balance sheet for the quarter ended June 30 shows gross earnings to be $327,676, as against $134,412 for the quarter ended March 31; net earnings after selling expenses $241,465, as against $41,946; cash, $386,316, compared with $299,431; notes and accounts receivable, $474,101, as against $326,701, and accounts payable, $109,606, compared with $78,981.

Stewart-Warner Speedometer Corp. announces that all of the $2,000,000, 8 per cent notes due March 1, 1926 have been retired. Virtually the entire amount was converted into stock at the rate of 25 shares for each $1,000 bond, the conversion, however, not increasing the outstanding capital stock, the company having purchased stock in the open market. It is reported that sales by the corporation for August were 103 per cent greater than for August of last year and that sales for the first eight months of the year have been in excess of the total for the whole of 1921.

Saxon Motor Car Corp. has issued a statement pointing out that the 240,000 shares of common stock offered for sale is the stock which was recently approved by the stockholders for issuance. It makes the outstanding common stock total 400,000 shares. A group of bankers has underwritten the entire new issue. An offering to stockholders by the syndicate is expected shortly. The proceeds of the sale will furnish additional working capital to round out the company's production program for the coming year.

Chandler Motor Car Co. has declared a regular quarterly dividend of $1.50 a share on capital stock, payable to stock of record Sept. 20. Current earnings are more than covering dividend requirements. President F. C. Chandler stated following the directors' meeting, and business is better than expected at this season. The company has no debts other than current trade obligations.

Hayes Wheel Co. in its general balance sheet as of July 31 shows cash on hand of $745,045; accounts and notes receivable $1,531,727, making total current assets of $3,764,609. Total current liabilities amounted to $1,219,031, leaving a net working capital of approximately $2,500,000.

Electric Storage Battery Co. has declared the usual quarterly dividends of 75 cents a share on the common and preferred stock, payable Oct. 2 to stockholders of record Sept. 15.

Allis-Chalmers Manufacturing Co. has declared a regular quarterly dividend of $1.75 on the preferred stock, payable Oct. 16 to stock of record Sept. 25.

Spicer Manufacturing Co. has declared the regular quarterly dividend of 2 per cent on the preferred stock, payable Oct. 1 to stock of record Sept. 21.

Autocar Co., Ardmore, Pa., is offering $1,000,000 new 8 per cent cumulative preferred stock at $102.

Sao Paulo Highway Officially Opened

State Rapidly Pushing Ahead with Road Plans—Decided Impetus Given

SAO PAULO, BRAZIL, Aug. 19 (*By Mail*)—The 450 kilometer highway connecting this city with Ribeirao Preto, the center of the coffee district, has been officially opened, and the trip between the two cities is now being made by automobile in from eight to ten hours. This highway is a splendidly built extension of the Sao Paulo-Campinas road that was opened in 1921 and is the longest stretch of improved highway in all of Latin-America. Traversing the coffee-growing section and ending at its center, the new road is expected to inaugurate new and important motor transport developments.

A large automobile traffic over the road is assured, and undoubtedly many motor truck services will be put into operation over it. Travelers are making the trip to Ribeirao Preto by motor car in two hours less time than by train. Furthermore, recent increases in freight rates have raised rail transport costs so high that there is serious consideration of opening inter-city truck lines along the new road. Bus service in this district is yet in its infancy, but, nevertheless, it seems certain to come in the near future.

The state of Sao Paulo is rapidly pushing ahead with its road plans. Consul E. M. Lawton has just submitted a report to Washington, stating that about 800 kilometers of automobile highways were constructed in the state during the last year, and that approximately 5000 kilometers more are projected, designed to cover the whole state and to line up with similar roads in the adjoining states of Parana, Minas Geraes and Rio de Janeiro. Much of this work will consist of the improvement of existing roads and trails, but there will be considerable new construction.

Sentiment Favors Good Roads

"A decided impetus has been given to highway construction during the year 1921-1922," Consul Lawton states. "While the increasing use of motor cars has been largely responsible for this development, it is a fact that there is a growing sentiment in favor of good roads and more ready means of communication and transportation in the interior of the state, which is being fostered by the Good Roads Association, with the very valuable assistance of the State Governor, himself a devoted advocate of good roads."

Sao Paulo city is thus becoming the center of a very large network of roads, such as those leading to the seaport of Santos and to the interior city of Itu, about 100 kilometers inland. The new Ribeirao Preto road in time will be extended to Bello Horizonte, the capital and chief city of the rich mining and agricultural state of Minas Geraes. Ribeiro Preto is about half way to Bello Horizonte. Work is also continuing on the road being built from here in the direction of Rio de Janeiro, but its completion is not yet in sight. Pressure is being exerted to start the construction from Rio de Janeiro toward the state line, where it will connect with the Sao Paulo road.

Automotive conditions have improved materially, particularly in the accessory lines. Motor car sales are being made in larger volume, and some new agencies have recently been opened. European products do not figure largely in sales, except among certain standard accessories, but comparatively few Continental cars or tires are being sold here.

INDUSTRIAL NOTES

Nolte Screw Machine Products Co. receivership and the dissolution of the company are sought in a suit filed in the Common Pleas Court of Cincinnati by John L. Moorhead and August B. Luckey, secretary and second vice-president, respectively. Assets are estimated at $57,000; liabilities, exclusive of the liability to stockholders, at $12,000. The petitioners declare that the business cannot be continued at a profit because the company has no available capital other than that invested in its machinery and equipment. The company makes automatic screw machines.

Oilgear Co. of Milwaukee has opened a New York office at 39 Cortlandt Street in order to be in direct touch with the entire eastern territory. Russell, Holbrook & Henderson has been appointed sales representative for the district in and near New York City. Cadillac Machinery Co., Detroit, will handle the company's products in the state of Michigan, and R. E. Ellis Engineering Co., 621 Washington Boulevard, Chicago, will represent the Oilgear Co. in Chicago and surrounding territory.

Metropolis Bending Co., Cleveland, manufacturer of top bows, has succeeded the Union Bow Co., through which it has sold its product for many years. A. E. Puls, formerly in charge of the sales department of the Union Bow Co., has been appointed sales manager and assistant treasurer with headquarters in Cleveland.

Taylor Rubber Co., Ltd., has acquired a block of 48 acres of land in Aurora, Ont., is planning to erect a factory to which its manufacturing operations will be transferred. Engineers are at work on plans, but building has not yet commenced. The plant will have a capacity of 500 tires a day.

Martin-Parry Corp. reports sales of bodies about 75 per cent ahead of last year, with August sales about double last year. Although dollar volume is smaller than last year per body, total sales in dollars still is well ahead of 1921 because of increased production.

Diamond Chain & Manufacturing Co. has opened an office in the Leader-News building, Cleveland, in charge of H. I. Markey who has been with the company for five years as mechanical engineer in the engineering and sales departments.

Gordon Tire & Rubber Co., of Canton, Ohio has resumed operations after having been closed for one week for the making of necessary repairs. The plant will operate on a 50 per cent basis.

METAL MARKETS

Steel producers as well as consumers continue to grope their way in a market that seems to sellers, no less so than to buyers, beset with pitfalls for the unwary. Although producers profess reluctance to the booking of new business at the nominal quotations now prevailing, most of them would be only too happy to reinforce their backlog of orders at these prices if they were certain that in doing so they did not pass up opportunities that would come to them in the event of a further boosting of prices. Consumers show little concern over the price situation a month or three months hence. What they are interested in at this time are chiefly deliveries on account of previously placed contracts.

It is quite possible that with the acceleration of mill output resulting from improved fuel supply, reserve accumulations of steel in consumers' hands may exert considerabe influence on the situation. Of course, amid the uncertainties of the good order car supply available for steel transportation, mill output may for some time to come run considerably ahead of receipts by consumers. Indications are not wanting that considerable tonnages of steel products have found their way into second hands and warehouses which would also be considerable of a market factor in the event that those who are holding it for an advance as the result of transportation difficulties should be disappointed and compelled to liquidate.

The outstanding development of the last few days has been announcement of a 5c. price by some interests for 22-gauge full-finished automobile body stock. This is really nothing more than an adjustment on the basis of the higher market for sheet bars. The 4.70c. quotation of the leading interest for this grade sheets which brought out quotations of up to 4.85c. by independent rollers dates from a $35 sheet bar market. Now that sheet bars sell at nearer to $40, the 5c. quotation for full-finished sheets was inevitable

Pig Iron.—Although there is somewhat more activity, buying is still more or less of a retail character, with malleable enjoying the best inquiry. The Chicago market is on a $32 base. On a Buffalo base No. 2 plain foundry continues quotable at $34, furnace.

Steel.—Strip steel producers report having booked some business for fourth quarter delivery and are operating their plants at very close to capacity. They are holding down fourth quarter orders so that in the event of a further advance in the steel market generally they can sweeten the average of their fourth quarter sales, most of which are said to be on a 2.75c. base for hot-rolled and 4.25c. for cold-rolled. Delays in deliveries of hot-rolled bars are causing makers of cold-drawn steel bars much inconvenience. In some cases premiums for immediate shipment have been offered, but producers are more anxious to satisfy their regular customers than for extra profits on small tonnages that would upset their shipping schedules all around. The 10 per cent advance in bolt and nut prices forecasted in these reports has become general.

Aluminum.—The immediate effect of the closer approach of a new tariff law revealed through announcement of agreement between the Senate and House conferees has been to cause holders, whether importers, dealers or speculators, to conserve their stocks.

Copper.—Domestic consumers appear to be well covered and the market rules quiet.

Calendar

SHOWS

Sept. 23-30—New York, Closed Car Show, Grand Central Palace.

Oct. 7-14—New York, Electrical and Industrial Exposition, Grand Central Palace.

Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8-13 — New York Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Sept. 1922 — Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Associação Automobilista Brazileria.

Sept. 15-20—The Hague, Automobile Show.

September — Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.

Oct. 4-15 — Paris, Automobile Show, Grand Palais.

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

CONVENTIONS

Sept. 18-23, 1922 — Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

Oct. 2-7—Detroit, Fourth International Steel Exposition and Convention of the American Society for Steel Treating and the American Drop Forging Institute, General Motors Building.

Oct. 7-14—Detroit, Second National Aero Congress and National Airplane Races.

Oct. 9-11—Chicago, Annual Convention of the American Gear Manufacturers Association.

Oct. 18-20—Chicago, National Association of Farm Equipment Manufacturers, Congress Hotel.

Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

RACES

Sept. 16—Kansas City Speedway, 300 mi. International Speed Race.

S. A. E. MEETINGS

Sept. 16—Metropolitan Section, Annual Outing, West Point; Sept. 21—Automobile Club of America, George A. Round, Lubrication.

Sept. 22—New England Section, Engineers Club, Boston, Starting and Lighting Equipment, Louis Ehrlich.

Sept. 29—Detroit Section, Lubrication, A. A. Bull.

Oct. 6 — Aberdeen Proving Ground, Md.—Oct. 26-27, Detroit, General Motors Building.

Jan. 9-12—New York, Annual Meeting.

Five French Makers Enter Truck Trials

PARIS, Sept. 1 (*By Mail*)—Trucks of 7½ tons load capacity will be presented by Berliet, Dewald, Renault, Saurer and Scemia in the French Army truck trials to begin at Versailles on September 26. These trials are open to French-built commercial type trucks of the indicated load capacity, capable of being adapted to army use in case of hostilities.

The successful vehicles have the privilege of being sold to private users with the guarantee of an annual subsidy for a period of three years. A load capacity of 7½ tons is required in order that these trucks can be used for the haulage of army tanks.

Following the truck trials, an army tractor competition will be held along the Chemin des Dames, north of Soissons, during the month of October. This is open to four wheel drive or creeper band type agricultural tractors, which can also be employed for the haulage of 75 and 155 mm. guns across country. Both light and heavy tractors are provided for.

The entrants in the heavy class are Citroen, Mistral and Renault, and in the light section Ara, Citroen, Mistral and Scemia. Use will be made by Citroen of the Kegresse type machine, which has rubber creeper bands. As in the case of the trucks, the successful tractors can be sold to farmers with the guarantee of a State subsidy.

No entries have been received for the 15 and 21 ton four wheel drive artillery tractors for use over roads. Last year only two makes entered the French trials and both failed to meet requirements.

NEW ENGLAND S. A. E. MEETING

NEW YORK, Sept. 14—Characteristics of present day automobile electric generators and starting motors will be described at the meeting of the New England section of the Society of Automotive Engineers in Boston, Sept. 22. L. B. Ehrlich, chief engineer of Gray & Davis, will present a paper in which he will describe method of voltage and current regulation, the types of winding and direct attention to the care and adjustment of electrical equipment in service. The meeting will be held at the Engineers Club, and a large representation of electrical service men is expected.

Gasoline Short Measure Crusade Brings Results

WASHINGTON, Sept. 11—The crusade against short measure selling of gasoline inaugurated by the National Motorists' Association has been started in earnest. The first shot produced results in that of 46 warrants sworn out in Louisville by the Louisville Automobile Club against managers of filling stations, six pleaded guilty and paid the fine of $10 each that was imposed by Judge William Earl. These warrants followed a four day tour of inspection by the club in co-operation with the city inspector of weights and measures. At each station visited five gallons of gasoline were bought and it is said that there was an alleged shortage of measurement in each case.

Charges made by the National Motorists Association are that the average filching of short measure artists amounts to two pints in each five gallons, a daily loss to purchasers of 1,000,000 gallons, valued at approximately $250,000, or $90,000,000 a year. This is based on the assumption that each motorist buys two gallons of gasoline daily.

"No evidence has been found that the fraud is countenanced by the oil companies, and in fact offers of assistance are being received from such companies," says the N. M. A. in its statement.

122 Cu. In. Race Won by Bordino in Fiat

MILAN, ITALY, Sept. 10 (*By Cable*)—Bordino, driving a Fiat, won the Italian Grand Prix for cars of 122 cu. in. displacement, to-day, covering the 497 mi. of the Monza speedway at 86.8 m.p.h. His time was 5 hr. 43 min. 13 sec. F. Nazzaro, also in a Fiat, was second in 5 hr. 51 min. 45 sec. Viscaya, in a Bugatti, was given third place, although he did not finish, the crowd invading the track and stopping the race.

Bordino, who also won the 91 cu. in. race a week ago, went through without an engine stop, although two tire changes were necessary. Nazzaro experienced no tire trouble.

Of the 39 entrants only eight faced the starter, Bugatti withdrawing its team at the last moment, claiming its cars were not equipped with the right sort of wheels and tires for the race. This stirred up the crowd of 150,000, and the Bugatti drivers were threatened by the enthusiasts. Fiat offered to loan tires and wheels. This offer was accepted, and the race delayed half an hour to permit the change.

Three Cars Finish

Only three cars finished, one Fiat broke its transmission at the starting line; two German Heims quit at half distance and two Diattos were out at the three quarters.

Bordino's fastest lap was made at the rate of 91.5 m.p.h.

The inner track, 2½ mi. round, was used. It is very similar in design and layout to Indianapolis, so interesting comparisons can be made. The last Indianapolis race, at 500 mi., it will be remembered, was won by Murphy at 94.48 m.p.h. in a 183-in. car. The cars in the Italian race were of smaller displacement.

W. F. BRADLEY.

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Parts Makers Seek Larger Profits and Better Distribution

Two paramount problems considered at annual convention of M. & A. M. A. Feeling general that bigger returns are justified on volume of business done. Replacement market more important in future. Education and expansion of dealer organizations proposed.

By James Dalton

BUFFALO, Sept. 15—Better business for 1923 was the rallying cry of members of the Motor and Accessory Manufacturers' Association at their annual convention which closed here to-day. It is significant that to them better business does not necessarily mean increased production. They seem to think there might be such a thing as greater profit with a smaller output. Obviously that would mean a higher price per unit.

Parts makers are not worrying about orders. They have all they can take care of and some of them more. They say they are not worrying about how to make sales but how to make them with a margin of profit large enough to permit a reasonable return to the stockholders on their investment.

THIS article gives a comprehensive summary and a somewhat complete report of the more important features of the annual credit convention of the Motor and Accessory Manufacturers' Association held at Buffalo, Sept. 13, 14 and 15.

After one general session, the convention this year was divided into groups with programs taking up problems of peculiar interest to executives and credit managers, advertising managers, export managers and traffic managers.

In presenting its report of the convention, Automotive Industries gives first a summary which tells some of the things parts manufacturers are thinking about. It then takes up, in order, the credit, advertising, export and traffic meetings. An attempt is made, without going into too much detail, to outline the high points of each session.

It was evident that C. A. Dana, president of the Spicer Mfg. Corp. and its allied companies, struck a responsive chord when he said:

"We are selling on a very close basis to the automobile manufacturer and the automobile manufacturer is just taking our figures and adding them together into a simple cost and putting a certain profit on and passing it on to the public—and we are not the gainers. We are not getting a legitimate profit that warrants us in being in business in a great many instances."

He seemed to voice the thought of most of the parts makers present, and a good many of the leaders of that branch of the industry attended the convention.

Another sentiment of Dana which brought approv-

ing nods was that the parts makers are pretty much in a position to dictate how many motor vehicle manufacturers shall be in the field, especially in the truck division. He and others believe it can be done by the simple expedient of limiting credits to weak companies and refusing them to new concerns which can't demonstrate that there will be a real demand for their products.

IT is true that these views as to the present paucity of profits with a tremendous volume of sales were not voiced so much on the floor of the convention as in private conversations, but it is a vital theme for the parts makers. They are not getting "cocky" and they don't propose to attempt dictation to the vehicle builders, but they do feel that they have not profited as greatly as they should from the record breaking automotive business this year.

At the beginning of 1922 they had on hand large inventories and heavy stocks of partly fabricated materials which had been held up from the time the slump came in 1920. They were glad to get releases and new orders then on almost a cost basis, but these stocks have been worked off and they can see little to be gained by keeping their plants running night and day unless the earnings are commensurate with the activity.

It was asserted with pointed emphasis by more than one man that motor vehicle prices wouldn't go much lower and it was even more freely predicted that prices to the purchaser were likely to be higher a year from now. It was admitted that car and truck companies have been wise in stimulating sales by lower prices, but it is felt this process has gone far enough if not a bit too far.

In other words, the parts maker believes that if he increases the price of his product just enough to insure himself a little more profit and that increase is passed on to the public by adding $50 or $100 to the price of a car in the medium price class, it won't militate very seriously against the sale of automobiles.

Next to profits, the parts manufacturer is interested chiefly in distribution problems and means of widening his market. The replacement market for parts has become a burning issue. For that reason these men are almost as much concerned as the motor car dealer or manufacturer in arriving at a sane solution of the used car question if there is such a thing as a sane solution.

Trading in used cars at exorbitant prices has cut a big hole in the replacement parts market, they contend. They sympathize with the dealer and they assert without equivocation that the vehicle maker is partly to blame because he is constantly forcing the market for new products.

As a consequence, they feel, the dealer pays so much for used cars, in order to make as many sales as possible of new ones, that he can't afford to have them reconditioned properly before he re-sells them. He simply polishes them up a bit, it is contended, and then exaggerates somewhat on the statement that they have been "re-conditioned." Frequently the buyer pays so large a price that he can't afford to buy replacement parts, either.

This replacement market is becoming more important every year and many parts makers are beginning to feel that there soon will be as much profit for them in its cultivation as in centering their efforts on sales to the car builders.

It is because of the replacement market, for one thing, that the dealer has become a person of vital importance. A good many parts makers do not think highly of the policy of restricting dealerships. To the contrary, they are inclined to believe the dealer organization should be enlarged. One of the chief difficulties is that there are not enough dealers to go round.

These problems are as common to makers of engines and frames and gears as they are to the makers of batteries and lubricants. They are all wondering how they can put more pep in their dealers, how they can teach them what they ought to know about the products they sell and how they can put over intensive sales campaigns. They feel they are not getting as much business as they should, either in the big towns or the little ones.

There is a dearth of dealers of the right type in the parts field just as there is in the fields of cars and trucks. Much thought is being given to educational campaigns, not only to teach the dealer what he must know to talk intelligently about his merchandise but to teach the principles of merchandising.

The parts maker is not concerned exclusively with the manufacturer and the retailer. He proposes to cultivate the jobber more carefully in future. Most of them believe the jobber is an important link in the chain of distribution and that practical assistance should be given in "ask 'em to buy" efforts.

Taken all in all, the parts men propose to expand their markets through every possible avenue. There is becoming apparent, also, a spirit of greater independence. None of them proposes to affront the vehicle manufacturers gratuitously, but they evidently think they will be justified in asserting themselves along legitimate lines, both as to prices and to the markets for their products.

There was considerable divergence of opinion on the subject of mergers. It seems to be generally accepted that the next few years will bring consolidations just as there have been in the iron and steel industry to effect greater economies of production and distribution.

SOME of the men at the convention are in favor of mergers, but it is probable a majority of them don't want too many. They admit that there are too many weak concerns making trucks and perhaps a few too many turning out passenger cars, but they feel that in the last analysis the public will determine the future of the automotive industry and that the prospective purchaser of a motor vehicle wants to make his selection from a wide field of models.

The atmosphere of the convention this year was much

TWO vital problems which are being given close consideration at this time by parts and accessory manufacturers are:

How to earn greater profits.

How to insure broader and better distribution.

They believe they are not getting a large enough return on the volume of business they are doing and it is certain that the trend of parts prices will be upward.

Distribution questions center closely around the dealer. Most of them favor expansion of dealer organizations. They look upon the replacement market as a highly profitable field in future.

less rarefied than it was at Detroit last year or at Cleveland the year before. In 1920 the parts maker was hanging on with grim determination, feeling that he was holding the bag for the entire industry, but with a wholesouled resolve to make the best of a bad situation. It is to his everlasting credit that he did it so well. He came through without whimpering, staggering under his load, but with a deep faith in the sound future of the motor vehicle.

But for his generous extension of credit, even when he didn't know where his next dollar was coming from, many a passenger car and truck company now doing a good business would have fallen by the wayside. For that reason there was an atmosphere of profound gravity at the convention in 1920 and questions peculiar to a period of deep depression were the ones given closest attention.

AT Detroit last September many of the clouds had rolled away and it was evident that the worst was over, but many difficult problems lay ahead. There was less of gravity and more of confidence. The atmosphere was one of sane optimism.

This year there was no pressing financial problem to consider except the one of profits. There was no question of keeping the wolf from the door. There are not so many past due accounts on the books and not so many credit men are playing a daily game of solitaire with a sheaf of notes wondering if any of the makers will, by a miracle, fail to ask for a renewal.

The present has become of less concern than the future. The men at the convention are trying, for the first time in two years, to look a few months ahead and make their business something more than a day-to-day affair. The atmosphere might be characterized as one of self-confidence.

Telegrams were read at the convention from some of the leaders in the motor vehicle field predicting a record breaking business in 1923. These wires, with their messages of cheer, were greeted with applause, but there was apparent an undercurrent of something approaching skepticism.

There is no fear in the heart of the parts maker that next year will bring anything in the nature of a slump in business, but he doesn't see how 1923 can bring any great increase in the sale of motor cars. He admits that the business done this year has been almost unbelievable and he will concede that he has been cautious so long caution may have become a fixed habit. But some of them will point out that the automotive industry has leaped far ahead of other lines of trade and that it isn't economically possible for it to go on leaping without waiting for the rest of the country to catch up.

A good many of these men feel that the automotive industry is approaching an era of stabilization and that there are not likely to be so many sensational spurts. They believe absorption of motor vehicles has reached a point where it will be governed more rigidly in future by the increase in wealth and population. Some of them are inclined to think that the sale of used cars will be less of a problem in 1923 and that the demand for new ones will not be quite so insatiable.

Summarizing the views of these skeptics, if they can be called that, it would not be an unalloyed misfortune if a good many more motor vehicles were driven until they were fit only for the junk pile instead of being traded and re-traded with a new car or at least a little used car being sold with every trade and re-trade. They argue that the demands of a stable replacement market would more than offset any diminution in orders from manufacturers and that all branches of the industry might profit if it could approximate its business somewhat accurately each year and make its plans accordingly.

Parts makers generally don't propose to get tangled up in any ill advised program of plant expansion. They believe it will be more profitable to operate their factories 24 hours a day, if necessary, and make them more efficient by installing better production machinery and methods. They think the passenger car builders will be making a mistake if they accept the tremendous business of 1922 as a barometer of what's going to happen every year in future. They believe that if there were a famine of cars at certain periods of the year for awhile it wouldn't be a bad thing and that it might tend to distribute sales more evenly over the entire year.

Because of the change in the general business situation, the convention this year was not devoted to so great an extent to credit conditions. Sessions were held by four different divisions—credit managers, advertising managers, export managers and traffic managers. Strangely enough, the fundamental ideas developed by the speakers before all these groups bore a marked similarity, although it might be supposed the problems of the men addressed would differ greatly. The most vital problems to all of them were:

How to earn greater profits.

How to insure broader and better distribution.

Profits, 1923 Business, and Used Cars Are Topics in Credit Session

Dana discusses financial and economic questions. Rukeyser, Reeves, and others talk on current problems

FIVE addresses of deep interest to executives and credit managers of parts companies were made at the sessions of the general credit convention. They were:

"Integration and Mergers in the Automotive Industry," by C. A. Dana, president of the Spicer Mfg. Co.

"The Financial Outlook and an Outside View of the Automotive Industry," by Merryle S. Rukeyser, financial and business editor of the *New York Tribune.*

"Trends of the Industry and the Outlook for 1923," by Alfred Reeves, general manager of the National Automobile Chamber of Commerce.

"Credit Conditions as I See Them from the Standpoint of the Credit Grading Committee," by R. E. Hayslett, treasurer of the Hydraulic Steel Co., Cleveland.

"Advantages of Cultivating the Jobbers' Trade," by T. E. Challenger, credit manager of the McCord Mfg. Co., Detroit.

EZRA W. CLARK of the Clark Equipment Co., in his opening address as chairman of the Advertising Managers Council, sketched briefly bus development in new fields. He said the increased use of motor vehicles by country merchants is cutting heavily into the business of mail order houses. He also referred to the rapid strides which are being made by motorized grocery stores in the rural sections.

AFTER sketching the reasons for the deflation which followed the war, with the tremendous shrinkage in inventory values, Dana said in part:

"Those tremendous depletions had to be taken out of either the undivided profits of the company, the surplus or through a sale of some form of investment or securities. The result is that many companies have not sufficient working capital. It may be due somewhat to lack of sales experience. More attention should be given both by truck and passenger car manufacturers to better sales, more permanent sales, better distribution of both cars and trucks. It may have been caused somewhat by a greater quantity of different name plates of passenger cars or trucks than there is a demand for. It may have been caused by bad judgment. But the fact remains that to-day there is a lack of working capital.

"We who sell to those various accounts have to decide as to what we are going to do with them, because we are in the position of the owners of those businesses. I am speaking very frankly about this because I think it is a serious matter that we, who are in the parts branch of the industry, are the owners of a great many of the truck and passenger car manufacturers even though we do not have the shares of stock in our names.

"We should recognize that so that we may lend every endeavor that we have and every thought that we have and all our experience to help to show them how they should sell, to help show them how they should finance their immediate requirements in order to liquidate some inventory that they already have on hand. We should show them how they may operate at lower costs and with a reduced labor cost, and how they, perhaps, should change their design so that the article that we are contributing to may be merchantable and more salable.

"That has led us to the creditors committee which was not known some time ago. They used to go into receiverships."

Reorganizations

Dana then outlined the methods by which these companies are liquidated, with as much salvage as possible, or are reorganized by the issuance of new securities to provide additional working capital. He warned that after gold notes or gold bonds are sold in these reorganizations, merchandise creditors become junior creditors. The success of a company which has issued these bonds or notes should be followed very carefully so that unduly large credits will not be extended. Coming to the subject of mergers, he said:

"There are two necessities for mergers. One is a financial necessity, in which one company needs the support of another company that is better financed, or they will secure financial assistance by making the proposition larger so that the securities are more marketable.

"I know of one automobile group in this country now in which the several companies were too small to warrant the financing of a sufficiently large amount of securities to support each of them, and consequently they blended together under one corporate entity so that that corporation would be able to issue a larger block of bonds which they could sell at less discount and which would be more readily marketable, and by means of having the greater marketing, they are going to get their money at a lower rate of interest and are going to be able to sell the bonds that they couldn't have done as individual entities. That would help all you gentlemen who are creditors of those several companies, because by means of that new money that comes in, even though it is a recorded obligation, it will help, and practically all of you, I know, are creditors with some of these companies. It will help you in getting a greater percentage of your claims paid eventually by continuing those companies, by means of this new money that is secured by this larger funded bonded obligation.

"That is the type of merger that is founded from financial necessity. The other type of merger is the one that is founded from economic necessity, such as the Steel Corporation, or to the Consolidated Coal Company, or the American Radiator Company, or the Bethlehem and Lackawanna Steel merger. It was their economic necessity to have a corporation large enough to not only finance their ore digging, the transportation of the ore, but the manufacture of either the billet, the ingot or the pig iron, and then the shipping of that to the finishing processes of the various classes of steel that you and I use in our industry.

"I have not been able to see the instance where there is a success in a merger that has been made for economic benefit where it has all been centralized in one administrative head. That policy was exemplified by Judge Gary when he formed and created the Steel Corporation by the merger of the various steel industries throughout the country. He showed great wisdom in perfecting this enormous industry which in each of its entities is strong and aggressive, and no particular one is pulling the other one along as a lame duck.

Limitations of Mergers

"Each plant manager is able to handle his own production, his own manufacturing in his own mine, and it is only where the sales of the one article are provided for that there is a centralization of organization.

"As I look into the automobile industry, I think you will find that the same rule prevails. The largest entity in the automobile industry I think is distinguished with us for the success of individual plants, and without mentioning names, we look to the various plants of the largest automobile manufacturer, and we attribute the success of the cars that any one of the members of that organization make, to the officers and the organization of that company, and as I see the workings of the minds of those who are conducting the business of this large industry, they are trying to encourage that more and more.

"The reason is because they are manufacturing different articles. An eight-cylinder car is not the same thing and doesn't meet the pocket book of the same class of person as a four or six-cylinder car and is made for a different purpose. Consequently the salesmen have to be trained in a different line and the manufacture of the various parts that go into them are either better or have not the finish on them, according to the price that they are expected to sell for.

"I would like to say this in regard to the general policy of parts manufacturers. I meet a good many, I see a good many balance sheets, I see a good many earnings statements, I see a good many costs that are submitted to various plants at different times, and it seems to me that in the parts industry to-day we are contributing too much to the public. We are selling on a very, very close basis

to the automobile manufacturer and the automobile manufacturer is just taking our figures and adding them together into a simple cost and putting a certain profit on and passing it to the public—and we are not the gainer, we are not getting a legitimate profit that warrants us being in business in a great many instances.

"I think the principle is wrong. You should increase production by reducing your costs, by lowering your labor, overhead or material cost, but at the same time to get a living wage is proper. The seventy-one per cent of the cars that are turned out here in the United States that sell for a thousand dollars and less that we have created here in the last few years are the mainstay of the automobile industry. Although they are only made by five companies, at the same time in trying to produce that quantity production, we should arrange our material, labor and burden costs in such a way that we can get a living.

Competition Keen

"It has appeared to me that in a great many instances the competition is too keen, that in trying to get the public to buy cars we pass something on to the public that they don't appreciate, that the saving they make in the purchase of that car which we should get for the benefit of the capital that is invested in our business is passed on to the owner of the car, so he spends it on paint for his house or on something else. He buys cars on a comparative basis. If all of those cars that are sold, we'll say in the thousand dollar class, had twenty-five dollars more added to them, so that it was on a comparative basis, I think there would be almost as many cars. I mean adding a small amount more of margin of profit. There is not enough being made by the industry to-day.

"The result is that many small companies who produce a small number of cars are not able to make the profits that they should in comparison with those who turn out larger quantities of cars.

"I believe with some of the speakers here that we should try to encourage a diversification of different types and classes of cars to a certain extent. We are the ones who create those customers. I know I speak for many here who know that the parts that they submit and that are assembled in those cars make those cars, and those companies that they submit those parts to have not the money to pay for them, but they are continued in existence because we give them either trade acceptances or notes, or deferred payments, until they in turn cancel either the trucks or cars that we have furnished the parts for.

"We are making those companies, and the thought has come up in my mind many times as to whether we are not creating too many of these companies so that we are weakening the credits that we should have from other companies that are really stronger, by creating competition against those companies that would give us more prompt payment and better credits.

Companies and Capital

"I don't think the future of our industry is going to be to try to encourage the greatest number of truck companies possible in the United States, or the greatest quantity of passenger car companies in the United States. It is to try to have a reasonable number of good companies that can pay their bills, that have some money left in the bank, that are a credit and a going concern risk to both the public, the bankers and to the officers that manage them.

"If our companies do not make money for the capital invested in them, we are criticized not only by the banks, but we are refused by bankers who would underwrite further the opportunity of gaining more money, so as to extend our business and maybe perfect our business. In order to live, and to live on a sound basis, we have got to make money because dollars and cents and money is the reward and is the medal of success, and either the banker, the possible share holder, buyer of bonds or whoever it may be, measures the success of the company entirely by the profits that they make, and the stock values and the other values are rated accordingly, and consequently I would like to support what one speaker said here, that we should not give our goods away.

"We are perhaps through the period of liquidation where we were trying to get rid of an excess of material in which we had to encourage people to take it off our hands in order to turn over our stocks; we are past that period, but we should get into a condition where we will only supply goods at a reasonable profit, not an abnormal profit, but a profit of which our shareholders, our bankers and ourselves, in the operation of our organization, will be very proud."

M. L. HEMINWAY, general manager of the association, in a review of the problems and service of the organization, said it had been suggested that the present is an opportune time to seek the repeal of Federal excise taxes on automotive products. He added that the association was closely in touch with the situation and that it viewed sympathetically the work of other organizations against longer continuance of a war impost in times of peace.

Small Profits and Quick Turnover Needed in Used Car Handling

THE address of Reeves, as the representative of the vehicle manufacturers, aroused unusual interest. He was asked numerous questions, especially in respect to the used car situation, which he said would be worse this fall. There is no cure for the evil, he declared, but many helpful remedies can be suggested. The best is for the dealer not to pay more for cars in trading than he can sell them for. The secret of success in handling used cars is "small profits and a quick turnover." No dealers' association can control the prices of used cars, he said, and he added that trucks should be used until they wear out and that no dealer ever should trade in them.

"Better service is needed," Reeves stated. "We need 100,000 mechanics right now. Poor service is the worst indictment a car can have. Too few people buy the same car a second time because of poor service."

Referring to the truck field, he asserted that many have been sold which were entirely unsuited to the needs of the customer and that as a consequence there has been overloading which will be stopped when more states pass laws similar to those in force in Connecticut.

"The present prosperity in the automobile business means employment for 2,250,000 people," Reeves said.

"In addition to the 200,000 men working in the automobile plants, to the hundreds of thousands of professional chauffeurs and drivers and of retail garage employees, there are about 250,000 accessory factory workers, 150,000 tire dealers and salesmen and thousands more in allied retail trades.

"One can realize also the effect on other industries by the fact that 22 per cent of the aluminum supply, 4 per

cent of the annual production of iron and steel, 20 per cent of tin, 16 per cent of the copper output and 30 per cent of plate glass manufacture are used in the making of motor cars and motor trucks.

"This effect of the public demand for increased modern transportation naturally is a very prompt stimulus to the business of those factories making parts and accessories. Sales for the past four months have been the largest for any similar period on record due to the keen competition on the part of manufacturers, each endeavoring to get a large amount of business by giving the most value for the money. In fact, more value for the money is being given to-day in motor vehicles than any previous time in the business.

"This is reflected in the accessory market by the increase in the equipment and appointments supplied with the finished product and the creation of a public desire to get the last word in motor improvement.

"This year's production should exceed 2,000,000 cars and trucks. I believe it is safe to say that next year, with export demands increasing, more than 2,250,000 motor vehicles will be sold.

"In this year's production about 10 per cent are trucks, but the truck production will keep on increasing as general business gets better.

"Of the cars produced this year probably 70 per cent will sell at $1,000 or less.

"I have been asked to say something regarding the future of the accessory business. One can only outline general principles and not predict in detail.

"Parts and accessory makers may look for business even better than they are doing this year. But I believe there are additional possibilities open to those firms which can develop new and useful devices.

"This is fully as true of the foreign field as the American. In fact, in some countries such as Argentina where owners will sometimes use several types of horns on one car.

"Aside from the fact that the public is an intelligent judge of motor products, and hence has an interest in improvements as they come along, there is a potential accessory demand in the fact of the great numbers of low priced cars which are being manufactured. The man who buys a low priced car and finds that he would like some particular added feature on it usually feels that he has bought his car at such a low price that he can afford to pay for minor improvements."

Urges Using the Jobber to Increase Parts Sales

CHALLENGER said, in reference to the jobber:

Broadly speaking, I believe the parts makers for whose product there exists any considerable volume of business, is losing a considerable and legitimate profit by confining his sales for service purposes, exclusively to the manufacturers to whom his product is supplied for equipment purposes.

Of the various channels of distribution to the retail trade, I think that only the manufacturer, with a huge volume of business, is justified either in establishing his own branches or in selling direct to the retail trade.

The exclusive distributor plan, perhaps, has some unique advantage but usually results in restricted sale and, consequently, restricted service to the vehicle owner, and has undesirable reactions in several directions.

Therefore, for the vast majority of parts manufacturers, for whose product there exists a reasonably large volume of business, I believe the well organized, established and financed automotive equipment jobber offers the most economical, most substantial and most profitable method of distribution.

I might add that at present there are in the United States and Canada automotive jobbers—and generally recognized as such—to the number of about 1700.

It is also a fact that the jobber's business has increased rapidly in spite of the fact that some items like tires and lubricants are now handled in the main by manufacturers' branch houses or through specialty distributors.

The demand for replacement parts, such as spark plugs, gaskets, brake linings, fan belts, piston rings and other items too numerous to mention, provides a large and profitable business for the jobbing trade.

In addition to this the possibilities for special accessories, such as bumpers, shock absorbers, motometers, mirrors and other similar items, including shop equipment, have provided an additional field in which the jobber has, naturally and logically, become the dominant channel of distribution.

Just now jobbers throughout the country are engaged in an active campaign toward better merchandising. The "Ask 'em to Buy" and "Ask 'em to Repair" campaigns are being conducted largely through the jobbers and are making better merchants of the supply dealers, and this also applies to the garage and repairman, all to the ultimate benefit of the accessory manufacturer. These campaigns also have been of very great benefit to the jobbers' sales organizations.

Another of the results is that dealers are tying themselves more closely to the jobber, who is teaching them better and more productive merchandising methods.

These and similar campaigns, and other good stimulants, mean more efficient jobber distribution, increased business and more substantial accounts for the manufacturers.

Good Dealers Essential

One of the vitally important questions with us is that of the potential business in a given territory and how we are to secure it, or reap the maximum harvest from what we may want to, or do, sow.

Can we secure our just due more directly and economically and without the aid of organizations, meaning, too, organized efforts, and without acquaintance among the many thousands of dealers and others who are in last contact with the consumer?

We might, in a degree, but it would require a mighty organization to properly cover the ground and a mighty expensive one, as well as the other, and many elements that would enter into such an undertaking. Even then, we would be under the handicap of being, comparatively speaking, strangers in strange lands, and along with the rest of it we would in fact be jobbers as well as manufacturers. I believe we can not be both and do the job, or both jobs, right.

In my judgment, there is where the jobber actually, necessarily and economically fits in.

If these arguments for the jobber are meritorious, then the manufacturer, to secure full advantage of his present or contemplated relations with him, must look well to his sales policy, as in cultivating and developing the jobber's trade this feature is most essential to such up-building and permanency.

Another important feature to be considered is that while literally the function of the jobber is to warehouse merchandise for which there is a demand, yet the demand must, in part at least, be created by the manufacturer, certainly developed by him, through sales helps and various forms of advertising too numerous to mention.

While, naturally, we would like to have the jobber push our individual line and to a limited extent, accomplish this

through advertising helps and other co-operation, yet, on the whole and due to the wide range of merchandise stocked, the jobber obviously cannot give any particular line much preferential attention, except upon occasions.

He stocks all the lines and supplies the demand the manufacturer creates.

I believe we should make him in a way part of our organizations. He is performing a service for us that is of great importance and value in the development of our businesses.

Conservatism in Plant Expansion Urged by Financial Editor

RUKEYSER pointed out to his hearers that industrial conditions have not become thoroughly stabilized although great progress has been made in the recovery from depression. He warned, however, against the temptation to further expand factory space at a time when a secondary period of inflation has just begun, asserting that it would be wiser to wait until indisputable evidence had been given that it will be possible permanently to do a greater volume of business than present facilities permit. He said in part:

"It is high time to escape from the economic psychology of war. While the nation was mobilized for a single purpose of co-operating in the defeat of Germany, the essential character of every economic thing was tested by its effect on gaining the nation's immediate objective. Pleasure cars, during the emergency, were more or less taboo. But the emergency is over and the taboo should be forgotten.

"Railroad executives are not unmindful of the expanding possibilities for competition from motor trucks and are seriously discussing the means of meeting the new situation.

"I think it would be futile for railway executives to seek to combat the motor truck. It is an instrument for usefulness whose worth is being increasingly recognized. It can be made to facilitate transportation over steam railway lines by taking over short hauls and by relieving congestion at necks of bottles, such as New York.

"Incidentally, the comparative lack of regulation suggests one of the main assets of the automotive industry. It has successfully kept itself out of national politics. Being newer, it has grown up in a different spirit from that prevailing some ninety years ago, when the pioneers of railway transportation first laid their plans. The leaders of the automobile industry understood that their profit lay in serving the farmer, for example, not antagonizing him.

"There is no political capital in swatting the automobile industry, as there has been in restricting the field of free endeavor for railroad men. The automobile industry would lose its favored position if competition should be followed up closely and if public service faltered.

"Unlike many of the older industries, the automotive is one of progressivism. There are no conservative leaders, in the sense of the precedent hounds. It is necessarily an industry of drastic change and incessant experimentation. The goad of competition is perpetually driving the pilots of the industry to discover means of more efficient use of fuels, greater simplicity of design, and heightened comfort for passengers.

"As for the outlook, next year's automobile business ought to be satisfactory. In all respects but one, the factors which can be foreseen, must be placed on the asset side. The one exception is the fact that part of the 1922 buying was due to the accumulated demand which had become pent up during the depression of the latter part of 1920 and of 1921.

"On the side of favorable influences, most of them can be expressed in the phrase better general financial and industrial conditions. It does not take a fortune teller nor a sooth sayer to know that business is on the up-grade.

"Up to the present, the improvement, broadly speaking, has been principally in the physical volume of trade, in the increased employment of labor, in more or less stabilization of prices, and particularly in the complete disappearance of the panicky feeling which led men of business to do foolish and unnecessary things in the end of 1920.

"Despite these enormous gains, there has not yet been, broadly speaking, especially profitable business in most lines this year. The aftermath of depression has left the business world highly competitive, with many units fighting doggedly for trade, often at the expense of profits. This narrowing of the margin of profits will no doubt, in some of the less favored industries, result in a secondary wave of bankruptcies among the weaker and less efficient producers.

"Unless we are wise enough to escape wholly from the experiences of the past, after the prosperity will come a crisis and a depression. Serious setbacks two years or so hence can be obviated by those in control of business who remain aware of the traditional tendency of trade currents to ebb and flow.

"Business, especially one like the automotive industry, which depends on mass production, and upon the simultaneity of production of hundreds of parts makers, cannot thrive, of course, on hunches and intuitions. The decisions of modern business must be based on an unending flow of essential facts, and it is the business of my profession accurately and faithfully to supply them daily."

Reasons Given for Financial Difficulties in Automotive Industry

SIMPSON'S address was a graphic summary of the helpful work which can be done in rejuvenating and reorganizing companies in financial difficulties. He advised liberal extension of time to permit the working out of problems with a broad gage view of each case. Individual interests should not lead to a selfish attitude but the best interests of all creditors should be considered.

He cited the following causes as some of those which contributed to bring about the condition of acute distress in which so many passenger car and truck companies found themselves when they felt the full effect of the period of deflation:

- Shortage of working capital in the beginning.
- Large unbalanced inventories.
- Departmental incompetence.
- Heavy investment in fixed properties.
- Expanded and high salaried office force.
- Long term contracts for expensive and often useless advertising.
- Poor and under-financed dealers' organization.
- Inability to collect on receivables.
- Heavy indebtedness to banks and trade creditors.
- Indebtedness represented by high interest rate; commercial paper.
- Burdensome fixed charges.
- Overbuying. (Speculation).
- Failure of dealers to pay for drafts, which had been discontinued by the company, and the charging of unpaid drafts back to company's account.
- Lack of adequate accounting and cost system and knowledge of operating cost.
- Failure to make provisions for taxes or set up proper reserves for contingencies.
- Failure to develop bank lines.
- Failure to co-operate and foster good will with sources of supply.
- Inflated book values.
- Quality and design of product.

"Sell the Dealer" Is Best Way to Reduce Advertising Costs

Undue importance has been given to influence of consumer advertising. Advertising managers discuss cost problems.

WHILE the Advertising Managers Council had on its program several topics pertinent to the main theme, "How Can We Get More Profitable Sales in the Automotive Industry at Less Advertising Cost," it was significant that when the advertising experts came to a round robin discussion on "My Best Bet for Getting More Return From the Advertising Dollar," it was the dealer to whom they turned their attention and who aroused their deepest interest.

In this discussion, which was led by S. E. Baldwin, advertising manager of the Willard Storage Battery Co., no panacea for solving dealer problems was offered but all the speakers gave evidence of earnest thought on the subject of dealer helps.

Baldwin declared the only way to sell the consumer successfully is by first selling the dealer thoroughly.

"He is the fellow we must think about and concentrate upon," Baldwin said. "Up to this time the industry has been coming up hill without any effort on its own part and we haven't had to sell. The time is near when we shall have to sell as we never sold before if we are going to move our products. We must get the dealer to work with us intelligently or we can't make good. We must sell the dealer our advertising with the purpose and reason back of it."

Harry Tipper, business manager of AUTOMOTIVE INDUSTRIES, asserted that undue importance had been attached to the direct acceptance of advertised products by the consumer. The average individual is not impressed by more than one one-hundredth of 1 per cent of the attempts made to reach him, he said. The great point is that attempts to advertise to the dealer have been much less effective than they should have been. This advertising, generally speaking, has not been sufficiently informative.

The point was made by Tipper that while dealers stock a great many lines, they sell comparatively few of them and concentrate on those things in which they believe personally. He said that the active flow of authority must be from the informed to the uninformed and not the reverse.

Tipper paid tribute to the men who sell automotive products at retail. He declared that considering the comparatively few years since quantity demand for these products became apparent the strength of the dealer organization which has been built up was little short of remarkable. While there are thousands of changes every year, no branch of the industry has become stabilized and the dealers are doing exceedingly well in view of the limited amount of educational effort which has been possible up to this time.

Attracting Dealer Interest

Alfred Reeves, general manager of the N. A. C. C., also paid tribute to the dealers of the industry. He said advertising must be designed in such a way that it will attract dealer interest. Automotive advertising copy is much better, in his opinion, than it was a few years ago and it is steadily improving. It must have news value if it is to appeal. Reeves asserted that considering the age of the industry and the growth it has attained, the dealers are a very wonderful lot of men. He pointed out that much of the advertising that has been done up to this time has been over the heads of many of the dealers and that it should be more or less elementary in character.

Baldwin explained that nothing was farther from his mind than criticism of dealers. They have done wonderful work but they need help in getting the most out of their work.

"The dealer needs all the help he can get," Baldwin said, "but so do all of us for that matter. We are facing problems we never met before and we must help each other as much as we can."

He advised advertising managers to go out and live with their dealers as much as possible, for only in this way can they learn how to give them the greatest help.

Too Many Superlatives

Harry Horning of the Waukesha Motor Co. expressed the view that automotive manufacturers are getting their message to dealers in an inefficient way. His chief complaint against automotive advertising is the number of meaningless adjectives and superlatives it includes. He cited Lincoln's Gettysburg address as a model of conciseness and effectiveness. Horning declared the character of the dealer is what sells goods. He is the one who must build up confidence in the products of the advertisers. Manufacturers would do well, in his opinion, to think vastly more of selling the dealer and much less of selling the consumer.

R. E. McKenzie, advertising manager of the Timken Roller Bearing Co., said he didn't believe the average owner of a motor car cared anything about the brand of bearings used in the car. The only reason for advertising to the public is as a means to an end and should not be designed exclusively for the sale of the product. He explained that it is necessary to sell engineers and selling them is made easier if they think the user knows about the products they are being asked to buy. He believes that it is necessary to have trade paper and consumer advertising go together to form a background for each other.

Ezra W. Clark, advertising manager of the Clark Equipment Co., Buchanan, Mich., and chairman of the executive committee of the Advertising Managers Council, who presided at the sessions, said that his company, after spending $100,000 in advertising automotive transportation, proposed to devote its campaign in the coming year chiefly to the statement that "Clark axles are good axles." He said no company gained by asserting that its products were far superior to those made by competitors and that it could get farther by telling the good qualities of its own goods without reference to others. He estimated that the $100,000 spent in advertising the industry had been worth $1,000,000 to the Clark Co.

"Charting the Future Markets of the Automotive Industry" was considered from somewhat different angles by Harry Tipper and C. A. Musselman, general manager of the Chilton Co. Tipper said:

Wide Market for Parts and Accessories

"THE basis of all calculations in connection with any industry is the economic position of all industry and the relation of the particular industry to that economic position. Upon this basis must be determined the present conditions and the tendencies of our particular industry with the aspects of its future possibilities. This again is divided into the groupings within the industry. For instance, the market for new products or the equipment market and the market for replacement. It must also be divided into groupings of the products in use and manufactured, such groupings being determined for automobiles and commercial vehicles by price classes more readily than in any other way. Within these various groupings the calculations may be carried further to show the competitive position of the different manufacturers within the group and in considering the particular problem of any manufacturer, they can be applied directly to his own policies.

"In considering the volume of parts and accessories of any type required, the probable future volume, the line of production development, and the line of registration constitute the bases for this consideration. In order to make the calculations, however, the rate of replacement must be determined, and this replacement rate can only be secured by field investigation as there are no reliable figures by which the rate of replacement on a given part can be secured from general statistics.

"The first period in the curve of the growth in any line of industry where a new product is being made is the period of experimentation, during which the product must prove its usefulness. This period is a period of slow development from the standpoint of volume and of intensive development from the standpoint of change in the product itself.

"Then there is the period of absorption during which the product is being absorbed into the social and business fabric. During this period the business tends to grow much more rapidly than the surrounding economic conditions would warrant under any other circumstances. It is a period of rapid development in volume and of much less rapid development in the character of the product.

"The third period is the period of adjustment, during which the product in its volume and character is being adjusted to the surrounding social and economic conditions. This is the period when the curve of development begins to flatten quite sharply as to volume and price changes, changes in character, and other adjustments in policy are frequent.

"Following the period of adjustment there is the period of stability when the growth of the business in volume is limited to the growth of population and wealth because it has become thoroughly adjusted to the surrounding economic requirements and cannot grow more rapidly than the business fabric or social fabric of which it has become a part.

"The automobile business is at present in a period of adjustment. The period of experimentation lasted until about 1910; the period of absorption until about 1920, and we have entered upon the period of adjustment.

"From these calculations, the curves of production and of registration have been arranged showing the probable future development of these in volume during the next few years. These curves are what is known as probability curves and they are much more accurate than the usual curves considered by commercial business because they are mathematically calculated in accordance with the understood law of directional flow and not merely indicative of the balanced areas of either volume or price.

"These statistics have been again divided to show the relation between this general curve of production and registration, and the various price groups within the industry. They are being carried further so that they will indicate the development in the various territories or geographical areas so that the registration in these areas would indicate the varying condition of the market in the particular territories.

"I have samples of two of these territories showing the registration curve in its relation to the population curve. In one of these territories the registration curve has arrived almost at a parallel direction to the population curve so that in this area the new registrations will be practically limited to the increase of population and wealth.

"In the other example, the direction of the registration curve is still much more sharply upward than the population curve, indicating that it will be some years before the market will be stabilized to the same point in this particular territory.

Analyzing Markets

"It is obvious that the future market in these territories represents the different potentialities from the standpoint of sales and from the standpoint of needed volume. The total volume of parts and accessories required is represented by the production volume in any given year on this curve plus the replacement needed for the vehicles in use, as shown by the registration curve. This volume, of course, varies tremendously in accordance with the rate of wear of the particular part of any accessory and consequently the actual replacement requirement.

"Investigation into the replacement is the most difficult part of this examination of the market because we have not yet arrived at the maximum requirement of service with the large portion of the volume of cars already in use and because there are no general statistics other than those we could gather ourselves by field work as to the rate of replacement for the particular part. It is necessary, therefore, for us to investigate in different sections of the country, the extent of sale required to service the cars in that particular area and from these investigations calculate the average requirement over the whole country for the number of cars in use. Of course, every investigation of that kind adds to the accumulative volume of information and corrects the previous investigation so that it represents a smaller degree of error in the general calculations."

Automobile Industry First in Production Value

"LET us realize that in America the great manufacturing enterprise in value of output is the automobile industry," Musselman said, "Many of us have been of the belief that the steel industry is the largest. Considerable research work through the Bureau of Foreign and Domestic Commerce, the Bureau of the Census and the Bureau of Mines at Washington, has resulted, however, in obtaining figures which conclusively place the automotive industry first and its allied industry, petroleum products, second, and it may surprise many to learn that iron and steel manufacturing ranks sixth. Agriculture has been excluded as farming can scarcely be classed as a manufacturing enterprise.

"The dollar value annually of America's ten leading manufacturing trades is as follows

Automotive Industry (cars, trucks, tires and replacement parts)	$2,865,000,000
Petroleum Products (45% automotive)	2,050,000,000
Slaughtering and Meat Packing	1,935,000,000
Foundry and Machine Shop Products	1,900,000,000
Lumber and Timber Products	1,675,000,000
Iron and Steel	1,650,000,000
Clothing	1,530,000,000

Flour Mill Products	1,275,000,000
Cotton Goods	1,250,000,000
Boots and Shoes	1,100,000,000

"Calculated sales of automotive products for 1922 have been divided into four classes:

Cars and Trucks	$1,490,000,000
Replacement Parts	550,000,000
Tires	675,000,000
Accessories	150,000,000
Total	$2,865,000,000

"If we add to the above figures the sum of $935,000,000 representing the value of gasoline and lubricants annually necessary to motor vehicle operation, we arrive at a grand total of nearly $4,000,000,000. And even this enormous sum does not include the cost of labor and administration.

"*We have now reached the turning point in the automobile industry.* We no longer look to new owners to obtain the greatest volume of sales. Until 1922 the majority of cars turned out by the factories went to new owners. This year the ratio has changed and for every two cars that go to new owners, three cars go to old customers to replace those which are scrapped. Carefully made calculations for 1922 show 825,000 motor vehicles for new owners, 1,200,000 for old customers. Of this great total of over 2,000,000 cars produced this year the division of passenger cars and trucks is as follows:

Passenger cars	1,800,000
Trucks	225,000

"It is now obvious that the majority of automobiles to be made hereafter will have to go to those who already are car owners but I, for one, feel the time will never come when new buyers will cease to demand motor cars in large numbers. Every year will bring its harvest—a new generation—a new army of buyers. Everything indicates a continued expansion. To realize this expectation, manufacturers of parts, tires and accessories will have to prepare for the waves of prosperity, as the incoming tide will surely flood those who do not build well for the future.

"For ten years the parts makers have been drawing their chief profits from sales to car manufacturers. Only five years ago—in 1917—five-sixths of the vehicles went to new car owners. Today the situation is entirely changed and the great market is the replacement field. The extent of this change as already accomplished, is shown by these comparative figures for 1917 and 1922 of *sales for replacement purposes:*

	1917	1922
Cars and Trucks	$279,022,000	$850,000,000
Replacement Parts	255,000,000	550,000,000
Tires (replacement)	390,000,000	650,000,000
Total	$924,022,000	$2,050,000,000

LACK of adequate parking space in cities has become a serious sales deterrent, in the opinion of E. P. Chalfant, president of the Gill Mfg. Co. He voiced the opinion that the parts manufacturers might well join with the other branches of the industry in attempting amelioration of the situation. The used car is an even bigger stumbling block in the way of sales, Chalfant believes.

"While the number of cars and trucks built in 1917 was nearly equal to the total to be turned out this year, the above figures show that sales of replacement parts to service stations have nearly doubled, during this same period.

"What better guide do we want in our efforts to approximate the character of market in 1923 than to figure the number of cars which have well passed their first efficiency and are ready to be rebuilt in whole or in part? And what greater assurance does the parts maker need to guarantee him satisfactory returns from the replacement field?

"With the continued increase in the use of automobiles it is apparent that the replacement market will represent a constantly growing proportion of the total market.

"What are you as parts makers doing to change your sales policies to meet these changing conditions? They are all in your favor if you will only take advantage of them.

Replacement Market Large

"The replacement market is the great opportunity of the present and the future. It offers:

(1) Greater volume.
(2) Greater profits.
(3) Greater independence.

"If we grant that replacement sales loom large on the horizon, then the dealer situation becomes of paramount importance to the manufacturer of parts and supplies for two very important reasons—first, the business of replacement sales cannot be concentrated in the hands of a few companies as is the case with the equipment business; second, the dealer and the service station are the dominating factors in the sales of replacement parts.

"The average amount of business per service station has grown steadily since 1919 from 142 to 177 cars per shop. This shows that the service station per unit offers a greater opportunity for the manufacturer and that, further, these shops are becoming larger and more substantial sources of outlet for the trade. Establishing yourself in the replacement field is a very definite form of life insurance for your enterprise. It's a market which always exists and one in which you can control your own business. To cater to this field requires a close contact between the manufacturer and the dealer and the initiative must come from you.

"Concentration of car and truck production in the hands of a small group of makers obviously endangers the parts and accessory maker whose chief business is factory equipment. Individual initiative and public demand are such potent factors in American life that I for one believe that no group of corporations will ever control the automotive industry. Combinations may have a great effect on the character of the supply and demand, and may divide the channels through which business runs and may result in companies adopting entirely new methods—but the big merger bugaboo has about as much reason for existence as the mythical 'point of saturation.'"

AUTOMOTIVE publicity from the viewpoint of the business paper and the newspaper, was taken up by James Dalton, editor of AUTOMOTIVE INDUSTRIES, and Walter Bermingham, automobile editor of the Chicago *Evening Post.*

Bermingham made a plea for truth and real news value in the material sent newspapers. He does not think that newspapers should eliminate the names of companies and individuals in their automobile pages for the reason that owners of motor cars always are more or less interested in the makers of them. He believes the function of the automotive publicity man is just as important to-day as it ever

was and that he will meet with just as much success if he confines his efforts to real news and sticks closely to the truth.

Both Bermingham and Dalton asserted that the signing of an advertising contract should not be used as a blackjack in an attempt to sandbag editors into giving space to publicity which is utterly worthless from a news viewpoint. The same position was taken by James E. Sullivan of the Boston *Globe* in a discussion of the papers.

Make Trade Paper Publicity Truthful and Informative

IN outlining the news needs of a business paper in the way of publicity and how publicity departments can help in this respect, Dalton said:

"More seems to be expected of trade journals in the printing of publicity which amounts merely to "puffs" than of newspapers. But as a matter of fact there is less excuse for using it. The function of a trade paper is to be informative. It never has space enough to carry all the informative material available for any single issue. Nothing should be printed in a business paper, except the editorials, which does not contain news or information. That applies just as much to a technical article as to a story on the formation of a new company.

"We are striving to keep our material up to the minute in freshness and I'm sure you want to help us to do it. Here are just a few suggestions as to the kind of material in which we would be interested so far as the parts branch of the industry is concerned:

Complete and technical descriptions of new products.
Descriptions of changes in old products.
Changes of personnel among executives.
Factory expansions or removals.
Reorganizations.
Consolidations.
Refinancing.
Financial statements.
Production figures.
Court decisions in patent litigation.

"Surely every plant can produce news falling within some one of these categories.

"Here are a few suggestions which, if they are followed, will make your publicity more welcome:

"In descriptions of new products or changes in old, let the facts speak for themselves. Don't make exaggerated or ridiculous claims for them.

Publicity "Don'ts"

"In the preparation of any kind of a story boil it down to the essential facts. Don't fill it full of meaningless adjectives and try to get half a column for what is worth half a stick on its new merits.

"Don't try to put over a story of no intrinsic merit on the strength of advertising contract.

"Don't take it for granted that an advertising agency is well equipped to turn out publicity which will be acceptable.

"Try to make your publicity absolutely truthful.

"Try to measure the value of your material by the amount of reader interest it contains.

"In sending out releases give the trade papers a square deal by giving copy to them far enough ahead of the newspapers so that they can at least get an even break in printing it.

"Try to remember that trade papers are all within the family and that when you give a story to them first it loses none of its news value for the newspapers.

"Try to think of the business paper as a friend who is constantly striving to serve you. When some trade paper representative calls on you don't treat him as you would a stranger or a casual visitor but try to realize that he wants to help you solve your problems and that he can't unless you are frank in telling him what those problems are. We can serve you better if we have rock bottom facts to work on and when you give us those facts it doesn't mean we are going to print all of them.

"Don't give us everything in confidence, however, promising to give us first crack at the story, then release it to the newspapers so we'll be a week late in printing it and then blame us if at some future time we make use of material we get without obtaining affidavits and permission from you after a few unhappy experiences of that kind. We always keep our promise about releases, frequently to our sorrow.

"Don't expect us to assume an attitude of watchful waiting so long that everything we print will be ancient history. We can serve you best by giving you advance information. You always are glad to get it when it concerns the other fellow and you ought to be willing to give up a little of it now and then when it concerns you.

"Try to keep in mind that there are certain kinds of publicity of deep interest to the business paper which are of no possible interest to the newspaper. Don't direct all your energies to obtaining publicity in newspapers. Remember that a considerable portion of it will be of more value to you in the business press. You always are willing to suit your convenience to that of the newspaper. Why not try some of the time suiting the convenience of your business paper?

"Keep it in mind that exceedingly valuable good will for your company and its products can be built up through business papers and business papers alone. They are addressed exclusively to potential purchasers and in them you don't waste any of your information.

"We will meet you more than half way. We will send one of our engineers any reasonable distance to get a technical description of a new product or a new process. We always are glad to pay tolls on news stories by telegraph. We don't expect you to do all the work. A new model or a new process is as important to us as a good murder is to a newspaper and we are willing to pay to get it."

A. R. ERSKINE, president of the Studebaker Corp., in a message of cheer to the convention, predicted that passenger car sales in the fourth quarter would fall off about 40 per cent, but that 1923 will be the greatest year the industry ever has known.

JOHN C. LONG, secretary of the educational department of the National Automobile Chamber of Commerce, speaking for Edward S. Jordan, who was unable to be present, said he believed advertising which created a desire in the mind of the person reading it, for the product advertised was more effective than that which was designed exclusively to emphasize the characteristics of the product. He expressed the view that copy for both vehicles and parts is steadily improving in quality.

Maurice Switzer, vice-president of the Kelly-Springfield Tire Co., asserted that the average advertising manager is not vested with sufficient authority to get the best results and that copy which is censored by executives who know nothing whatever of the psychology or technique of advertising loses most of its force.

Explains How to Cut the Cost of Advertising

CUTTING advertising costs through standardization of sizes and forms in selling literature was considered by J. C. McQuiston, manager of the publicity department of the Westinghouse Electric and Manufacturing Co.

"Almost every advertising man believes in the standardization of printed matter," McQuiston said. "What all are looking for is the standard or standards. That efficiency and economy will come from standardization there can be no question. How to get the standards is the problem that is to be solved." Giving his new idea of the solution, he said:

"You ask how these standards may be brought about. I suggest that the Advertising Council of the Motor and Accessory Manufacturers Association is one of the logical organizations to start definite work towards standardization. It seems to me if a small committee were appointed by the Advertising Council of the M.A.M.A. to work with representatives from other national organizations, particularly the Industrial Advertising Association, the Association of National Advertisers, the Society for Electrical Development, the Automobile Chamber of Commerce, the American Electric Railway Association, Paper Manufacturers Association, United Typothetæ and other organizations, to make a study of this situation, and make it acceptable to the various classes of industry, this would assure the support of such standards as would be adopted.

"I suggest that through the medium of the Associated Advertising Clubs, the Direct-Mail Advertising Association, the Association of National Advertisers, jointly or separately, we could bring about a conference on standardization of printed matter that would bring about some results—first getting standards and then working according to those standards. Such a conference should bring in:

> The electrical business, textile business, automobile business, railroads and railways, paper manufacturers, United Typothetæ, National Association of Purchasing Agents, and others.

"In this connection we should recognize the splendid work that is being done by paper manufacturers in bringing about a standardization of paper stock. They have gone a long way toward the realization of the goal I have in mind.

"Let us have a vision for the standardization of advertising matter. As the railroad, the telephone, the electric lamp, and the automobile have been standardized, so may we, the engineers and creators of advertising and printing, also bring about standardization in our work as a goal of efficiency, economy and service."

First M. A. M. A. Export Session Portends Greater Foreign Business

Dorman of Overseas Motor Service Corp. urges increased export activity. Other speakers outline ways and means.

THE export section of the Motor and Accessory Manufacturers' Association is a new departmentalized activity and consequently the export managers' meeting at Buffalo was the first conference of this character to be held at any of the annual meetings. With an increasing interest and trade in the export of unit equipment and accessories to other countries, the section may be expected to grow in importance, as its activities warrant. The Buffalo meeting was a good example of how it may be of service to those manufacturers who are desirous of building up an international commerce in their products.

The program of the conference was built up with the expectation that it would be attended by numerous company officials desirous of ascertaining how their companies might launch their export selling policies. With this in mind, the list of speakers and the topics under discussion were confined strictly to the automotive industry, this being almost an innovation in foreign trade meetings of this character.

Automotive exporters have had but few opportunities to listen to members of their own industry speak about the problems of the trade. The annual meetings of the Foreign Trade Council, such as have been held at Philadelphia, Cleveland and other cities in past years, have no specialized sessions of particular importance to the industry. The N. A. C. C. export meetings, usually held at the time of the New York show, have considered only passenger cars and trucks and consequently have not been of much value to the unit and parts makers, even should they have the opportunity of being in attendance.

The M. A. M. A. section on foreign trade, recognizing this lack, was organized last spring under the chairmanship of W. O. Rutherford, vice-president of the Goodrich organization, to promote the enlarging activities of its members in the international field.

Contact with the industry through a series of bulletins and informative letters has been obtained and the department has co-operated closely with the Automotive Division of the Bureau of Foreign and Domestic Commerce, at Washington, and with other agencies promoting overseas trade. This work, however, has been under way only a few months and is still in the process of development, but there is much to show that it should attain to goodly proportions.

There was indicated at the Buffalo meeting a feeling that the manufacturers both of unit equipment and of accessories have before them an increasing activity overseas. This was brought out by most of the speakers, particularly Gordon Lee, chief of the automotive division, who stated that a number of unit manufacturers had recently requested the assistance of the division in getting their overseas trade departments under way. With the curve of passenger car, truck and other automotive exports on a generous ascension, the importance of foreign development is being brought home to the various makers and Lee is of the belief that many of them will seek to organize foreign activities during the coming months.

S. W. Dorman, vice-president and general manager of the Overseas Motor Service Corp., of New York, acting chairman in the absence of Rutherford, took a strong position on the necessity of foreign effort. He advised that manufacturers should seriously consider foreign trading

activities. He instanced the growth of automotive jobbing companies in many countries, such as Australia, Cuba, Argentina, and others, and he declared that the American products were finding most favorable reception where they were being properly introduced.

He counseled that the manufacturers should quote their lowest terms to overseas buyers and he declared against a general policy of giving open territorial rights on all except a few highly specialized products. Selling through jobbers, or direct to the dealers, almost always worked out to the best advantage where exclusive arrangements had not been made. Furthermore, Dorman asked that manufacturers make every effort to ship their foreign orders without delay, instead of holding them up for weeks or months as was the case with some companies whose habit was to think of overseas trade as being merely an opportunity to dispose of some excess production. Dorman believes that foreign sales should take up a definite volume of production that will extend throughout the year and not merely when factories find sales in a lowered state at home.

Financing Shipments

Financing was one of the major subjects under discussion and here the export men heard it discussed from the standpoint of their own industry, rather than by bankers or general credit men who were not intimately acquainted with automotive conditions. One of the speakers on this subject was Glyn Davies, foreign manager of the General Motors Acceptance Corp., who is in charge of the financial end of the large overseas business now being done by the G. M. C. units. Davies considers the use of bankers' acceptances as the most workable means of financing export shipments and he stated that there should be close financial co-operation between manufacturers and the buyers. He does not believe that cash against documents in New York, the terms so frequently used by automotive manufacturers, can be maintained for any except a few products and, while he does not counsel that unrestrained credits be given, he stated that manufacturers should not require the earth from their buyers. Also, he does not consider it a part of the American manufacturer's task to finance time payment sales at retail in other countries.

The manufacturer may, perhaps should, finance the shipment to its destination—doing so by the use of acceptance credits or open credits in some cases, with a guarantee posted in advance to cover expenses should the shipment be refused—but time retail sales should be financed by the distributer or dealer. Another point particularly stressed was that manufacturers and dealers should not tie up their credit arrangements in such a way as to gamble in foreign exchange. Immediate covering by the dealer for his dollar needs was given by Davies as being the most satisfactory policy.

George F. Bauer, the foreign trade secretary of the National Automobile Chamber of Commerce, also discussed foreign financing, telling about the efforts the Chamber is making to arrange more favorable reception to automotive paper with the banks. This, if successful, would result in co-operative arrangements between manufacturers and banks, foreign shipments being financed as follows:

1. Dealer or overseas buyer posts a guarantee of 25 per cent.
2. Manufacturer discounts draft for 80 per cent of the face value, leaving other 20 per cent standing until transaction is completed.
3. Bank insures itself against credit risk and charges premium of about one per cent for six months to manufacturer.
4. Interest on credit extension is charged to the buyer.
5. Control of shipment, as collateral, is retained by bank until payment is effected.
6. Disposal of shipment, if rejected, is provided for in cooperative arrangement between bank and manufacturer, whereby latter contracts to give preference to returned goods in filling any export orders on the books.
7. Expense of returning any rejected shipment is amply provided in buyer's guarantee of 25 per cent, which is forfeited in event of rejection of the goods.

Gordon Lee outlined the work that the automotive division has under way and he related the efforts being made to obtain better statistical information concerning the monthly export shipments. The division is seeking a method by which the shipments of unit parts may be classified differently from those of accessories. At present, these two items are listed together and consequently there is no indication as to the totals of either. Manufacturers and export managers were requested to write to Washington insisting that some such separation be made, thus strengthening Lee's effort.

The packing and transportation problems that confront the industry were brought up for consideration by John F. Keely of the Transportation Division of the Bureau of Foreign and Domestic Commerce. First of all, Keely exploded the old theory that American manufacturers and exporters are unable to pack goods properly for overseas shipment. Great strides in this respect, he said, had been made in the last year or so and reports to the Bureau from its representatives throughout the world show that American shippers are now second to none in this respect. The boasted German packing is not up to pre-war standards and it likewise is far from being equal to that of the American shippers, Keely declared.

Chairman Dorman, in discussing the subject, told of a company that had been fined $129 in a foreign port because in marking the shipment a mistake was made of listing the weight at 53 instead of 43 kilos. He also advised that patent strapping would seldom be successful unless it were nailed down. If broken at one place, he said, all of the strapping would be lost but, if nailed, this would not be the case.

Another speaker was George E. Quisenberry, managing editor of *El Automovil Americano*, who discussed the growing trade in automotive equipment and the development that might be expected.

Bright Future Assured

"We can well look forward to the next twelve months as being bright with promise so far as the international field is concerned," he said. "The hold-over stocks of automotive equipment, practically everywhere, have been completely liquidated. New buying has begun, the financial and business depression is passing and the important currencies (excepting only some European countries) have come back so far that their depreciation is no longer a hindrance to buying.

"The export situation is tending to become everywhere more favorable. We are shipping abroad more automotive vehicles than in any other year of the industry, except only 1920, and we are making a big dent in that. We are beating 1919, which we thought was mighty good at that time, and the shipments now going forward from the United States and Canada are from 400 to 600 per cent of what they were during the low point of 1921. Month by month, with but few exceptions, the curve has been upward since the summer of last year and the detailed reports from the various territories indicate that demand will continue to grow."

The chief action of the traffic department was to recommend the appointment of a M. A. M. A. traffic committee which does not exist now. Then have all companies work through the M. A. M. A. traffic committee. This matter probably will come up before board of directors for action.

Dealer Representatives Discuss Used Car Selling Plans

Trading allowances given by manufacturers denounced as price cutting of the most destructive kind. 28 dealers in one city have such allowances. Central appraisal plan, maximum allowance plan, and the market value information plan are analyzed.

By Neal G. Adair *

IF a group of automobile manufacturers could have sat behind portieres in Chicago last week and listened to half a hundred automobile dealer association secretaries and dealers discuss causes of the used car "problem" their ears wouldn't have burned much. In two whole days of talk about used car losses and means of avoiding them the conference kept away from the favorite pastime of some tradesmen of blaming it all on the manufacturers. This used car meeting, while calling attention to a few policies of some manufacturers that contribute to dealers' used car troubles, came to the conclusion that the dealer himself must right what he thinks are his wrongs and that he can do it by application of knowledge supported by co-operation.

The conference, called by the National Association of Automobile Show and Association Managers, brought together trade association secretaries and a number of dealer members of associations from most sections of the country east of the Rockies. Dealer associations in such large cities as Chicago, Detroit, Cleveland, Kansas City, St. Louis, Boston, Baltimore and Indianapolis were represented. Still other large cities were registered. Robert E. Lee, secretary of the St. Louis Automobile Dealers' Association and acting president of the National association, was in the chair. After the discussion the association decided to compile a Used Car Merchandising Manual, which will outline the principles of profitable handling of used cars, summarize the various co-operative plans which associations and groups of dealers have employed to combat destructive competition and set forth the machinery of these plans. The manual will be made available for dealers and the various dealer associations.

It has been said that the conference did not chastise the manufacturers. It did consider in open discussion, however, such policies as trading allowances and the forcing of car shipments beyond the reasonable market capacity of a dealer's territory, both of which were condemned as obstacles to establishment of definite used car market values. It was generally agreed that establishment of such values based on local conditions and education of dealers and car owners to their reasonableness would go a long way toward elimination of present difficulties in the used car field.

THE discussion of trading allowances brought out reports that there were three or four prevailing in most cities, a few more in others and, in one city where the trade is thoroughly organized in used car co-operation and so has competent sources of information, dealers have special trading discounts on twenty-eight makes of cars. Delegates frankly branded such allowances as confessions of weakness on the part of manufacturers making them and as acts of price cutting of the most destructive kind.

On the subject of allotments the secretaries generally felt that manufacturers were entitled to hard, intelligent work on the part of their dealer organizations and that often it is failure to give this service which brings a dealer forward with complaints that he is being forced to take too many cars. The conference regarded most manufacturers as appreciative of the fact that only profit-making dealers are good dealers and attributed much of the over-allowing that prevails in the used car field to the failure of many dealers to understand the steps that lead to net profit.

There was no support of a suggestion that the industry stop trading. It was conceded that while private sales of used cars should be encouraged where conditions are right, the average owner has neither the time nor the means of finding a buyer. But the dealer performing the service for the owner should not do it gratuitously but insist upon a fair profit and manufacturers should assist the process in every possible way.

GETTING into the dealer's own problems, the conference made an exhaustive study of co-operative plans, which in some cases have helped dealers banded together in an association to reduce their used car losses. The plans fall into three general classes:

1—Central appraisal plan.
2—Maximum allowance plan.
3—Market value information plan.

The central appraisal bureau plan has various modifications. In some cities an association or group of dealers employs an appraiser who values all used cars offered in trade to the dealers supporting the bureau. The appraiser's figure is regarded as the maximum price which should be allowed for the car. If a dealer can get it for less so much the better for him. Some of these bureaus also take on the character of a used car exchange, not only appraising but actually buying, reconditioning and selling used cars as a corporation operating for the dealers who own it. The dealers have no used car departments. In other places the bureau merely makes the appraisal for the dealer who sends in a car, also reporting the appraisal price to other co-operating dealers who may inquire in case the owner also offers it to them. These used car ex-

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changes and central appraisal bureaus have worked at least fairly well in some small cities. None, so far as is known, has succeeded in a large city.

The maximum allowance plan is found in numerous modifications of the Saginaw plan, which has been in operation in the Michigan city for eight years. Under the original plan maximum fair price allowances on all models of all makes of cars represented in the city are stated by the dealers with agencies for these cars. The lists are compiled and printed in a book distributed to co-operating dealers by a central committee which also, on the basis of market values, fixes maximum allowances for cars not represented in the city but more or less frequently offered in trade. The allowance price books usually are of vest pocket size, with loose leaves so that price changes, due to new car price changes or other causes, can be put in promptly without inconvenience. Boston and some other cities have modified the Saginaw plan by basing maximum allowances on a careful checking of current market values effected by gathering and averaging used car selling prices reported, usually weekly, by co-operating dealers. Whether individual dealers or the central committee states the maximum allowances there is generally a ground-work of used car value depreciation on a percentage basis.

In Boston, now, 1922 models are listed at 65 per cent of list, 1921's at 55 per cent, 1920's at 40, 1919's at 30, and 1918's at 22. Some other plans allow only 60 per cent for a year old model.

The market value information plan is an exchange among co-operating dealers of used car selling prices. In several large cities, including Chicago, Kansas City, St. Louis, Cleveland and Detroit and many smaller cities, the dealer association secretary or a special used car secretary is the pivot around whom the plan revolves. Each week, on a day specified, each co-operating dealer sends to the secretary a list of all used cars sold, giving the year, model and other identifying information, together with the car's general condition and the price for which it was sold. The secretary tabulates the information, multigraphs it, and at the earliest possible moment sends it out to all members. Names of dealers selling the cars, of course, are not included in the report; the secretary alone having this information, which is held confidential.

THIS is the simplest form of market value information service. Improved plans, which most of the cities have worked out, include a listing of cars on hand so that if cars of certain makes and models in any considerable numbers are shown unsold week after week dealers are warned that they are not good cars to trade except at prices which will permit attractive resale offers. In still other cities there are columns in the report for allowance price and sales price. When selling prices show losses dealers receiving the report are effectively reminded of the folly of over-allowances.

It is a foregone conclusion that none of these plans—central appraisal bureau, maximum allowance or market value information—can be introduced or operated without pressure being brought to bear upon individual members of a dealer community or organization. Pressure on a penalty basis has never accomplished anything, except perhaps for a brief period, in any city. Threaten to fine a dealer or throw him out of an association or embarrass his credit facilities at the banks if he doesn't co-operate and you make him an enemy of the co-operative plan. Unless co-operation is based on friendship and mutual trust it won't last because it isn't co-operation. So the pressure which association officers and members bring to bear upon individual members is an educational pressure.

THE individual dealer must be shown that it is to his advantage to give information so that in return he can get information, thus contributing to and profiting by the establishment of used car market values. He must be shown that it is to his advantage to hold used car allowances down to market value figures, thus encouraging other dealers to do the same thing and cut down destructive competition. He must know that it is unsafe to over-allow on used cars by pointing out dealers who have failed because of it. When dealers in a maximum allowance plan are called on the carpet for over-allowance they find it uncomfortable to explain their injection of a destructive element into competition, particularly when shown what it is doing to their own profits. When there is just a sales price information service, without maximum allowance figures, dealers are confronted weekly with the prices that cars are bringing in the market. These constant reminders, with jolts from time to time from their bookkeeping departments, in many cities have helped to discourage the over-allowance habit. There is not much evidence on the central appraisal bureau of used car exchange plan. In Quincy, 80,000 population, only 10 out of 24 dealers are co-operating in the exchange, which appraises, reconditions and sells these 10 dealers' used cars. Yet the conference was told that the plan was keeping down these dealers' losses and would be continued.

MORE than 40 secretaries and managers of automobile trade associations met in Chicago last week and talked about used cars. They called their meeting a National Used Car Conference.

The secretaries were not interested in what others might think of them but in sifting some fundamentals out of the welter of opinions and ideas prevailing about used car merchandising. The same thought impelled their associations to spend the money required to send them to the meeting.

The discussion, on which a manual for the guidance of trade associations is to be based, did not for a moment descend to a rawhiding of manufacturers. It analyzed suggestions for improvement of used car conditions and recognized that in the main dealers must work out the improvement.

An outline of the discussion, in this article, we believe will be of interest to manufacturers' executives.

The principal talk on co-operation was made by L. B. Sanders, secretary of the Boston Used Car Statistical Bureau, supported by eighty Boston dealers. Sanders declared that a business which had cost dealers more than $200,000,000 in used car losses in 1921 needed "a raid by a band of fool-killers." It needed to be made to understand that the dealer with his 20 or 25 per cent commission on a new car has to sell two cars before he gets into his hands the full list price on which the commission is based. It costs just as much to sell the used car as the new and unless the dealer does it without loss, in which the used car reconditioning cost and salesman's commission are included, he does not get the full profit on the new car.

Sanders told how this fact had been emphasized in getting Boston dealers to stop competitive bidding up of used car prices; how the necessity for correct market value in-

formation as a basis for maximum allowance prices had been used to induce dealers to make prompt and correct reports on allowances and sales; how mutual confidence had been maintained by getting dealers to call each other on the phone and learn that a prospect's tale of another dealer's extravagant bid was often pure fiction; how dealers were shown their own and the whole group of dealers' losses in the early months of the year as proof of the need for reform, and how, through newspaper stories and dealers and salesmen's interviews with prospects the public had been educated to cease expecting exorbitant allowances.

The plan has worked so well that associations, some newly formed for the purpose, have taken it up all over New England, buying and using the Boston loose-leaf, vest-pocket allowance price books.

The allowance price list, supported in Boston by the reports of prices the public is actually paying for used cars, is showing dealers that the value of a used automobile is not what the owner thinks it is or what the dealer, in his anxiety to get the owner's new car order, thinks he might get for it. The car's value is what the public will pay for it, and this is the lesson being taught in Boston.

The Saginaw plan, which has maximum allowances given by dealers on their own cars, without the modification by selling price statistics employed in Boston, has a practical feature in the exchange of used cars among dealers, so that as far as possible used cars will be marketed by dealers in the same make of new car.

Of all co-operative plans it may be said that, generally speaking, penalties for violation have passed out. The real penalty for a dealer who allows more than a used car is worth is his loss when he sells it. The "teeth" in the successful co-operative used car plans of to-day are the means which the co-operating dealers employ to show the reckless trader what his losses are and that he cannot escape them. Of these means the foundation is prompt and accurate information regarding market values.

Making Sulphur Free Gasoline and Lubricants

Petroleum Industry, as Well as Automotive Executives, Are Much Interested in Possibilities of the Silica Gel Process

IT has long been known that sulphur compounds are detrimental in nearly all petroleum products. For this reason oil refiners treat gasoline, kerosene and lubricating oils, beside other products, for the removal or partial removal of sulphur compounds, when these are present in material quantities. This is done chiefly by treatment with sulphuric acid which dissolves out the sulphur compounds. The refined product must then be freed from acid by washing.

A new method for removing sulphur has recently been perfected by the Silica Gel Corp. which is said to be less expensive than conventional methods and at the same time more efficacious. The details of the process are of interest primarily to petroleum refiners, but if the results attained are as beneficial as those who have developed the process claim, they will prove of considerable interest to all users of automotive apparatus, and consequently of importance to the automotive industry.

Gasoline and oil which is high in sulphur compounds has a tendency to deposit out a gummy substance, especially when these petroleum derivatives are heated as they are in normal use in an automotive engine. This gum deposits on inlet valves and is believed to account for a considerable proportion of the carbon deposited in the engine cylinder. In some cases it has even caused trouble in the fuel system. It also contaminates the lubricating oil and accelerates its deterioration. Since Pennsylvania and Mid-continent crudes are low in sulphur content, the refined products made from these crudes have given relatively little trouble from sulphur content. But the introduction of certain other crudes, especially those from Mexican sources, which are high in sulphur, have led to much trouble.

Gum formations are said to have been attributed at one time to the presence of unsaturated hydrocarbons, but since, by treating with sulphuric acid it is said to be impossible to make a product low in sulphur without at the same time losing a considerable proportion of the unsaturated hydrocarbon, and since products high in sulphur are frequently high also in unsaturated elements, the shrinkage caused by a treatment sufficient to remove the desired amount of sulphur is high. There is a temptation for the refiner to leave the product as high in sulphur as successful marketing will permit, thus saving as much shrinkage as possible.

The Silica Gel process is said to enable selective and complete removal of sulphur compounds without a corresponding removal of unsaturated hydrocarbons, thus leaving in the fuel elements which are believed to be highly desirable when free from sulphur.

Silica Gel is in gelatinous form only in one stage of its manufacture. As used in the process here referred to, it is a hard glassy material having the appearance of quartz sand, which is ground to a fine powder. It has the chemical formula SiO_2. It is said to possess a highly porous structure, the pores being of exceedingly small and uniform size. The pores are said to effect a selective separation of the liquid having the lowest surface tension from a mixture of hydrocarbon liquids, and since the sulphur compounds present in petroleum oils have lower surface tension in relation to pure hydrocarbons themselves, the former can, it is claimed, be completely separated from the latter, when treated with the proper proportion of silica gel.

Prominent executives in the automotive industry are understood to be much interested in the process, and certain of the oil refiners are known to be negotiating for rights under the Silica Gel Corp. patents covering the process.

Midwest Engine Compression

AN error was made in regard to the compression of the new Midwest passenger car engines in the description which appeared in AUTOMOTIVE INDUSTRIES of Aug. 10.

Model 411 and 412, which are the $3\frac{5}{8}$ x 5 in. jobs, carry 90 lb. compression instead of 75 lb. as indicated, while on the model 410, compression is 95 lb. instead of 80 lb.

New French Light Car Has Four-Cylinder Air Cooled Engine

First departure in France from conventional water cooling. Belt-driven centrifugal blower, mounted in front, forces air through cast aluminum jacket. Cylinders are cast separately with vertical cooling fins and have vertical valves seating in head.

By W. F. Bradley

AIR-COOLING has never found much favor among the automobile manufacturers of Continental Europe. Even the prominence given to 67 cu. in. light two-seater cars, during the last three or four years, has failed to bring forth anything but four cylinder water cooled jobs.

The first break away from this preference for water cooled power plants has been made by a French company formed to produce the S.A.R.A. light car with a four cylinder air cooled engine to the designs and patents of engineers Tiserant and Piazzoli. Incidentally this is the only four cylinder air-cooled job in France and also the only one with a forced draught of air.

The S.A.R.A. has four separately cast cylinders of 62 by 91 mm. with vertically placed cooling fins and vertical valves in the head, operated in the usual manner by push-rods and overhead rockers. The four cylinders, which are mounted on an aluminum basechamber, are surrounded by a cast aluminum air jacket with which is combined a centrifugal turbine in the forward portion, immediately behind the dummy radiator. The turbine is driven from the crankshaft at one and a half times engine speed by a broad woven camel's hair belt. Eccentrically mounted ball bearings are used for the turbine shaft, thus allowing of taking up slack in the belt.

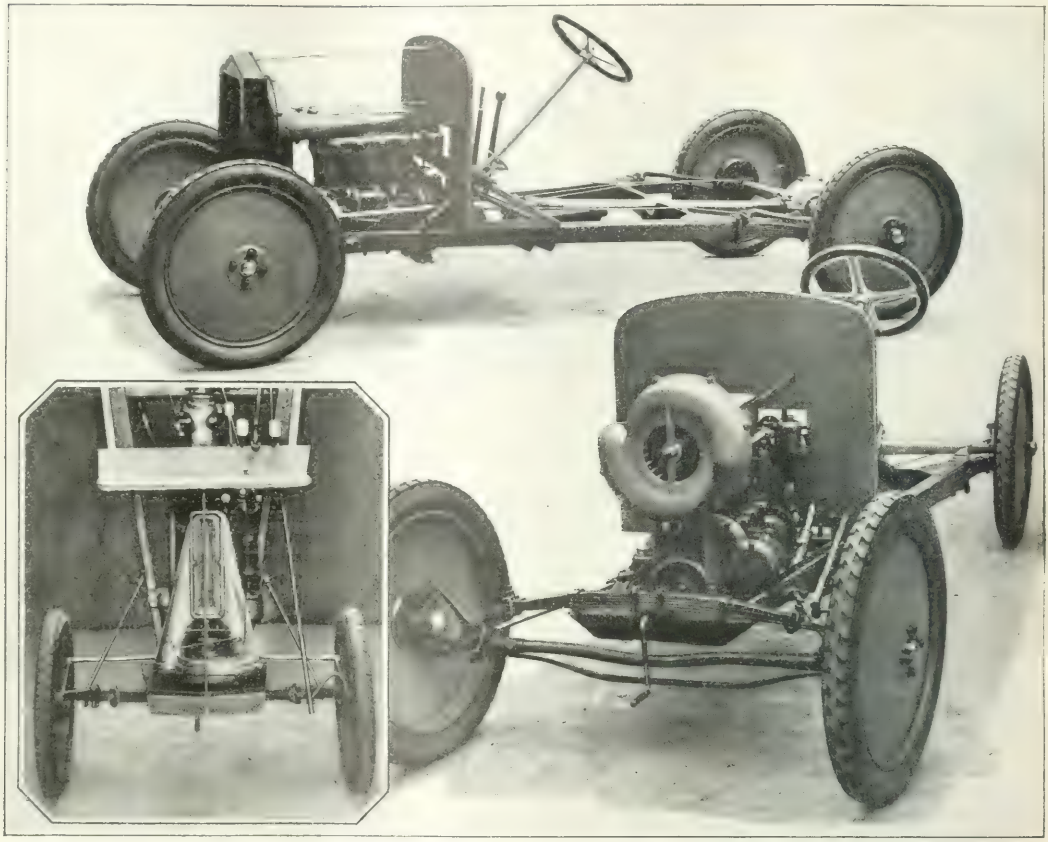
The turbine is capable of handling 56,000 cu. ft. of air a minute. It draws the air into a spiral housing and delivers it through the two main air leads forming a V when seen in plan view, to left and right of the cylinder heads. The portion of the air jacket immediately above the cylinder heads is removable for access to the valves, and on its inner face is a baffle which serves to deflect the horizontal current of air downward, around the cylinder barrels. The shape of the air passages has been designed to reduce resistance and the interior is finished off perfectly smooth, with a view to securing efficiency and silent operation.

OFFICIAL tests of this engine have been made at the laboratory of the Automobile Club of France, under the direction of Engineer Lumet. Of six individual one-hour full load tests, the average power developed was 28.93, at an average crankshaft speed of 2668 r.p.m.. The maximum engine speed was 2720, and the lowest speed to which the engine could be throttled was 210 r.p.m. These trials were made with an American Bosch magneto and Solex carbureter. There was no misfiring at any time, the cooling was satisfactory, and the engine was free from vibration. The engineers responsible for the S.A.R.A. point out that being stationary instead of in motion through the air, the turbine absorbed more power than would have been the case had the engine been moving over the road at the corresponding car speed. The difference probably would have brought the power up to 30.

As the cooling is designed to be adequate for the most strenuous conditions, the engine will run too cold on average service. On this account a throttle is fitted in the mouth of each of the two main air passages and a single control brought up to the dash. A distance type thermometer is also fitted at the base of the air jacket, between cylinders No. 2 and 3, with its dial mounted on the dash by the side of the throttle. The most advantageous degree of heat is marked on the dial, and clients are recommended to adhere to this, by the use of the air throttle.

A TWO ball bearing crankshaft is used for the engine. The connecting rods are I-section and of bronze-aluminum alloy. Pistons are of aluminum alloy. Lubrication is assured by a gear pump which delivers oil direct to the crankshaft bearings and to troughs for the connecting rods. The intake manifold arrangement is one which is finding increased favor among Continental engineers. A perfectly straight manifold, of uniform section, polished internally, is employed. A Solex carbureter is mounted at the dashboard end by means of a flange. A hole is cut in the dash so that the driver can reach the carbureter without moving from his seat. This type of mounting is used, among others, on the Voisin 12-cylinder engine.

The weight of the engine, including its accessories, is 175 lb. The chassis has a wheelbase of 99 in., a track of 43 in., and weighs, complete, 640 lb. The S.A.R.A. has a three speed gearbox forming a unit with the engine, an inclosed propeller shaft and Gleason gears, without a differential, in the rear axle. Springing is transverse in front and quarter elliptic at the rear. The latter, as will be noted by reference to the cuts, are bolted inside the channel section side members of the frame, and radius rods are fitted above the spring. The radius rods are hinged to the frame at the points at which the rear springs are attached.



Three views of the new French S.A.R.A. chassis equipped with four-cylinder air-cooled engine. Note mounting of blower and arrangement of air ducts, also the radius rods located above the rear springs

2,000,000 Miles of Safe Flying

TWO million miles without fatality is the record that the United States air mail service has achieved. Almost this entire distance was flown with an efficiency of 94 per cent and during the last eight weeks, ending Sept. 9, an efficiency of 100 per cent was attained.

Col. Paul Henderson, Second Assistant Postmaster General, in a talk before the members of the Aeronautical Chamber of Commerce in New York, expressed the hope that night service would be installed by next spring and that day and night service must be maintained if the airplane is to offer much to the mail service.

Plans have been made to light the Chicago field and ultimately to light flying fields every 25 miles between Chicago and Cheyenne. With a beacon light which is visible 40 miles on an average night, there will be no time in which a pilot will not have two lights in sight.

Experiments in the lighting of flying fields has developed an interesting fact, namely, that lights must be so arranged as to give daylight perspective. The ordinary method of flooding a building with light from the sides will not serve for aviation, consequently a system of goosenecks has been devised which will light the field much as the sun would. The planes must carry a powerful searchlight while the field is to be bordered with lights and a colored light centered to indicate the exact spot to land.

The installation of night flying would decrease the time of mail service from San Francisco to New York by 30 hours, making it possible to send a letter across the continent in 28 hours.

Col. Henderson believes that Alaska offers great possibilities for the use of airplane mail service due to the fact that distances are so great. He believes that the government should continue the air mail service while it is in its development stage, but that eventually it should be turned over to private contractors, much in the same way that the mails are now carried by the railroads. He regards airplanes not as competitors but rather as adjuncts to the railroads in the carrying of mail. It creates, he thinks, a new necessity for service for which people will be ready to pay more for than the customary delivery service. For example, bankers wishing to send securities to Chicago may save vast sums of money by quick-mail service.

Air Cooled Engines Not Inherently More Economical

Maximum desirable mean cylinder temperature not known. Lack of data on this and other factors accounts largely for numerical superiority of designs using water cooling. Weight advantage of air cooled type in question. Data on area of cooling fins given.

By A. Ludlow Clayden

WHILE water cooling contains many factors which have been neglected by a majority of engineers, it is probable that direct air cooling is still less fully understood. There are several commonly believed fallacies, one of which is that air cooled engines generally are more efficient than others from a fuel economy viewpoint. This is utterly untrue. The fact is that *certain* engines with direct air cooling have been so designed in other respects that they are abnormally efficient. Also many of the air cooled engines that have been used for automobiles and motorcycles have been so skimped on surface that they run at high temperature with only medium throttle opening. Such engines will be liable to show economy superiority over the average water cooled job, but they will not stand more than short period operation without overheating if anything like full power or the same brake mean effective pressure as the water cooled job is attempted, and they will show no superiority at all over a cooler running engine with proper fuel intake heating. The economy idea arose simply from the confusion of cause and effect which the writer has mentioned before as being difficult to avoid in thinking of cooling problems.

THIS is the concluding article of the series of four dealing with the subject of engine cooling. The articles have created much interest and constitute a valuable contribution to the rather meager literature of the subject. Their value will be further enhanced if readers of Automotive Industries will contribute written discussion or any additional data which will tend to throw light on points which may be in question.

We appear to be on the verge of some comparatively radical changes in the design of cooling systems. The present prevailing type suffers from several disadvantages, most of which can and should be overcome. It is evident that a frank interchange of information on this subject will be of benefit to all concerned.

Perhaps it is an advantage to run an engine hotter than 200 deg. Fahr. mean cylinder wall temperature, which is about the limit of water cooling. Difficulties with piston expansion and with lubrication point rather the other way if anything, but the chances are that the immediate ideal of air cooling is to exactly duplicate the performance of water cooling with respect to such things as valve and spark plug temperatures at least, and this has been the real aim of most air cooled engine designers.

Another fallacy is that the air cooled engine is essentially lighter. Lanchester is very cautious in his statements regarding the possible weight of the cooling system with direct air cooling, and, as has been shown in previous articles, his assumptions for the weight of water cooled systems, though correct at the time, have since proved to be very much greater than the actual facts.

Still, there is more knowledge on air cooling now, too. One of the most important changes of the last few years in aircraft engineering has been the increase in brake mean effective pressure obtained; that is to say, the power from a given size of cylinder. As the brake mean effective pressure increases, so does the efficiency of combustion, and the proportion of heat *necessarily* rejected drops from the heat equivalent of the brake horsepower as in automobile practice, down to perhaps half of that amount or even less.

There is no object in repeating here the calculations given by Lanchester. The important thing to keep in mind is that for any given material there is a best proportion of cooling fin and of spacing or pitch of fins. This is another way of saying that for a cylinder of given size there is a fairly definitely proportionate amount of surface which can be added to it in the form of fins with one constant for cast iron, another for aluminum, another for copper, and so on. The advantage is with the small cylinder, because its ratio of surface to volume is greater. With a small cylinder of automobile size surface, within close approximation to the theoretically correct proportions for the fins may be added and provide about a half square foot per maximum horsepower, using cast fins. With the same standard of engineering on a cylinder of twice the bore and stroke the total possible cast fin surface would be around one-quarter square foot per horsepower.

There are, of course, two present types, the cast fin and the copper fin. Obviously, the only theoretically correct form for a fin section is a triangle, the thickness decreasing as the distance from the root of the fin (the cylinder wall) increases, so maintaining the heat flux at

a constant value and keeping the temperature constant over the whole fin surface. Obviously, too, by using sheet metal a great many more fins can be attached and more surface of a lower average of efficiency obtained. It appears likely that on the score of weight saving the tapering fin has it, but in automobile work, where manufacturing advantage is more important than weight, the reverse may easily be true.

S. D. Herron, who has developed a number of air cooled aircraft designs both for the American and British armies, and is now carrying on his work at McCook Field, has provided the writer with some instructive figures on recent air cooled engines of repute. He says: "With the type of construction used by the Air Service the cooling surface obtainable for a cylinder of any given capacity will not vary much. For cylinders of 160 cu. in. capacity about 0.2 sq. ft. per maximum brake horsepower is required and is readily obtainable. In an aircraft engine cylinder of 70 cu. in. capacity 0.3 to 0.35 sq. ft. is required. These amounts of surface will give maximum output and fuel economy with blast velocities of 90 m.p.h. in the case of the larger cylinder and 60 m.p.h. for the smaller. Reduction of blast velocity will involve reduction of output and increase in fuel consumption.

"THE general tendency is for the surface per brake horsepower to diminish, owing to a slow but steady increase in output obtained, due to increase in brake mean effective pressure and in revolutions from a given size of cylinder. The fin area obtainable for any given size of cylinder will not increase very much with other improvements in design or development.

"For automobile engines having in general lower mean effective pressure and higher revolutions per minute with much smaller cylinders than used for aircraft, the surface available with hemispherical head cylinders of cast iron or cast aluminum will vary between 0.3 and 0.5 sq. ft. per brake horsepower. All the figures given are for cast or machined fins of about ⅜ in. pitch and 1 in. length, as used in modern practice.

"On the Type J aircraft engine of 5⅝ in. bore and 6½ in. stroke the total surface is 11.4 sq. ft. or 0.254 sq. ft. per brake horsepower at maximum output. For the B.S.A. (a British light car) approximately $3\frac{1}{2} \times 3\frac{1}{4}$ in. bore and stroke, the total surface is 4.18 sq. ft. and the surface per brake horsepower at maximum output is 0.492 sq. ft.

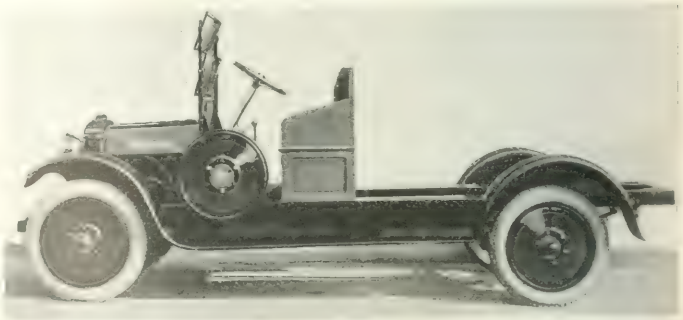
"It is, of course, obvious that the cooling surface for the average brake horsepower (normal running instead of full power) will be in the neighborhood of 1 sq. ft."

ON the question of the volume of air required per brake horsepower per minute for automobile cooling, Mr. Herron states that he thinks 30 cu. ft. probably adequate for severe conditions, but points out that the deciding factor is the length of time it is desired to permit the engine to operate at full power. In water cooling this same consideration occurs, and the writer stated his opinion as being that operation at full throttle and full speed on high gear ought to be possible on any passenger car, and that if such a condition exists with water cooling it will usually be found that the system is adequate to take care of all normal requirements.

Since the air supply with fan-supplied air must be in some proportion to the speed of the fan, the same statement is likely to hold true. It may be pointed out, however, that the reserve capacity or "flywheel" that provides for extra output at low speeds on low gear is, in the air cooled engine, simply the mass of the cylinders, and we have the heat capacity of the castings as compared with that of the circulating water. Now we cannot heat a water cooled engine hotter than boiling which limits the flywheel reserve effect definitely; just how hot we may permit an air cooled engine to go temporarily depends upon many other things.

The oft-repeated question, Why are there not more air cooled cars? can be answered very easily; the available mass of data on their construction is but a drop by comparison with the ocean of knowledge available in the other case.

New Commerce Truck Model



1923 Model 9 Commerce special delivery speed truck chassis

THE Commerce Motor Car Co. has just put on the market its new Model 9, special delivery speed truck. This truck has a 1500 to 2500 lb. capacity and sells in chassis form for $1150 f.o.b. Detroit. With canopy top express body, it sells for $1330.

The new truck incorporates the 3¾ by 5 in. four-cylinder Continental truck engine with three-bearing crankshaft. This is a unit powerplant with a cone type of clutch 14 in. in diameter. The truck is driven through a tubular propeller shaft with a spiral bevel, ¾ floating type of rear axle. The rear axle ratio is 5.87 to 1. The brakes are 16 in. in diameter, both sets being mounted on the rear wheels. The wheels are Michelin steel disk with roller bearings and the truck is equipped with 32 by 4½ in. non-skid pneumatic cord truck type tires, front and rear.

A single standard wheelbase is used, this being 127 in. and a choice of four types of body is provided. These are, open express, canopy top express body with curtains, stake body and panel body. The open express body is $1250, the platform stake body $1300 and the panel body $1430.

Why Railroads Don't Buy More Rail Cars

Some pertinent facts which should interest both sales and engineering departments. Insistence upon conventional automotive construction throughout is one great obstacle. Use of railroad type axles and bearings would decrease sales resistance.

By Donald A. Hampson

IN view of numerous successful installations and knowing the field that is ripe for harvest, the question naturally arises, why don't the roads buy rail cars?

The answer is simple enough. Railroad men don't like automobile construction. They have found out from the experiences of nearly twenty years that the big heavy rail cars do not meet an economic need, in the long run. They must be sold on a lighter car and flexible units.

If an engine manufacturer, for instance, produced a unit that could be set on the truck of an ordinary passenger coach and drive directly to the truck axles, such units would probably sell without resistance in spite of the fact that the coach's capacity is five times greater than is usually needed. Such a car would not smack of automotive construction, but it would not solve the problem any more than its predecessors did. Nevertheless it would appeal to the railroad man because it would include his familiar coach and truck constructions and would be simply driven by an engine similar to that in his automobile. A few years' experience would again prove the proportion of dead load to pay load too great and the disgusted manager would return to his two-car steam train.

To use a catch phrase, the railroad man is "in the driver's seat." This is a buyers' market and the salesman of rail cars must expect to do two things before he can get the coveted signature—his product must reflect railroad practice, combined with simplicity, and he must be prepared to sell the railroad man on economy.

The motor truck in highway service is making it easier to convince railroad men, but the latter resent the idea of any one outside of their own organizations knowing anything about railroads. The automotive man with something to sell is still regarded in the light of an inventor and as such must overcome a natural prejudice. Until a steam boiler of small size is perfected, the automotive salesman must hammer his way through that wall of prejudice. A rail car with steam as motive power is already three-fourths sold.

Before the salesman can hope to do business, his product must pass out of the experimental stage and emerge rationally engineered. And the successful engineer will have to be strong minded, far sighted and unbiased—he will have to waive conventional practice and S. A. E. standards to some extent. He must get the railroad man's point of view.

Confining ourselves to a car less palatial than a Pullman, probably four or six wheels, we must direct attention to perfecting the following members:

1. A better drive from wheels to body.
2. An improved spring suspension.
3. Simpler and more durable axle bearings.
4. Simple rear axle construction.
5. More economical gear ratios.
6. Improvement of the transmitting system from engine to axle.

The drawing, Fig. 1, shows a construction which automotive engineers have apparently overlooked. It is the pedestal drive. In one unit this design is capable of taking care of the first four items named above.

In the final analysis, it will be found that the railroad man will mass his objections around axles and bearings, that he will insist that there the rail car is weak. Cars for use in steam trains have been built with rigid axles

ALTHOUGH many rail car installations are proving satisfactory and highly economical, there is still much sales resistance to overcome before rail cars are used to the extent they can be used with profit. Some of the reasons for this lack of enthusiasm on the part of railway men are here explained by a man experienced in both railroad and automotive circles.

* * *

The information given is worthy of study both by executives and engineers. The future of the rail car depends largely upon getting the railroad and automotive men to cooperate. Conventional railway practice cannot be followed completely in adapting truck chassis to rail uses. Neither can conventional automotive practice be imposed upon the railroad without regard to experience, the value of which has been proved by years of service. Success will be attained only by compromise. The sooner this fact is appreciated the better for all concerned.

and with anti-friction bearings and various devices intended to eliminate hard riding, bearing troubles, friction, maintenance, etc., but not one per cent of these devices ever boasted a duplicate installation because they either failed to show an improvement or their maintenance was out of proportion to their worth.

Automotive engineers cannot justly condemn railroad axles and bearings. Unthinking, they call the familiar journal box construction a low order of design. It is not; it passes the acid test, that of service. It may have been many long months since boxes were oiled, but an overloaded freight car runs serenely on at 35 m.p.h. without attention and carrying bearing pressures as high as 600 and 700 lb. per sq. in. And that bearing can be repacked or its "brass" changed by the most ignorant workman on the force. It is a triumph of design besides which some automobile bearing and oiling systems fade into oblivion.

Such a bearing system is good enough for rail cars. It is simple, it is durable and cheap. Railroad labor can make all the adjustments required. Railroad men are not unprogressive and in this one respect they have standardized on a construction that shows the best all around results—a rail car with such construction starts out with 30 per cent less sales resistance than the one with an elaborate system of anti-friction bearings.

Despite impressions to the contrary, ball and roller bearings do not show the savings expected in single car operation. Exhaustive tests on street cars have shown that plain bearings consume 15 per cent more power in starting than do anti-friction bearings under the same conditions, but this excess has dropped off considerably at 5 m.p.h. and disappears entirely at running speeds. Tests made upon trucks for rail cars have shown exactly the same results.

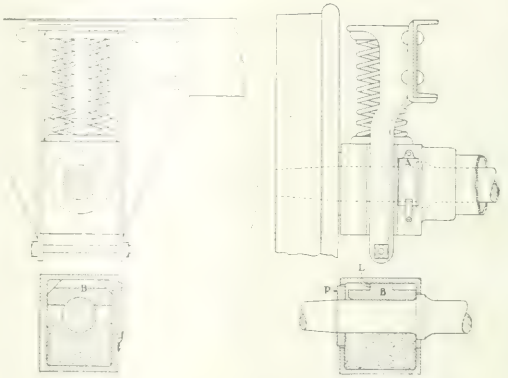


Fig. 1—Diagram showing type of axle bearing recommended by the author for rail car service. It is said to be simpler, much cheaper and more satisfactory for the purpose than the anti-friction types of bearing, and far more acceptable to the railroad man

Why, then, continue the use of ball and roller bearings on axles? The most frequent source of trouble with rail cars has been rear axle trouble, first bearings and then gears. A majority of rail cars are destined to go where repairs will be made in yards along ballasted track. Disassembled axle parts of necessity will be laid down in this dirt—the impossibility of getting these accurately fitting, numerous small parts together again without carrying grit with them is at once apparent. One such actual experience will show the automotive engineer the folly of delicate construction and will arouse his admiration for the time-honored brass of the railroad man.

Ball or roller bearings should be retained in every part where now used ahead of the axle. There is nothing gained by using plain bearings there, in fact, to secure equal results would entail special construction without any gain. Axles are subject to the pound on rail joints, however, and as unsprung weight, aid in the battering that hastens the renewal date of anti-friction bearings.

The axle shown in Fig. 1 has a 3 x 6-in. journal. This size is an M.C.B. standard journal, something that appeals to the railroad man, and is ample to carry any load imposed by a rail car aside from those of the Pullman type. (An old drafting room rule specifies 300 lb. per sq. in. as a working load for car journals, though modern practice deviates from this).

A journal box—better called journal "housing" out of respect to automotive practice—construction involves an axle built specially for railroad work. Axle companies are already making special railroad axles, so it may be seen that the railroad axle is destined to become a stock product. While they are making one, it should be the best one in the light of railroad experience.

The journal housing in Fig. 1 is a casting rivetted to the tubular side members in the usual manner. The differential case is rivetted to the other end, also as usual. Whether or not the differential case houses equalizing gears should depend entirely on road conditions; the divided axle is best on roads with sharp curves, but for use on steam roads, where the curves average only 4 to 6 deg., there is nothing gained but complication and the continuous axle is to be preferred.

Reference to the drawing shows the brass B. a half bearing resting between the sides of the housing. Parallel to the axle center line, the brass is retained between the back wall and a lug L cast in the roof of the housing. As the brass has only one-third bearing on top, it is enabled to adjust itself for track misalignment. The space below the journal is filled with waste and oiled—access may be had through the opening at A.

End thrust is taken between axle shoulders and the ends of the brass. An eighth of an inch play is allowed at this point. In the lurch of the car from one rail to the other, this play must be taken up before actual contact results and as the bearing is loaded meanwhile, the blow is softened on the way. At the outer end of the axle, thrust may be taken against an axle shoulder or against the wheel hub itself or against a removable ring, as shown at R.

The wheel must be removed before a brass can be changed. This is simple work for a railroad laborer, involving no hardship with the relatively light wheels on rail cars even though it be done much more often than brasses actually have to be changed. At this writing it is understood that one concern is working on an axle design wherein the half bearing can be removed by drawing it inwards and lifting it from a pocket, on top of the axle housing, uncovered by a plate. Bearings of this type are removed by placing a jack under the housing, raising it enough so the shoulder on the brass frees itself from the lug, then withdrawing the brass longitudinally.

The center axle bearings can be plain or anti-friction. As these are not subject to the ring of metal to metal,

there is no objection to the ball or roller type. Pinion shaft bearings may well be carried to an extreme of oversize and spacing.

Transmitting the tractive force of the wheels from ground to body and the spring suspension of the body have given engineers infinite study as well as endless worry. The wearing of spring bolts and eyes, the noise and rattle, a drive that will ride easily and brake comfortably—these are the salient features to be considered. One typical motor truck includes 70 parts besides nuts, rivets and cotters in making what the engineers consider a high class construction—these are—

4 spring hangers,
8 spring bolts,
28 spring leaves,
4 straps,
4 shackles,
4 spring clips,
8 grease cups,
6 parts in the adjustable radius rods.
4 radius rod bolts.

Contrast this multiplicity with the design of Fig. 1, which consists of 6 parts for the entire suspension and drive. Two coil springs are used on each side, each end resting in a socket. Spring makers do not hesitate to supply coil springs for such work that will give the best of riding qualities under varying load conditions. Pedestals are rivetted to the frame members just as spring hangers are. The vertical faces of the legs are machined to suit corresponding machined faces in the housings. An easy sliding fit is made and wearing plates (not shown) allow for renewal.

Conventional truck drives and suspension were developed for automobiles and motor trucks. These vehicles encounter road inequalities not dreamed of on railroads and the complication of design may be justified by highway conditions. That is no reason why such complication should be continued for a highway of steel that shows only the space between frog rails as a maximum inequality. Pedestal truck construction may be expected to take away much of the shock, noise and expense of rail car suspension. Its adoption will be one of the strongest points in gaining the favor of skeptical railroad buyers.

The final drive is still an open question. Chains have much in their favor, but shaft drive is more popular, both with automotive and railroad men. Considering the shaft drive, the demand for simplicity is going to center attention on the bevel gear axle with a single reduction.

Here, again, highway conditions have been allowed to cloud the real issue. The tractive force required to move a given load on rails and the absence of real grades make it possible to use a ratio as high as 3 to 1. By so doing more economical engine speeds are obtained, smoother riding results because there is not the vibration in descending grades. A car in which the gear reduction is too great is apt to be "logy" and unresponsive. Gear boxes with four, or even three, speeds can include a sufficient range for starting and economical running without resorting to a big reduction at the bevels. The two-speed axle or selective, nested bevels offer possibilities untouched in the way of economical engine performance and freedom from vibration.

With the pedestal type of drive and suspension, two universal joints are required. Most motor trucks use two universals with conventional drives. The all-metal joint has lost in favor for highway vehicles, but railroad conditions are different—the angularity is never as great on the rails and this opens up the field for a small diameter joint, all metal, of few pieces, and with limited range.

In every field of endeavor, it is slow expensive work educating the trade to your way of thinking. Automotive men have found that out in attacking the railroad problem. The sales department had to suffer for the work of the engineering department and when the (infrequent) sales were made the engineering department had troubles coming their way at full speed. These troubles and the undeniable sales resistance can better be met by adopting the railroad man's view than by any educating process. It means breaking away from the crowd. The break is rational, however, just as much so as it was to break away from existing railway and machinery ideas in developing the automobile. It is one purpose of this article to direct attention to rational lines toward making the rail car a success.

Whether the car is to accommodate 25 or 50 passengers depends upon local railroad conditions and demands. It is the work of the salesman to bring the railroad executive to this frame of mind. It is impossible to run a big car as cheaply as a small one—it is silly to demand space for fifty when the average load is twelve. The railroad man must realize this before he can realize on a less expensive means of caring for his traffic than the steam train—he has got to see it—he has got to learn that he can't keep his cake and eat it, too.

When this point has been reached, it may be found that a car which is a modification of the truck maker's product will answer for two-thirds of the demand. Such a standardized product can be made to sell at a compelling price. Rightly engineered, it will fill the long-felt want on railroads.

The rail car salesman cannot fail to turn the recent shop men's strike to his advantage. In the matter of rail car repairs, the harrassed general manager need not be throttled by union control, for besides the great army of garage workers, every man who cares for his own car is capable of doing ordinary running repairs. The inconsistency of the claim that rail cars are more expensive to keep up may be noted by comparing rail car figures with the $300 and $400 per month that is spent on the maintenance of even light locomotives—and the end of the strike's first week revealed hundreds of these rugged pieces of rolling stock gone bad already.

During the year of 1921 there were 1626 miles of railway lines abandoned in the United States. Practically all of this mileage was steam roads. And during the same period the Interstate Commerce Commission received applications for abandonment on 760 additional miles.

Of the lines abandoned, one-sixth of the total mileage has been permanently discontinued and the tracks torn up. The remaining lines have been left a prey to the elements—either as not justifying the expense of removal or in the hope of resuming operations at some more favorable time. Not all of the fifty-six roads that were abandoned wholly or in part are in the "short line" class; for instance, the Colorado Midland, which abandoned its entire 338 miles, for the operation of which it was equipped with 63 locomotives and 800 cars.

The reason for such extensive abandonment is found in the oft-repeated tale of light traffic and heavy operating expenses. Some of these lines were already in receiver's hands, others were unprofitable sections of trunk roads, and the greatest in number were the smaller roads; compelled to give service established during other and more prosperous days, a shifting of population or exhaustion of natural resources has made continuance of that same service unprofitable even though labor and maintenance had remained at original levels. The same

is true of service maintained on many lines that are not abandoned—other service is earning the revenue that is "carrying" the light traffic sections. The management of one of the largest Eastern trunk lines states that 32 per cent of its total passenger traffic earns less than the cost of coal and the train crews' wages.

Railroad men have dreamed of lowered labor costs and a less expensive mode of operation, and this is true of the lines annually abandoned but not taken up, for, if cars could be developed to run for "cents per mile" instead of dollars and these cars did not require the perfection of roadbed necessary for steam trains, then the existing traffic could be handled at a profit. The automotive engineer rises to state that the rail car is already here and will do all these things. True, we have the rail car and the manufacturers are in a position to supply several thousands of existing types within a year though, actually, the sales are so infrequent as to excite newspaper comment when made.

Beyond question the most satisfactory installations of rail cars thus far made are those in which standard motor trucks have been adapted to railroad purposes. Intensive study of this type will make it still more popular, particularly on small roads. The adapted motor truck has these advantages which cannot be usurped by the bigger, specially built rail car—due to quantity production, its first cost is far lower and the quality remarkably high; the power plant and transmission is highly developed and these units are thoroughly understood by every automobile mechanic; these parts are standardized, cheap and found in service stations in every part of the country; the cost per mile is so low that the cars show a profit even under very light operating conditions.



Fig. 2—A White rail car being used successfully for carrying freight on a western railway. Note the turntable which is carried under the frame and can be used to turn the car about at any point on the road

It is worthy of note that some of the most successful installations of this equipment have not been by railroad companies. For instance, the Sugar Pine Railway of California had become unprofitable and the owners applied to the I. C. C. for permission to abandon, which was granted. After the road ceased to be a common carrier, it was leased by a large lumber company, which now operates rail cars over its 15 miles, primarily as a plant facility, but affording such service as the sparsely settled region actually needs.

The Harlan Coal Co., in Kentucky, could not afford to continue its steam train and three years ago bought rail equipment for a Dodge one-ton truck. They haul freight and passengers over a nine-mile line and say, "The car easily makes 10 deg. curves with the steering gear bolted fast and takes our heaviest grade (3 per cent) with any load we can get on. It very well serves our purpose and is giving good satisfaction in every way."

What is probably the most extensive use of rail cars in the country is found on the Hetch Hetchy Railroad operated by San Francisco in connection with its water supply system in the Sierra Nevadas. This road forms as severe an application as could be wished to test the roadability of stock chassis; it is 68 miles long, largely through mountainous territory, has maximum grades of 4 per cent and curves as sharp as 190 ft. radius; the railroad man will appreciate how severe these conditions are when informed that (steam) geared locomotives are used on the freight trains. Originally, steam alone was used but, one by one, rail cars have been installed for freight and passenger service until there are now a total of nine such in service.

This equipment includes Packards, Pierce-Arrows and five Whites. One of three White freight trucks is shown by the accompanying cut, Fig. 2. It will be noticed that very little change has been made in the chassis. In front, a leading truck has been substituted for the axle and two wheels and a locomotive pilot added for safety's sake. (These cars operate through city streets as well as out in the open.) The body is specially built for freight service and a glance will tell that it is built for maximum loads, even the space under the overhang at the rear being utilized.

Further details of these interesting cars may be seen. A turntable is part of the chassis. Carried underneath and suspended at the center of gravity, when light, it may be swung around at right angles, overhanging the ties, and then the car jacked up until the flanges clear the rail, when it is swung around to face in the reverse direction. Backward operation would be unsafe on such a mountain line and this device forms a convenient means of turning at any desired point—in connection with the delivery of a load of material or supplies at locations other than settlements or camps, this outfit is as efficient a means of transportation as could be devised. Compartments for blocking and jacks are arranged in proximity to the turntable.

Brakes are supplied on all six wheels. On the rear wheels the drum brakes are supplanted by two brake beams and four shoes bearing against the treads, forming a clasp brake of approved modern design, most efficient and insuring greater comfort in the car. Most of the cars have hand brakes only, but on some air brakes are fitted as well. The front truck brakes are applied through a steel cable running from the steering arm and actuated from the wheel.

This Hetch Hetchy installation is worthy of study from many angles. Extending over nearly a decade and operating under such severe conditions yet with extreme satisfaction, it is a striking example of motor truck versatility.

In the six months ending September, 1921, the road operated these machines over 70,000 car-miles. For that period the average cost per mile, freight and passenger cars included, was 18.2 cents—this including all labor,

supplies, repairs and equipment. One of the lighter cars hung up a record of 12.9 cents per mile!

Railroad men have been doubtful of the success and safety of a single pair of wheels at the rear. If none of the other applications were considered, this one would show that such construction would operate with the greatest success for the two wheels drive all the load that can be carried up their long, steep grades and around sharp curves, while in the matter of trailing there has been nothing shown to warrant the prevalent fear of derailing. The passenger cars run at higher speeds and the rear wheels trail perfectly; some of the chassis have been lengthened to give more body space and this has created a wheelbase as long as 18 or 19 ft.

Other points well proven are the reliability of hand brakes, the durability of stock parts and the ease with which such equipment can be kept in good repair, the economy of lighter dead weight than is found in specially built cars and the flexibility of a fleet of single cars. The latter is a point on which the average railroad official must compromise. A Monday morning load on the Hetch Hetchy may require all nine cars to transport laborers and material, but an engineers' inspection trip during the week requires only the smallest car. In each case the expense is in proportion to the load and there is no running a 60-passenger car for a handful of men.

The use of comparatively small, moderate speed, four-cylinder engines is worthy of note in connection with recent agitation in favor of high speed engines of more than four cylinders. There is little doubt but that a proper selection of gear ratios, as on the H. H., will show the slower speed four-cylinder engine the more durable and economical.

A New Four-Wheel Braking System

A FOUR-WHEEL braking system, developed by A. De Coninck, a Belgian engineer and known as the Adex system, has recently been introduced in this country by J. L. Chantemerle. According to the designer the system has been applied successfully on several European makes of chassis, including Voisin, Excelsior and Nagant.

As will be seen from the accompanying cut, the brake actuating cam is arranged with the center line of its face in the same plane as the axis of the steering pivot, this axis also being that of the cylindrical bearing surfaces of the cam. The shaft which carries the cam is mounted in bushings held rigidly in seats formed in the front axle and therefore moves with it.

It will be apparent that the change in position of the front wheels when the latter are moved in steering the car has, with this arrangement, no effect upon the operation of the front wheel brakes. The brake shoe faces against which the cam bears are made separate from the shoe and are therefore easily hardened. Furthermore, by the use of a stepped rear surface engaging with a similar surface on the brake shoe, the bearing blocks are made adjustable for wear. They are held in place by a bolt which is countersunk in the block and passes through an elongated hole in the brake shoe.

The brakes are actuated by a flexible steel cable attached to the brake arm carried between bearings on the camshaft. With this arrangement no universal joints or telescoping members are required. The working parts are inclosed in a manner similar to that employed on the conventional expanding type of brake. This type of front wheel brake is applicable whether the steering pivots are inclined or vertical.

One feature of the Adex system is the arrangement of the actuating cables. These are connected in such a way as to actuate the brakes on diagonally opposite wheels. In other words the left front and right rear brakes are connected by the same cable while the right front and left rear brakes are similarly connected. As will be seen from the diagram, the cables from the front wheel brakes pass to a pivoted tubular member on which the pedal is mounted. The cables pass through this tube and thence to the brake levers on the opposite rear wheels. At the ends of the tube are arms with segmental end grooves over which the cables pass. When the tube is turned on its axis by pressure on the pedal the cable is pulled taut and the brakes applied. Since the cable can slip through the tube the brakes are equalized and it is necessary to shorten the cable at one end only when it is desired to adjust the brakes. Should one cable break or one set of brakes fail for any reason, the other pair will still operate. The diagonal arrangement is also said to prevent skidding. The cable can be carried over pullies, if arranged to pass through the frame of the car, and the layout can readily be so made that the motion of the axles does not tend to apply the brakes.



The Adex four-wheel braking system showing cable arrangement and details of the front wheel brake

What the Pacific Coast Dealers Are Thinking About

Dealer associations growing in power. Co-operative effort gaining support. Discounts unsatisfactory. Greater contract protection desired. Object to subordinating local firm to car name in advertising. Coast price of cars causes difficulty.

By Gordon Lee *

TREATMENT which manufacturers give their dealers on the Pacific Coast in the next year or two will determine to how great an extent the vast potential sales possibilities of that territory will be developed. Dealers and distributors in that section do not have as close contact with their factories as do some of the middle western and eastern representatives. Consequently, the Far Westerners sometimes have difficulties and "kicks" concerning which the factory doesn't get first hand information.

Intimate conversation with hundreds of these dealers during the last few weeks revealed some interesting thoughts that are in their minds about the factories whose cars and trucks they are selling. In certain instances, the dealer may have the wrong angle. He may be basing his opinion upon personal desires which neglect a consideration of all the factors involved. In other cases, he is probably right and is pointing out a condition which should be remedied for the benefit of the manufacturer as well as himself.

The growing strength of dealer associations all through the West, and especially on the Pacific Coast, is an outstanding fact of present developments. Dealers, garage men, and service men are all getting together in this section. They see themselves as a part of a big family which must pull together for the best interests of all. They are talking things over with one another and are finding that others are having the same troubles as themselves and are having the same difficulties in finding suitable remedies.

The sentiment is growing rapidly that many dealers making united demands will have more chance of attaining their desires than one dealer fighting by himself. The possibilities of organized activity already have been demonstrated to them in certain local instances, and the spirit of co-operative action has become strong.

The present enthusiasm for organization and active dealer association work is caused partly because of certain grievances, real or fancied, which the dealers hold against manufacturers. It is undoubtedly true that the rapidly growing strength of the Pacific Coast dealer associations is due in some measure to the antagonism felt to certain current factory practices.

Pacific Coast dealers on the whole are not satisfied with their contracts. They feel in a general way that they are not given enough protection in view of the big investment in money and reputation which they have at stake in their business.

These dealers point out that nearly every car manufactured to-day has a high degree of mechanical excellence. Nearly all cars in the same price class will give reasonably good performance, so that minor changes in detailed construction or finish are no longer of much value from a sales standpoint. They contend that this fact makes the individual selling ability of the dealer a constantly increasing factor in determining the sales volume of any given car. The dealer is making his sales more and more on the basis of his individual reputation and integrity, his personal standing in the community, and his ability and desire to render adequate service after his cars have been sold.

The dealer must involve practically all of his financial resources, together with his personal reputation. His stake in his business and in the car he is selling is vital to his business existence. His individual existence as a dealer, however, is not vital to the factory, despite the fact that dealer co-operation, taking all the dealers together, is essential to factory success.

Thus, the Pacific Coast dealer feels in need of greater contract protection than he has been accorded in the past and he will seek by every means within his power to get it. The factory which meets him half-way in his attempt to get what he considers favorable terms will have more loyal and sales-producing dealers than will those factories which take action only under pressure.

Especially do the dealers object to the present rate of discounts which prevail. Most of these Pacific Coast dealers are doing business on a 20 per cent discount. They are strongly in favor of having that percentage increased to 30.

Knowledge of Territory

Most factory sales managers have a very meager knowledge of the territories in the West, according to these dealers. They do not generally recognize the great distances that have to be covered and the difficulties that face the distributer in getting about to all of his dealers. The story is told, for instance, of a factory sales manager who visited a distributer in Seattle recently.

The sales manager was bent on "getting the organization

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pepped up." He said to the distributer, "Now let's drive over to Blank to-morrow morning and see the dealer over there. He hasn't been doing so well lately. We'll drop in and pep him up a little."

"Whada'yu mean 'drive over there to-morrow morning'?" the distributer replied. "It takes a day and a night to get there by train."

This was cited as a somewhat exaggerated example of what factory managers know about the necessities of some of their western territories.

Coming on top of this lack of consideration of territorial necessities, many Pacific Coast dealers object to the sales literature which is sent to them. This literature, designed to tell them how to sell the car, was characterized by one representative as "mostly bunk." One dealer claims to have received 22 pieces of sales literature from his factory in 4 days. The result was that he read scarcely any of it. Several dealers expressed a strenuous desire for "more information and less 'pep' in sales promotion literature."

Two main objections are made in connection with the price of cars on the coast. Nearly all the dealers strongly object to the practice of selling a car in California at the F.O.B. Detroit price plus freight, when the car has been assembled on the coast. This practice not only gives the manufacturer an extra profit without benefiting the dealer, but also makes selling a good bit more difficult.

Coast Prices of Cars

The other objection centers about the national advertising of the F.O.B. Detroit price, which is very far away from the price that a man actually has to pay for the car on the coast. The Pacific Coast dealers would like to have manufacturers use a Pacific Coast price in addition to the F.O.B. Detroit price in connection with any general advertising likely to reach buyers on the Coast. Such a practice would make selling considerably less difficult for the Coast dealers, many of them believe, since they have difficulty explaining price differences in many cases.

Pacific Coast dealers feel very strongly that their importance as a factor in making sales is growing at a rapid rate. They feel that the best way to increase sales for themselves and for the manufacturer is to build up their own business to a high standing in the community. For this reason, they object to being asked to spend much money for advertising which features the car exclusively and their own establishment only in a minor way. The stronger dealers, particularly, feel that they are doing as much to make their car a success as the car is doing to make them a success. They feel that ultimately the sales volume will be built up in proportion to the standing in the community of their organizations.

Individuality Big Factor

The dealers may not be entirely right in all of their contentions, as noted previously. It is certain, however, that they are sincere and that they believe there are great possibilities in co-operative effort. There is no question about the growing strength and enthusiasm of the dealer organizations on the Pacific Coast and in the Western States.

The potential power and ability of these associations is great. It can be directed into constructive sales building channels in such a way that it will aid the manufacturer materially. Or the dealers may utilize their power to force changes and policies within the industry. They will not hesitate to use their force in this way if necessary.

The policy of manufacturers in extending definite and specific co-operation to these Pacific Coast dealers during the next few years will have much to do with determining into which channel the potential power of these associations will flow. Manufacturers can utilize this growing power for constructive ends if they consider carefully the dealer problems in this section, get together with their representatives, and honestly try to solve the problems in a way designed to be of mutual benefit. The time to get the greatest benefits from "co-operation" is before circumstances compel co-operation.

Motor Boat and Airplane Exports Good

THE Automotive Division of the Department of Commerce reports a decrease in every classification of automotive exports in July, except motor boats and airplanes. There was, however, an increase in the unit values in all cases. Passenger car exports during July decreased 28.4 per cent in number and 24.4 per cent in value as compared with exports during June, 5600 having been exported at a value of $4,395,541. The unit value of $784 was an increase of $42. The lowest decrease was shown in exports of cars valued between $800 and $2000.

Motor trucks decreased 26.7 per cent in number and 6.9 per cent in value, exports having totaled 822 valued at $734,148 and the unit value having increased $192, the average value of trucks exported being $893. Here again, the smallest decrease was shown in medium-priced trucks or those from 1 to 2½-ton capacity. The unit value of the latter classification increased $487 and that of the trucks over 2½-tons capacity increased $635.

While the leading passenger car markets of the United States took decreased shipments, larger exports to several Latin American countries and New Zealand are in evidence. Brazil took 240 passenger cars valued at $201,179 during July as compared with 90 valued at $91,507 during the previous month. Argentina took 217 valued at $223,994 as compared with 113 valued at $96,128 and 652 valued at $382,726 were exported to Mexico against 563 valued at $369,531.

New Zealand received 140 valued at $99,893 as compared with 59 valued at $50,431.

Exports to Sweden fell to 70 cars valued at $76,406 as compared with 961 during June and 802 during May. The largest decrease was shown in shipments to Canada, only 891 cars having been exported to that country as compared with 1807 during June, Australia took 663 as compared with 816 and the United Kingdom took 523 as compared with 775.

Belgium was the leading truck market, having taken 170 trucks valued at $38,031 during June and 340 valued at $84,405 in July. Canada occupied second place with 117 trucks valued at $225,697 as compared with 156 valued at $250,626. Mexico was third with 105 valued at $45,880 against 135 valued at $65,546.

A BRITISH parts manufacturer advertises a transmission for light cars which weighs only about 34 pounds. It is made with either central or right hand control. This is a three speed and reverse gear and is probably the lightest gearset for stock cars ever produced.

Who Is Responsible for Most Automobile Accidents?

Recent New York statistics prove pedestrians at fault in majority of cases. Drivers to blame for 22 out of 213 fatal accidents on Manhattan Island in first 6 months of 1922. Children and old men usually victims. Better traffic regulation will help.

TRAFFIC accidents in congested centers are increasing to an alarming extent. This is a fact of vital interest to everyone in the automotive industry. It is responsible chiefly for periodic attempts to regulate more stringently the operators of motor vehicles. Real remedies are badly needed and the subject is one worthy of the most careful consideration.

The National Automobile Chamber of Commerce has undertaken a safety campaign under the direction of Edward S. Jordan and considerable valuable work has been done, but long and arduous educational effort must be exerted before anything tangible can be carried through. Municipal authorities are demanding in ever louder tones that something must be done to curb the "juggernauts of the streets" which leave "death and destruction" in their wake.

No one is any more eager than the great majority of motor vehicle operators for sane traffic regulations, which will make driving safer. Drivers who recklessly endanger the life and limb of pedestrians should have their licenses revoked and a jail term would be beneficial for some of them. They are just as much a menace to other drivers as they are to pedestrians.

There are comparatively few drivers, however, who sally forth with the feeling that if any one gets in their way it is the other fellow's fault and he must take the consequences. There are a few who have no more respect for human life than a gun man, but there also are clergymen who violate the regulations laid down for their conduct and exceed the speed limit. But when an occasional clergyman strays from the path of virtue the entire church is not condemned.

It is a fundamental of American justice that a man is innocent until he is proven guilty. But most attempts to regulate traffic and minimize danger seem to be based on the theory that the motorist is always to blame and that if he is regulated sufficiently accidents will cease. This is not true in any sense and statistics prove that it isn't.

The latest quasi-judicial body in New York to propose greater "safeguards" for traffic by more stringent regulations for the motor vehicle driver, is the August Grand Jury. It has sent various recommendations on this subject to the district attorney, the state motor vehicle department, the police and the magistrates' courts. One of its most striking recommendations is the following:

"We recommend that with applications for chauffeurs' and operators' licenses a physician's and oculist's certificate be filed, certifying to the general health, hearing and eyesight of the applicant and that licenses be granted only to those apparently possessing normal hearing and vision."

If this suggestion were enacted into law it undoubtedly would solve the entire problem. It would keep the lame, the halt and the blind off the driver's seat. The proposal opens up an interesting field of speculation, also. For example, how much would the factor of safety be increased if all applicants for licenses were forced to submit to the Binet test? Should licenses be revoked temporarily when young men become engaged, on the theory that they are likely to be nervous and fail to concentrate properly on the work of driving? Should not every driver be compelled to take with him an oculist and a physician every time he goes out, on the chance that he might get a cinder in his eye or suffer an attack of indigestion?

To back up its contentions the Grand Jury submits an impressive statistical table which proves nothing except that motor vehicle drivers were to blame for only 22 of the 213 fatal motor vehicle accidents in the Borough of Manhattan in the first six months of 1922. This statistical table follows:

How Killed	Fault of Driver	Fault of Victim	Crossing Between Streets	Other Known Causes	Unknown Causes	Stealing Ride
Struck, private car	4	16	24	2	17	..
Struck, taxicab	3	7	7	..	7	..
Struck, autobus	..	1	2	..	2	..
Struck, commercial car	8	27	31	..	28	1
Struck, motorcycle	..	..	..	..	1	..
Collision, street car	1	..	..	..	2	..
Collision, two motors	3	1	..	1	4	..
Collision, horse drawn	1	..	..	..	..	..
Collision, other	..	3	..	..	..	..
Miscellaneous	2	2	..	4	..	1
Totals	22	57	64	7	61	2

Miscellaneous includes killed boarding, alighting or riding in motors, skidding cases and overturning of cars.

Other known causes include blinding lights, trying to avoid collision, flushed streets, blown by wind into vehicle.

Criminal carelessness in a fatal motor vehicle accident constitutes manslaughter and it is to be assumed that the police or the district attorney's office made a complete investigation of all these accidents. Such being the case, it is evident that drivers were to blame, en-

tirely or in part, for only a little more than 10 per cent of these tragedies. In more than 25 per cent of the cases, it has been demonstrated, the victims were themselves at fault. Thirty per cent of the accidents were due to "crossing between streets," or "jay-walking." The "jay-walking" habit certainly is not promoted by the motorist.

This shocking list of accidents is a sad commentary on the complexities of modern life. It offers an unanswerable argument in support of the contention that something must be done to cut down street casualties. The automotive industry will admit this as readily as anyone.

But in the face of this ghastly table compiled by the Grand Jury why should the attempt to cut down the toll be made chiefly by further regulation of motor vehicle operators? Why not regulate pedestrians a little more closely? Why not make it a rule of law and equity that a person who "jay walks" does so at his own risk? Traffic is regulated at the more important crossings in the larger centers of population and motorists make no demur. They willingly concede that it is a necessary precaution.

When a traffic officer gives the "Go" signal, is not the motorist justified, however, in assuming that his road will be clear until he is stopped again by the upraised arm of the law?

It is significant that almost coincidentally with the presentment of the Grand Jury, the Health Department of New York made public an analysis of the annual deaths by accident on the city streets. These statistics show that in 1921 most of the victims were between the ages of 5 and 14, the period when children use the streets for play, and over 56, when the infirmities of advancing age decreases their ability to look out for themselves.

"It is evident from these figures," said the report, "that the pedestrians are largely responsible for accidents of this sort because they occurred during the period of life when, on the one hand, they are careless, and, on the other hand, when because of infirmities of age they are unable to cope with the inevitable dangers of street traffic.

"In commenting upon the increase in the number of fatal street accidents we much not lose sight of the fact that it has not kept pace with the increase in the number of vehicles using the streets. If the same ratio between accidents and vehicles obtained to-day as in previous years the fatalities would be many times greater, so that in reality a big saving of life has been effected through the regulation of traffic and the closing of streets for play during certain hours of the day.

"The big need in our city to-day is more playground space for children of the crowded neighborhoods. In such districts, while street traffic may be comparatively light, accidents are more numerous because of the throngs of children on the streets."

The Grand Jury also recognized the conclusions of the Health Department, up to a certain point, by recommending closer regulation of pedestrian traffic at street crossings, similar to that which prevails on Fifth Avenue, and that municipal buses discharge passengers at the curb lines instead of in the middle of the streets. Most of its proposals were directed at the motor vehicle, however, as is evidenced by the following:

That the Motor Vehicle Bureau of the State Tax Department should be more rigid and thorough in tests before granting owners and drivers licenses.

That the traffic regulations should be made more stringent and be more strictly enforced.

That an automatic device should be installed on all commercial vehicles limiting their speed to a reasonable degree.

That whenever possible jail sentences follow convictions for infractions of the law, instead of fines.

That the authorities having charge of traffic matters confer with similar officers of other localities with a view to effecting similarity of traffic regulations and the adoption of a uniform standard system of hand signaling by automotive vehicle operators.

With a full acceptance of their responsibility as users of the streets in which pedestrians have equal rights, the automotive industry and motorists in general should unite in a campaign of their own to cut down accidents. They should begin by agreeing to drive not only cautiously and courteously, but they should insist also upon the pedestrian accepting his share of responsibility and not risking his life by dashing across the street through moving traffic to save a few seconds of more or less valuable time.

Traffic regulation should be upon a reciprocal basis. It should not be assumed that the motor vehicle operator always is wrong. Sane regulation is wise and necessary, but the number of accidents will not be cut down materially by idiotic red tape, which will make it as difficult to get a driver's license as to pass a civil service examination for curator of a museum.

Motor Transportation Services in Uganda

AN extensive motor transport service for both passengers and freight is being operated by the Transport Department of the Uganda Protectorate, with headquarters at Kampala. Thirty-eight trucks of from 1½ to 2 ton capacity and two Guy tractors make up the equipment. Seven of the trucks are of American make, while the rest are entirely of British manufacture and consist of 25 Albion trucks, 3 Thornycroft, 2 Lacre, and 1 Commer. These trucks are available at Kampala, Entebbe, Jinja, and Masini for the conveyance of traffic over any suitable road, and regular routes are maintained, with rest houses along the way for white travelers. The longest distance covered is about 232 miles. All the vehicles are run on kerosene after being started with gasoline and are driven by native chauffeurs, trained by the Department. Passenger rates are 0.5 shilling per mile for white people (one shilling being equal to 22 cents, U. S. currency), 0.3 shilling per mile for Asiatics and 0.2 shilling for Africans.

Notice was given in the Uganda Official Gazette of June 30 that motor vehicles weighing more than 6 tons and imported after June 15 into Uganda would not be licensed under the Highways Ordinance of 1921. The cases of vehicles already ordered but not yet imported were to be considered separately.

Exports of Passenger Cars,

COUNTRIES	GASOLINE PASSENGER CARS						GASOLINE			
	Up to $800		$800 to $2000		$2000 and over		1 ton and under		Over 1 to 2½ tons	
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value
Europe										
Austria	6	$2,386					1	$404		
Azores and Madeira Islands										
Belgium	472	160,048	39	$42,880	11	$30,580	170	38,031		
Bulgaria										
Czechoslovakia	14	5,947					2	1,000		
Denmark	51	21,871	13	15,531	3	8,993	17	4,061		
Esthonia			1	1,013						
Finland										
France	68	34,359	11	12,158	6	20,875	1	217		
Germany	1	484	3	3,895	1	2,850				
Gibraltar			1	1,518						
Greece	6	2,033			2	5,384	2	808		
Hungary	1	414								
Iceland and Faroe Islands										
Italy	1	700	1	1,000	3	7,901				
Malta, Gozo and Cypress Islands	3	1,084	2	2,007					1	$1,200
Netherlands	45	29,982	21	22,483	11	34,521			2	1,614
Norway	5	1,800	5	6,864			2	483		
Poland and Danzig										
Portugal	2	836	11	12,124			1	500		
Roumania					2	5,384				
Russia in Europe	90	37,296								
Spain	62	28,122	32	35,017	2	6,562				
Sweden	17	9,498	50	58,832	3	8,076				
Switzerland	10	4,880	6	11,012	5	12,284				
Turkey in Europe	23	9,425	2	2,548						
Ukraine							2	1,500		
England	300	189,809	191	205,039	22	63,013			49	71,973
Scotland			4	3,870						
Ireland	4	1,450	2	2,950						
Yugoslavia, Albania, etc.	6	2,727	1	1,025						
North and South America										
British Honduras										
Canada	476	286,077	377	436,221	38	116,583	33	22,028	48	75,892
Costa Rica										
Guatemala	5	3,750	5	6,019						
Honduras	1	300	3	3,245						
Nicaragua										
Panama	4	1,713	3	3,100						
Salvador			3	2,731	1	2,011				
Mexico	507	208,320	133	146,241	12	28,165	95	32,156	8	11,724
Newfoundland and Labrador	1	790	2	2,124						
Barbados							2	4,000		
Jamaica	11	6,333	1	1,300			6	2,424		
Trinidad and Tobago	7	3,872	5	5,242			5	2,020		
Other British West Indies	7	2,593					3	1,380	13	12,246
Cuba	102	40,709	8	10,667	7	17,925	26	8,971		
Dominican Republic	23	9,285	5	7,014	1	2,810	8	3,232	2	3,597
Dutch West Indies	7	3,312								
French West Indies									2	4,075
Haiti	3	1,278	1	2,000						
Virgin Islands of U. S.	2	608					1	345		
Argentina	112	77,748	95	120,698	10	25,518			1	820
Bolivia					1	2,692				
Brazil	124	41,911	100	113,679	16	45,589	40	9,557		
Chile	23	8,730	4	4,891	1	2,155	6	2,760	3	2,989
Colombia	6	2,146	2	3,500					1	871
Ecuador			1	975			3	4,230		
British Guiana	11	6,491	1	1,000						
Dutch Guiana	3	2,200	1	980			2	880		
Peru	3	1,590			2	6,140	18	7,272		
Uruguay	25	14,099	6	6,618	1	2,685				
Venezuela	11	5,945	10	12,182	4	9,518	3	1,212	1	3,910
Asia										
Aden	3	1,815							1	2,400
Ceylon	11	5,450					2	1,000		
China	19	12,795	10	11,378						
Chosen										
Kwantung							1	800	6	7,193
British India	115	71,368	61	69,969						
Straits Settlements	10	5,340	6	5,637						
Java and Madura	50	36,200	15	16,441	1	2,300				
Other Dutch East Indies			1	1,010						
French Indo China	10	3,658	1	919						
Hejaz, Arabia and Mesopotamia										
Far Eastern Republic										
Hongkong	77	28,572	14	18,351	3	12,000	75	30,300	12	37,198
Japan	57	25,265	25	28,120			1	750	1	2,800
Palestine and Syria	26	9,317								
Persia	26	10,900	10	9,915	2	6,447				
Philippine Islands										
Greece in Asia	1	500								
Turkey in Asia										
Siam										
Oceania										
Australia	282	168,651	361	391,800	20	45,773	5	9,311	18	20,042
New Zealand	103	63,925	37	35,908			2	1,515	6	14,013
Other British Oceania							1	590		
French Oceania	2	708								
Other Oceania	1	837								
Africa										
Belgian Congo	6	1,958					8	2,752		
British West Africa			17	22,209					11	13,633
British South Africa	37	26,116	115	124,442	4	11,436				
British East Africa	12	8,688								
Canary Islands	4	2,040	2	1,904						
Algeria and Tunis							2	808		
Other French Africa	2	1,448								
Egypt	39	15,291								
Portuguese East Africa	1	481					6	2,424		
Other Portuguese Africa	8	2,707								
Total	3,568	$1,778,995	1,837	$2,070,316	195	$546,230	552	$199,721	186	$288,190

Trucks and Tires for July, 1922.

TRUCKS Over 2½ tons No.	TRUCKS Over 2½ tons Value	PARTS Value	ELECTRIC CARS AND TRUCKS No.	ELECTRIC CARS AND TRUCKS Value	TIRES Casings No.	TIRES Casings Value	TIRES Inner No.	TIRES Inner Value	TIRES Solid No.	TIRES Solid Value	COUNTRIES
											Europe
											Austria
					1	$ 953	48	$110			Azores and Madeira Islands
		$12,[illegible]			[illegible]	[illegible]	132	288			Belgium
											Bulgaria
		95									Czechoslovakia
		221,145			1,411	[illegible]	745	7,634	80	$[illegible]	Denmark
											Esthonia
		248			362	1,995	16	80			Finland
		242,[illegible]			7,111	25,[illegible]	1,570	4,308			France
		100			2	901		95			Germany
		4			7	[illegible]	182	371			Gibraltar
		1,725			235	[illegible]	265	515			Greece
											Hungary
		1,571			18	445	24	90			Iceland and Faroe Islands
		24,[illegible]			[illegible]	1,[illegible]	426	741			Italy
		1,[illegible]			[illegible]	[illegible]	96	181			Malta, Gozo and Cyprus Islands
		7,[illegible]			1,[illegible]	[illegible]	1,[illegible]	2,181			Netherlands
		7,[illegible]			1,117	[illegible]	870	2,[illegible]	14	[illegible]	Norway
		[illegible]			[illegible]	[illegible]	[illegible]	[illegible]			Poland and Danzig
		4,[illegible]			427	7,[illegible]	[illegible]	421			Portugal
		[illegible]			[illegible]	[illegible]	[illegible]	[illegible]			Roumania
		[illegible]			[illegible]	[illegible]	[illegible]	[illegible]			Russia in Europe
		28,[illegible]			2,264	30,574	1,925	3,[illegible]	113	[illegible]	Spain
		2,[illegible]			3,[illegible]	62,274	[illegible]	[illegible]	55	1,[illegible]	Sweden
		[illegible]			[illegible]	5,406	400	885			Switzerland
		[illegible]			364	4,675	4	12			Turkey in Europe
		[illegible]			[illegible]	[illegible]	[illegible]	[illegible]			Ukraine
		[illegible]			36,[illegible]	[illegible]	10,[illegible]	50,172	407	11,441	England
		[illegible]			[illegible]	[illegible]	[illegible]	[illegible]			Scotland
		16,[illegible]			[illegible]	[illegible]	[illegible]	1,[illegible]			Ireland
		[illegible]			[illegible]	[illegible]	[illegible]	[illegible]			Yugoslavia, Albania, etc.
		242			27	211	30	53			North and South America
—	$[illegible]	1,[illegible]	2	$8,[illegible]	4,[illegible]	[illegible]	5,629	8,150	257	[illegible]	British Honduras
		1,[illegible]			[illegible]	[illegible]	[illegible]	[illegible]			Canada
		1,[illegible]			341	[illegible]	144	455			Costa Rica
		2,996			47	[illegible]	92	228	42	752	Guatemala
		68			28	[illegible]	36	75			Honduras
		5,943			542	6,767	144	265	10	[illegible]	Nicaragua
		1,294			98	2,451	[illegible]	828	82	1,[illegible]	Panama
2	2,000	63,603			6,655	70,645	[illegible]	10,124	80	2,401	Salvador
		1,653			[illegible]	[illegible]	[illegible]	295			Mexico
		1,210			73	[illegible]	[illegible]	131	3	59	Newfoundland and Labrador
1	150	6,198			402	[illegible]	[illegible]	591	82	[illegible]	Barbados
		3,425			375	4,130	[illegible]	574	32	710	Jamaica
		2,071			48	392	[illegible]	[illegible]			Trinidad and Tobago
		[illegible]			8,[illegible]	93,058	[illegible]	16,[illegible]	512	[illegible]	Other British West Indies
		[illegible]			[illegible]	7,272	[illegible]	[illegible]	[illegible]	447	Cuba
		[illegible]			170	1,829	[illegible]	[illegible]	[illegible]	[illegible]	Dominican Republic
		1,[illegible]			266	3,101	[illegible]	440	6	105	Dutch West Indies
		[illegible]			141	1,667	[illegible]	10			French West Indies
		[illegible]			53	593	[illegible]	414	4	[illegible]	Haiti
1	4,200	26,673			6,[illegible]	72,235	[illegible]	5,[illegible]	40	2,[illegible]	Virgin Islands of U. S.
		48			148	[illegible]	[illegible]	[illegible]			Argentina
[illegible]	57,358	37,996			2,[illegible]	35,954	1,[illegible]	1,[illegible]	148	2,716	Bolivia
1	3,342	6,887			[illegible]	9,906	[illegible]	631	22	[illegible]	Brazil
		6,144			[illegible]	7,879	[illegible]	1,217	5	160	Chile
1	5,350	2,844			[illegible]	1,144	[illegible]		2	16	Colombia
		1,483			70	575	[illegible]	96			Ecuador
		813			[illegible]	207	[illegible]	74			British Guiana
2	9,860	10,367			1,[illegible]	20,011	1,[illegible]	2,307	17	[illegible]	Dutch Guiana
		8,008			1,[illegible]	23,736	[illegible]	1,085			Peru
		8,167			[illegible]	12,052	1,139	2,229	8	134	Uruguay
		[illegible]			[illegible]	[illegible]	[illegible]	[illegible]			Venezuela
		[illegible]			196	[illegible]	10	12	4	60	Asia
		1,[illegible]			34	344	[illegible]	[illegible]	2	80	Aden
		6,[illegible]			384	5,749	354	520	22	[illegible]	Ceylon
		[illegible]			240	1,[illegible]	284	852			China
		1,750			[illegible]	[illegible]	[illegible]	[illegible]			Chosen
		31,958			1,[illegible]	18,402	177	420	384	7,[illegible]	Kwantung
		8,893			[illegible]	4,655	[illegible]	1,065	38	[illegible]	British India
		13,946			[illegible]	39,323	1,[illegible]	3,470	87	[illegible]	Straits Settlements
		1,750			[illegible]	[illegible]	[illegible]	[illegible]			Java and Madura
		64			115	1,[illegible]	84	179			Other Dutch East Indies
		5,141			143	1,[illegible]	[illegible]	[illegible]			French Indo China
		44			[illegible]	[illegible]	[illegible]	[illegible]			Hejaz, Arabia and Mesopotamia
		1,024			[illegible]	1,514	107	297	45	[illegible]	Far Eastern Republic
1	[illegible]	21,035	25	[illegible]	447	7,525	119	315			Hongkong
		11,356			[illegible]	10,472	[illegible]	1,[illegible]	4	20	Japan
		1,662									Palestine and Syria
		6,282			[illegible]	61,[illegible]	[illegible]	[illegible]	249	[illegible]	Persia
		20			1	[illegible]	[illegible]	21			Philippine Islands
						[illegible]	[illegible]	[illegible]			Greece in Asia
		204			40	442	[illegible]	119			Turkey in Asia
											Siam
37	[illegible]	44,[illegible]			1,[illegible]	[illegible]	1,[illegible]	2,[illegible]	[illegible]	[illegible]	Oceania
[illegible]	[illegible]	[illegible]			[illegible]	[illegible]	2,[illegible]	4,[illegible]	[illegible]	[illegible]	Australia
		[illegible]			[illegible]	[illegible]			[illegible]	[illegible]	New Zealand
		1,[illegible]			[illegible]	474			[illegible]	[illegible]	Other British Oceania
		1,[illegible]			[illegible]	[illegible]	12	28			French Oceania
		[illegible]			[illegible]	[illegible]	12	24	2	[illegible]	Other Oceania
		158									Africa
		7,201			[illegible]	4,924	[illegible]	1,[illegible]			Belgian Congo
		32,184			5,[illegible]	33,190	[illegible]	1,[illegible]	14	[illegible]	British West Africa
		1,764	1	[illegible]	[illegible]	4,[illegible]	[illegible]	448			British South Africa
		8,097			[illegible]	[illegible]	[illegible]	88			British East Africa
											Canary Islands
		57			[illegible]	[illegible]	[illegible]	[illegible]			Algeria and Tunis
		3,[illegible]			7[illegible]	[illegible]	[illegible]	1,[illegible]	4	[illegible]	Other French Africa
		[illegible]			[illegible]	[illegible]	[illegible]	[illegible]			Egypt
					[illegible]	[illegible]	[illegible]	[illegible]			Portuguese East Africa
											Other Portuguese Africa
39	$246,227	$2,[illegible]	29	$[illegible]	121,[illegible]	$1,417,[illegible]	[illegible]	$171,123	$[illegible]	$[illegible]	

Wage Systems and Production Costs

Milwaukee plan provides for increased base rate after a certain point of efficiency has been reached. In contrast to practice of cutting rates when earnings pass given value. Production costs have been cut by method described; workers satisfied.

By Harry Tipper

MANY difficulties in industry would be solved if it were possible to avoid arbitrary reductions of wages or long drawn out fights for increase of wages. So long as all members of a group of employees are paid by time only, however, and their pay has no relation to the production costs, wages will bear an unsatisfactory relation to the cost of production on the one hand and the cost of living of the workers on the other. It is not surprising, therefore, to find a great deal of discussion of wage systems occurring from time to time and many suggestions for change.

In the metal trades field the work of Taylor, Gantt and other industrial engineers has improved the situation in many plants. The original bonus systems, as first adopted, presented a good many difficulties and many of the bonus systems still employed are too intricate for the best results.

All these bonus systems, however, are based on a reward for the amount of production in addition to the minimum rate per day which is considered necessary for all employees. To that extent, they bring the wages more into line with the production possibilities and co-ordinate the cost of the production with the market requirements.

It is not sufficient, however, to enable the worker to earn more money. It must be possible, at the same time, to reduce the production cost to some extent in order that the total manufacturing expense may be lowered without reducing the purchasing power of the individual.

One of the plans adopted was indicated in the story of the Delco factory in a recent issue of AUTOMOTIVE INDUSTRIES. William Baum, industrial engineer of Milwaukee, has worked out a somewhat different plan which has been used in a plant employing approximately 2000 people in that city, with very excellent results. The effect of the operation of this plan was to increase the production and to reduce to some extent the cost per unit of production, while avoiding the necessity for the reduction in wage rates from the 1920 scale. The plan itself includes:

> **1. A minimum rate guaranteed to each worker irrespective of production. This minimum rate is used as a basis upon which the gain-sharing plan is operated. It is, however, an unusual provision because where the efficiency is increased to a predetermined point, the hourly base rate is automatically raised. This plan is directly the opposite of the tendency to cut prices as the efficiency increases. It is interesting because many manufacturers are still under the impression that they cannot afford to pay an individual worker more than a certain amount for his day's work, regardless of production. This plan considers it possible to pay an individual worker an increased hourly rate in addition to the premium as the production increases.**

The plant in which this job was examined was a textile plant and, consequently, the operations are not of interest to the automotive manufacturer. However, the elements included in the plan are interesting.

2. The second point in the scheme is the creation of a standard time unit for each operation. The saving of time between a standard time unit and the operative's time is divided equally between the company and the worker. Thus, if the operative saves 1/3 of the standard time, the saving accruing is 1/6 to the company and 1/6 to the operative. The system itself is based upon the Kelsey Premium Plan and the Taylor Differential Piece Rate Plan, and provides both a premium on larger production and a higher basic classification for operators. The standard time unit includes an allowance for fatigue, for unavoidable delays and for imperfect work from preceding operations.

Allowance for Delays

No allowances are made for delays or inefficiencies under the control of the operator concerned. The time studies themselves are made with the purpose of considering the manual motions and the machine time necessary. These readings are taken with a stop-watch as in the usual practice, but the time study man is expected to make observations upon the fatigue and the delay necessary to recuperate from this, as well as other delays which may have been included in the allowance for time.

The studies are made with three kinds of workers—the average type, the extremely good and the sub-average. Any changes in the plan are made in co-operation with the employees wherever possible. This element of the time study could be emphasized a little more fully because of the means of a thorough understanding on the part of the operator and a sympathy with the object of the work.

Individual and group records are used to show the individual relation between earnings and production and to indicate the progress of the group under a foreman or a sub-foreman.

These records also suggest possible causes for low earnings and low production by showing machine idleness, delays on account of material and delays which may be due to fatigue or the surrounding conditions of the work.

Of course, these records are most valuable in determining the relative progress of the individual so that slow workers may be transferred to operations for which they are more definitely fitted and those who are not worth while can be weeded out.

The adoption of the plan was preceded by group meetings of workers in the different departments in order that the plan might be thoroughly understood, and instructions to small groups given to enable the operators to figure their own pay.

This last point needs a little emphasis. The operators should be able to figure their own pay on any bonus plan and figure it easily if the full effects of the bonus plan are to be fulfilled. Workers are not likely to view with confidence any system of wage payment which it is difficult for them to understand.

They want to be able to figure their own pay and they are entitled to work with a system that is thoroughly understood by them, the operations of which are entirely familiar.

This plan, like the Delco plan previously considered, guarantees a minimum rate below which it is not wise to go in providing a reasonably efficient organization of workers in the factory. Nothing is said in the details of this plan regarding the payment of the standard rate for idle time beyond the ordinary delays figured which the time study has taken care of in the regular operations of the system itself.

Where delays seriously interfere with the possible production, and therefore with the earnings of an operator, justice demands that the operator should be paid on a standard basis during the idle time caused by that delay, unless the delay is due to the errors of the operative concerned. In the Delco organization the payment of standard time wages under such conditions wipes out the last possible objection to such a system of piece work payment in a plant where the work of each individual depends upon the smooth operation of the whole organization.

The application of this sort of plan to any factory is a matter of patient analysis and study from the engineering standpoint, careful observation, readings in the time and motion studies, and a thorough understanding of human affairs in dealing with the operatives. The important results are included in the simple statement of high wages, increased production and lower production costs.

This examination of the wage system for the direct labor in the factory leaves out of account entirely the large amount of factory labor which is not directly a part of the operations of manufacture and is usually classified in factory overhead. It is not unusual to find the direct labor in the factory figured out in five decimal places so that exact costs can be determined in advance in connection with any job demanding certain operations and certain tooling. Very frequently, however, the overhead costs cannot be determined for a particular job in less than units, although the overhead costs in the factory frequently reach twice the total of the direct labor.

Comparatively little engineering work has been done in the examination of methods by which the factory overhead costs can be brought into their proper relation to production.

These factory overhead costs vary between factories even more largely than the direct labor and less information is available as to the causes of these variations.

A large amount of work can be done in this direction, however. This is indicated by the case of one factory where the consideration of the overhead costs was almost entirely responsible for turning the factory from a losing proposition at maximum production to a money-making proposition at 80 per cent production.

Plans like the one described in this article develop the fact that reduction of wages is not necessarily a part of the reduction of market prices nor is it necessary to a reduction in the cost of producing. The cost of the direct labor per unit of production grows out of the relation between the equipment, the working conditions, the efficiency of the worker and the rate of pay per hour or per day. Some day we shall learn very thoroughly that the greatest period of prosperity and accumulation of wealth is not necessarily a period of rising prices but a period of greatest efficiency in production and marketing, and may very easily be a period of highest earnings. In the meantime instances multiply where manufacturers have been able to maintain high wages, lower cost of production and increase efficiency of that production, as far as direct labor is concerned.

Market for Tires on the Edge of Mongolia

THERE is a fair market in the Kalgan, China, district for tires and tubes, according to Consul Sokobin. There are not more than 40 cars operating at present in this district, but as nearly all are engaged in carrying passengers between Kalgan and Urga, a distance of 700 miles, the number of tires and tubes used by these cars is equivalent perhaps to the number used by 400 cars in cities in America or China where the streets and roads are paved. The road between Kalgan and Urga, which is the capital of Mongolia, is a natural road, no part of which has been constructed; it is the old camel caravan route between China and Siberia. There are very bad sections of ragged rock, sand, and gravel, and there are some good stretches of dirt road over a grassy plain.

The cars usually carry five passengers, but some times six and seven are carried in a five-passenger touring car, together with 40 lb. of baggage for each passenger and five to seven cases of gasoline. The entire gasoline supply for the trip must be carried from Kalgan or a point not far from Kalgan, and as a result the cars are usually overloaded; this fact, together with the nature of the road, causes rapid destruction of even the very best tires and tubes.

There are five German Benz buses now used between Lima and the suburb of Miraflores, and according to the automotive section of La Prensa it is understood that fifteen more have been ordered with the proposal of extending the bus service to other suburbs in the vicinity.

Assistant Trade Commissioner Turner, Lima, states that these buses have a seating capacity of forty, twenty in each deck, and will charge a fare only a little in excess of that charged by the trolley lines and consequently will cause considerable competition with the street railways.

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Movies Help Motorists

THE automobile business is going to get some constructive assistance from the motion pictures. Everything that tends to make driving more pleasant and economical decreases sales resistance. Thus manufacturers will be interested to know that "Topics of the Day" Films is beginning a campaign for "Fair-Play on the Highways."

The campaign is beginning with a plea to towns all over the country to play fair with the automobile stranger within their gates. Here is the first message that is going to be shown in three thousand theaters:

> Many rural communities are having their advancement retarded by the attitude of their officials toward transient motorists. Abandon the idea that every automobilist is to be milked, mulcted and bilked to supply fees for justices and constables, and amusement for court (?) loafers. It's a detriment to local business men.
>
> Harassing the automobilist drives potential investment away.
>
> Every community owes its growth to the outsiders who visited it. Close your town to visitors and you die of dry rot.—"Topics of the Day" Film, 1562 Broadway, N. Y.

Suggestions are desired for future parts of the campaign. The automotive manufacturer has a chance to enlist the aid of a powerful publicity agency in a cause of vital interest to the industry. The usefulness of highways to the community, the amount of local business brought by tourists, and courtesy on the highway are just a few of the topics which might be used in the future.

Accessory Sets

ACCESSORY manufacturers might increase the size of their unit sales by working out standard sets, comprising a certain number of each of their models, and then marketing the set to the dealer. A visor manufacturer, for instance, makes some twenty-five different models, each one designed to fit on a particular make of car. Usually he will just take the dealer's order for whatever number of each type the dealer may happen to specify. Some types will sell very infrequently.

Suppose he worked out with some degree of accuracy, however, the number of visors for each make of car that the dealer might reasonably expect to sell. If such a proportion were once worked out, it could be applied to the registration figures in any given territory and thus provide a basis for a dealer order.

The car and truck manufacturers have done something similar to this in determining how many units of each spare part should go to the dealer for every complete car which he sells. This has been done with considerable success in many cases.

The advantage of such a practice to the accessory manufacturer is threefold. First, he has a larger unit to merchandise. Thus the selling cost is reduced. Book publishers, for instance, can sell a $10 set of ten books at less merchandising cost than they can sell ten $1 books separately.

Second, he sells the units which the dealer is most likely to need, and thus makes a favorable reception for future sales effort.

Third, he will probably increase the volume of total sales.

Durability of Good Appearance

AS engineering progress makes possible only minor changes in design and construction of motor vehicles, the factor of appearance and the durability of that appearance will play an increasing part in selling. It will not be sufficient to obtain better appearance through increased cost, as the trend of value per dollar will be constantly upward. But better and more sustained appearance will be demanded.

Some service kicks get back to the factory more rapidly than others. The premature wearing out of upholstery, appointments, or paint does not come as forcibly nor as rapidly to the attention of the dealer

and the factory as do engine and chassis troubles which prevent the car from actually operating. Dissatisfaction on these points exists, nevertheless, and act as sales resistants.

There are some paint jobs, for instance, which stand up for only a few months after getting into the owner's hands. The failure may be due to any one of a number of factors, but often comes through a desire to dry too quickly and hasten production. If a manufacturer were to give particular attention to his painting problems, for example, making it possible to guarantee a finish without cracking for twelve months, he would have a talking point for his car that would weigh heavily in the minds of prospective purchasers.

The increased proportion of closed cars is making this matter of painting and general appearance of greater importance every season. The far-seeing merchandiser will give special attention to these matters long before the reaction from the public becomes so strong as to necessitate such procedure.

More Radical Changes in Engine Design

THE recent announcements that all of the new London buses would be equipped with the Argyle type of sleeve valve engine has awakened considerable interest in this country.

It is quite generally conceded that 4000 r.p.m. is about the maximum speed at which it is practicable to use the ordinary spring operated type of poppet valve. If engines are to run at higher speeds it will probably be necessary to turn to some other type of valve actuation.

We have recently been permitted to view a highly developed, air-cooled, non-poppet engine capable of running at extremely high speed. Mean effective pressures considerably above those common in current water-cooled types are said to be developed and it is not outside the bounds of possibility that this engine will be in production by a prominent manufacturer before next spring.

It may be of interest to know that the sample engine which has been constructed incorporates not only aluminum pistons and aluminum connecting rods, but will probably also have an aluminum block, probably with an iron or semi-steel sleeve.

Developments of this kind indicate that the future of automotive apparatus in this country is not necessarily completely tied up with the poppet valve engine. The endeavor to secure a high output from a unit of small dimensions acts as a constant spur to engineers to develop something new. Much of this research extends back all the way into pure science. For instance, in one well-known laboratory, the reflectance of certain colors to heat flow is being studied with the possibility that coloring the combustion chamber will cause heat to be retained and less conducted to the water jacket.

In spite of the fact that in all of the new models announced so far this year or which will probably be announced during the remainder of the year, the changes are only of a detail nature. Nevertheless, there is considerable activity in the field of new development and even of radical adventure into new fields of engine design.

Recent laboratory investigations which have been made both in this country and abroad have resulted in a greater knowledge of the fundamentals of chemistry and physics involved in the functioning of an internal combustion engine. It is probable that some of these facts can be turned to practical use. Important changes do not come rapidly. Considerable time has elapsed, for instance, since the first experiments were started on the forging of aluminum and it is only recently that the forged aluminum connecting rod is beginning to be used as standard equipment in certain passenger car engines.

The automotive engineer is a restless individual who is not content with present day developments, but who believes that it is possible to materially improve existing apparatus. One result of this restlessness is likely to be a most interesting phase of development during the next few years. There are already a number of signs which indicate that we are in for material advances, particularly as regards greater power output from small units, due largely to materially higher rotative speeds than those to which we have been accustomed and to the use of lighter materials which are, nevertheless, capable of standing up under extremely high stresses.

The Industry Supports Commercial Aviation

THE interest of automotive executives in commercial aviation is strikingly illustrated by the prominent part taken by automobile companies in supporting the recently established flying boat service between Detroit and Cleveland. This service was established on July 14, 1922, by the Aeromarine Airways, Inc. Two trips are made each day from each city. The flying time is 90 minutes as opposed to more than five hours required by rail.

General Motors, Hudson, Packard, Maxwell, Timken, and Ford are those mentioned as watching the service with interest in Detroit, while Peerless, Goodrich and Goodyear are said to have participated in the movement to establish the line and foster its progress from Cleveland.

Thus far the service has been regular. It is operating on schedule just as do the railroad trains. A continuance of regularity and safety will aid materially in developing confidence in commercial flying. This line is of special interest because it has more of a commercial character than most other similar attempts in this country. It runs between two big business centers and has the direct interest and support of the Chamber of Commerce.

The automotive industry can well afford to take an active interest in the development of commercial aviation. It is more closely allied to this new field than any other established industry and by aiding development will profit itself as well as other business interests.

No Great Decline in Sales Expected

Indications Are for Normal Fall—Factory Expansion Program Under Way

NEW YORK, Sept. 18 — For the fourth time this year the automotive industry established a new record in the production of passenger cars and trucks, the output for August being 272,000, an increase of 12 per cent over the previous month and a gain of 53 per cent over August of last year. It closely approached the mark made in June, which thus far has been the banner month in the industry.

Production Unhampered

In view of the consistently strong demand followed during the preceding months, it would not be surprising if a delayed seasonal falling off in sales came in September which, with the aftermath of the rail and coal strikes, would result in a slight curtailment of manufacturing schedules. So far neither strike has interfered with production activities. Manufacturers have adhered scrupulously to their policy, announced earlier in the year, that production would be governed solely by consumption.

The decline in sales usually experienced at this season has not been apparent except in isolated instances and has not been such as to lead to the conclusion that any general halt to the buying movement is imminent. To the contrary, the falling off in sales in these few cases during August has been more than offset by gains elsewhere.

Count on Farmer Sales

There are many reasons for believing that should a lessened demand come it will be relatively slight. Not the least is the feeling that the agricultural districts, under the impetus of a bumper harvest, will enter the market more aggressively than in the past and become an active purchaser of both passenger cars and trucks.

Improved business conditions, higher wages to labor and the anticipation of good crops have already had their reflection in the demand for motor vehicles. They lead to the conviction that the rest of the year will be normal, at least, with a strong probability that it will not fall very far behind the general average for the first eight months. In that period the total production was 1,671,418, as against 1,668,550 for the entire year of 1921.

Every indication is that next year will see an even greater output. Anticipating such a condition, manufacturers have started an extensive enlargement of their manufacturing facilities. While such additions, in many cases, will be used to meet the increased demand for closed body types of cars, they will also be able to take care of the prospective demand for both open and closed models.

Business in Brief

NEW YORK, Sept. 16—The settlement of the coal strike, the improvement in the rail situation and better conditions in the agricultural areas have combined to impart a more optimistic note to trade and industrial circles and act as a strong impetus to renewed buying.

Assurance of a coal supply has been the dominant factor in stimulating industry and bringing it back to the pre-August level. There still remain, however, the difficulties to be encountered through the somewhat retarding effect of the rail strike and the apparent settlement at a time when cars will be in great demand for moving the harvest.

The bumper American farm crop will be augmented by a record-breaking yield in the Canadian fields. More rain and cooler weather have had very noticeable and salutary effects.

Wholesale and jobbing trade has shown a marked gain in many cities, with a better feeling noted, also, with retailers. The buying movement, which appeared to have suffered a set-back, now seems to have resumed with some of its old-time earnestness.

The iron and steel industry are showing recovery and are making progress with more confidence. Many central-western furnaces have resumed operations, and the outlook for steel supplies has been aided by the increase in mill capacity since the first of the month.

There has been a greater demand for coke, indicating an eagerness on the part of iron and steel makers to return to full speed in their operations.

Building operations assumed large proportions in August, with a strong tendency to maintain the high level established through September.

The end of the tariff discussion has had the effect of causing to be withdrawn from bond much of the wool supply.

Bank clearings have shown a further expansion, a gain of 14 per cent being evident over the previous week.

Ford Secures Coal; Will Reopen Plants

Price Changes and New Models Indefinite, Depending on Future Conditions

BULLETIN

DETROIT, Sept. 21—Ford Motor Co. will resume work to-morrow in all plants and expects to be back to a normal operating basis within ten days. Because of the detail involved in re-enrolling its former workmen it will be several days before a full working force can be restored. As fast as men can be handled the work of opening the factory will go forward. The opening is declared due to the satisfactory arrangements the company has been able to make on coal deliveries from its mine fields and from operators in the Kentucky and West Virginia fields.

DETROIT, Sept. 16.—The Ford Motor Co. factories closed to-day for an indefinite period. Approximately 70,000 men employed in the Ford factories at Highland Park, River Rouge and the Lincoln plant were dismissed with no word as to when work might be resumed.

No official statement has been made by the company, but recent conferences of executives would indicate that steel prices rather than coal have principally influenced the closing. Thousands of workmen in other factories making parts and materials for the Ford company will be affected. Few other factories in the Detroit district serve the Ford company alone, so that operations will be maintained in most other plants but on a greatly reduced scale. Body, wheel, tire, parts and other accessory manufacturers for the company will make big curtailments in operation.

Orders Carried Over

In going into the closed down period, the company declares that it is carrying a considerable number of orders over. Denial was made that the closing was because of business falling off appreciably, but on the contrary that orders would warrant a continuance of heavy operation. A sufficient stock of parts has been accumulated to carry over the servicing of all cars until factory operation is resumed.

In the case of the Lincoln company, orders are known to have been on hand to cover several more months of operation without new orders being received. Some material suppliers report that they had been notified that the closing was for two weeks but others said no notice of any kind had been received.

Branch managers from all parts of the country have been in conference with the sales department for the past two weeks, the purpose of which, however, was said to be to obtain a check on the

(*Continued on page 595*)

Milwaukee Plants Rushed by Demand

Immediate Problem of Strike Less Severe—Production and Sales Maintained

MILWAUKEE, WIS., Sept. 18—While rail transportation and fuel problems continue to trouble the minds of the automotive industries, this concern is more a matter of the semi-distant future, for at this time some improvement is discernible in relation to both problems. Local automotive shops of all classes have a satisfactory amount of business on the books to make production according to schedules demanded by buyers more important than getting more business.

Although some concerns have made provision for the use of fuel oil in case coal and coke supplies should run out, the majority now feel that the situation has been relieved so far, and prospects for further relief are so good, that emergency methods are merely under consideration.

More Coal Moving

More coal was received at Milwaukee in the week ended Sept. 16 than at any time since the coal strike started. Nevertheless, total receipts so far in the 1922 season of Great Lakes navigation are still far below normal, and it seems physically impossible to bring enough fuel to Milwaukee for distribution to the Northwest by the end of navigation about Dec. 1 to meet all requirements during the coming winter.

Manufacturers of engines, frames and other important units for motor truck manufacturers report that sales are increasing slowly but steadily, and while nothing spectacular is expected to develop before next spring, they are in a more satisfactory position than in more than two years.

Passenger car manufacturers are buying parts and equipment steadily, and those with term contracts are directing deliveries at least according to order schedules, with some asking larger quantities up to the ability of the parts makers to produce and deliver.

Agricultural implement and machinery shops, including tractor builders, are making good headway, and while their purchases are not yet of consequence, the prospects are regarded as distinctly favorable for the next six to eight months.

Retail Sales

Retail sales of passenger cars in Milwaukee, as analyzed by several representative dealers, have held up remarkably well so far in September, and while it would be unfair to compare actual transactions in number with those in April, May, June or July, the state of trade is said to be eminently satisfactory. A distinctly better feeling exists now than in July or August, in which months there was an inclination among prospects to hold off to await the outcome of the railroad and coal strikes and anxiety over the effect of these troubles on business generally during the winter months.

Dealer trade has an aspect of briskness, due to the fact that while current sales are not so heavy as last spring and summer, shipments from factories on orders booked in the last 30 to 60 days are now coming through, enabling dealers to place cars in hands of purchasers. This affects enclosed types largely, although some dealers encountered considerable delay in delivering roadster and touring models promptly.

Industrial Situation Does Not Warrant Tying Up Capital in Finished Products

By C. H. QUIRK,

Sales Manager of the Detroit Carrier & Mfg. Co.

Detroit, Sept. 18.

IN view of the menace of the railway situation during the winter months, it has become a matter of extreme importance to the industry to be fully prepared to meet the emergency in whatever manner may be necessary.

Developments of the past few weeks would indicate that it is only a matter of a short time when we will be unable to expect any definite service from the railroads, either as to deliveries of materials or the availability of cars to meet shipping requirements.

With such a situation confronting not only this industry but every industry in the country, it is necessary that every manufacturer study the problem from his own individual angle and set his house in order to meet it. The most important duty is to obtain immediately a proper balancing of stocks so that continuance of operation may be carried out independently of material deliveries.

As a parts maker we have prepared to meet the requirements of our customers by laying in an ample stock of raw materials, and we will add to this as opportunity presents. We consider this to be our duty to our customers and believe that every parts maker serving the industry should also make such preparations. With raw materials in stock the parts maker is not taking any undue risks.

It is unwise, however, that manufacturing into finished product be carried on at any greater rate than the actual shipping specifications furnished by customers. Though it may impose a burden on workmen to be forced out of employment or be forced to go upon short time, it has been proven bad business in the depression period of the recent past to tie up capital in finished product for which there may not be any demand for months.

In view of the generally unsettled conditions in the country it is to be expected that the industry will confine itself to operations based upon actual sales requirements. There has been a general improvement in the financial condition of most companies during the year, and this strength should be conserved now when there is a possibility of a severe set-back due to transportation difficulties.

ELWOOD TRACTOR BUYS PLANT

MILWAUKEE, WIS., Sept. 18—The Elwood Tractor Co., Madison, Wis., manufacturer of tractors, engines, etc., has taken over the business of the Paris Mfg. & Engineering Co. of Paris, Ill., and is moving its entire works and headquarters to Paris. The Elwood company maintained an experimental and development shop in Madison about seven years and is now getting into quantity production, but found no suitable quarters there. H. A. Burd, general manager, and C. D. Elwood, chief engineer, will continue in charge of the Elwood business at Paris. A production schedule of 1000 Elwood tractors in 1923 is planned.

L-M Axle Acquires Jones Gear Plant

CLEVELAND, Sept. 18—The L-M Axle Co. has purchased the plant of the Jones Gear Co. for $500,000. The gear company went into bankruptcy some time ago, and the axle company has been producing its products in the building that it has just purchased, having leased it from the receiver.

The axle company obtained a plant that is fully equipped to make its products and will go into large production. The L-M double reduction axle is for trucks, and it was invented by Leo Malanowski, at one time chief engineer for the White Motor Co.

George B. Durell, treasurer of the American Fork and Hoe Co., is president and treasurer of the axle company; Warren H. Cowdery, president of the American Fork and Hoe Co., is chairman of the axle company's board of directors, and Attorney J. L. Vaughan is secretary.

CHICAGO SALES HEAVY

CHICAGO, Sept. 16—A report by R. G. Dun & Co. gives the number of new automobiles sold in Cook County, including Chicago, in the seven months ending July 31 as 28,590. It states that sales in May, June and July were about 5000 a month.

Fisher Body Plans Plant Expansion

Facilities Will Permit Chevrolet Production of 2000 Cars Daily

DETROIT, Sept. 16—Chevrolet Motor Co. will operate on a schedule approximating 2000 daily in 1923, this schedule being indicated by the completion of expansion plans by Fisher Body Co., which will permit it to make that number of Chevrolet bodies daily after Jan. 1. Three manufacturing plants will be given over entirely to Chevrolet, as will a large part of the Fisher Ohio Body Co. in Cleveland.

A general outline of the complete expansion program was given by W. A. Fisher at an "appreciation and acquaintance" dinner given by the Flint Chamber of Commerce to Fisher and General Motors officials, signalizing the start of operations on the Fisher plant at Flint. C. S. Mott, vice-president in charge of the advisory staff of General Motors, a resident of Flint, presided at the dinner, and A. G. Bishop, president of the chamber, was toastmaster.

The Flint Plant

The Fisher Chevrolet plant in Flint will have a capacity of 400 to 500 bodies daily and will employ 1000 men. It will adjoin the manufacturing plant of the Chevrolet company and will be connected by an overhead conveyer. Fisher said that this entry of the Fisher company into Flint would probably be augmented in the near future by the erection of a body plant to meet the added requirements of the Buick company.

In addition to the Flint plant, Fisher will have Chevrolet body manufacturing plants in Pontiac and St. Louis, in which cities it has taken over the O. J. Beaudette plant in the first instance, and the former General Motors plant in the second. In addition to these there will be body assembly plants in Buffalo, Cincinnati, Oakland, Cal., and Janesville, Wis. In the latter plants only body assembly work will be carried on. At the Cleveland factory a large part will be devoted exclusively to manufacture and assembly of Chevrolet work.

Other General Motors officials at the dinner were H. H. Bassett, president of the Buick Motor Car Co.; Albert Champion, president of the A. C. Spark Plug Co.; T. S. Merrill, secretary of General Motors Corp.; G. F. Lord, advertising director of Chevrolet; C. F. Barth and W. D. Douglas, of the Chevrolet manufacturing division at Flint, and H. J. Mallery, of Buick.

Chevrolet Starts Building

DETROIT, Sept. 18—The Chevrolet Motor Co. has purchased tracts of land in Buffalo and Cincinnati on which it will begin building operations at once in preparation for manufacturing soon after Jan. 1. These, with the existing manufacturing plants in Flint, St. Louis, Tarrytown, N. Y., Oakland and Fort Worth, will give it a daily production of over 2000.

The new manufacturing plants will provide buildings for the Fisher Body Co., which will be devoted solely to supplying bodies for Chevrolet cars. The Cincinnati property includes 16 acres and is located on B. & O. and P. C. C. and St. L. railroads. The Buffalo plant will be located on 29½ acres of property on Erie railroad.

300 Cars Daily at Cincinnati

Cincinnati will employ 1200 men on Chevrolet work and 900 men in the Fisher plant, and will have a production capacity of 300 cars daily. In the two plants there will be 350,000 feet of floor space. Buffalo will have 2000 men on Chevrolet work and 1800 in the Fisher factory, with a production capacity of 500 cars daily. In these plants there will be 600,000 feet of space.

W. S. Knudsen, vice-president in charge of operations of the Chevrolet company, said that with the completion of the new plant Chevrolet will be prepared to enter a production schedule of 2000 cars a day. At the present the capacity is about 1100 cars daily, this figure being the one at which the Chevrolet factories have operated since early summer.

Define Manufacturer for Tax Assessment

MILWAUKEE, WIS., Sept. 18—A. H. Wilkinson, collector of internal revenue, Milwaukee, has given an explanation of the section regarding assessments on automotive parts used in connection with repair and replacement work by garages and service shops to combat misunderstanding among some dealers and manufacturers. He says:

"Regarding repair work other than top and body work, a person who manufactures for sale separately parts and accessories, and who is also engaged in the repair business, will be held to be a manufacturer with respect to all such parts and accessories made and sold by him, regardless of whether used in repair work or not. A person who does not manufacture any parts or accessories for sale separately, but is engaged in doing a strictly repair business, and who makes only occasionally a part needed for an immediate repair job performed by him, is not a manufacturer, and is not required to pay any tax with respect to any such parts or accessories."

GETS FOREIGN HORN ORDER

MILWAUKEE, WIS., Sept. 18.—The Fulton Co. of Milwaukee, manufacturer of automotive equipment, has just received a large order for Aermore exhaust horns from a jobber in Osake, Japan. Several other sizable orders for miscellaneous equipment have been booked recently from Japan, China and other foreign countries. Domestic business is reported as very good and production schedules are steadily being extended to meet delivery specifications.

First Flint Car Ready for Debut

Production to Start at Long Island City and Flint by January—Rush Elizabeth Plant

NEW YORK, Sept. 18—The first showing of Durant's new Flint car will be given simultaneously in New York and Flint, probably this week. Production is expected to be started at the plant in Flint, Mich., by Jan. 1 and at the Long Island City plant possibly at an earlier date. Operations at the latter factory will depend upon the progress that is made on refitting the former Willys Corp. plant at Elizabeth, N. J., which Durant Motors, Inc., purchased and which it will use exclusively for the production of the Star and Durant.

These two cars are now being turned out at the Long Island City plant and no effort will be made to begin production on the Flint there until they have been removed to New Jersey. Work is being pushed rapidly on equipping and making rearrangements at the Elizabeth plant to meet the requirements for Star and Durant production with the result that removal may be effected by the middle of next month.

No schedule has been outlined for Flint car production, but the Long Island City plant has a capactiy of 100 cars daily and the first five units of the plant at Flint a capacity of 500 a day. By next spring it is thought that the two plants will be turning out from 400 to 500 cars.

The schedule for the Durant has been fixed at approximately 6000 for September, an increase over August output.

No complete plan of distribution of the Star has yet been made. As a starter the car is being given to Durant distributors in various cities who will act in the capacity of branches of the State company. This will establish a closer contact between distributor and factory. Star Motors, Inc., the selling organization, has companies in most of the States.

Farmers Show Great Interest in Tractor

CHICAGO, Sept. 15.—Increased interest by farmers in tractors was noted by Guy H. Hall, director of the National Institute of Progressive Farming, at the Minnesota and Wisconsin state fairs from which he recently returned.

The Minnesota fair was not as largely attended this year as in the past, Hall said, but the farmers who were there showed unusual interest in the tractor and other power farming exhibits. "The amusement section was practically deserted," Hall said, "while the men and boys from the rural sections were climbing all over the tractors and other machines."

The Wisconsin fair was largely attended and the tractor exhibit was one of the most popular, Hall said.

Maxwell-Chalmers Settlement Nears

Noteholders' Protective Committee Approves Plan for Exchange of Notes for Stock

NEW YORK, Sept. 17—Further steps in the adjustment of the affairs of the Chalmers Motor Co., by which it is expected that the Maxwell Motor Corp. will obtain title to the Chalmers company, were taken this week with the approval by the Noteholders' Protective Committee for the Chalmers first mortgage 6 per cent five-year gold notes of the plan under which the notes will be exchanged for stock in the Maxwell corporation. It is understood that a majority of the noteholders already have consented to the plan. Time for additional deposits of the Chalmers notes with the New York Trust Co., as depositary, expires Oct. 5.

Plan Note Exchange

The plan provides for the exchange of notes on the basis of ten shares of Maxwell Class A, ten shares of Maxwell Class B stock and $60 in cash for each $1,000 note, or the alternative of $860 in cash.

The Class A stock is of the par value of $100 and the Class B stock of no par value. Class A is entitled to non-cumulative preferred dividends and the rate of 8 per cent per annum and to participate equally with Class B stock in any year after 8 per cent has been paid on each class. Upon any liquidation of the corporate assets Class A stock is entitled to receive par in priority to Class B stock. Both classes have voting power.

It is also provided that, if necessary, non-dividend bearing scrip certificates will be delivered for fractional interests in a share of stock.

In its letter to the noteholders the committee which consists of Mortimer W. Buckner, chairman; Philemon Dickinson and Morton F. Stern points out that "depositors who do not accept the offer may, under the terms of the plan, find themselves entitled only to a distributive portion of the price of the Chalmers assets realized at judicial sale."

Committee Organized

Organization of the committee was effected early in April of this year immediately following the default in the payment of interest on the notes. These notes had been secured by a first mortgage executed by the Chalmers company to the Metropolitan Trust Co. of New York and aggregated $3,150,000. Under the provisions of the mortgage the principal was declared due on July 6.

During July the Fisk Rubber Co., a creditor, filed a complaint in the United States District Court for the eastern district of Michigan, southern division, and this was followed by the instituting of an action by the Metropolitan company asking for foreclosure of the mortgage. These two actions subsequently were consolidated. At about the time of the issue of the notes all of the properties of the Chalmers company were leased to Maxwell Motors. Various differences arose, however, and the lease was terminated on May 31, 1921. The property then reverted to the possession of the Chalmers company.

The plan that had been entered into between Maxwell and Chalmers provided for the deposit of stock for the Chalmers company but by the terms of that plan the notes were left undisturbed.

Maxwell holds a claim against Chalmers in excess of $3,500,000, offset by a disputed claim approximating $6,000,000.

To Sell Chalmers Property

The committee plan contemplates the sale of all the property of the Chalmers company, under a court decree, with its purchase by the committee acting for Maxwell Motors which will then reimburse it by the exchange of stock for the notes, on the terms agreed upon.

"In deciding the course to be recommended to the noteholders," the letter of the committee says, "the committee has considered that the lien of the mortgage is limited practically to fixed plant and does not cover good will, inventory, receivables or claims; that it is uncertain whether the mortgaged assets at forced sale will bring the amount due on the notes; and that a deficiency judgment must share pro rata with other claims, including those of Maxwell Motor Corp., against unmortgaged assets, the value of which is unknown and can be established, if to any extent, only after costly and lengthy litigation and investigation."

Will Keep Cadillac Force at Top Speed

DETROIT, Sept. 16—Following a convention of distributors and dealers this week at which fall and winter sales were discussed, President H. H. Rice of Cadillac Motor Car Co. has declared that factory operation will be continued through the winter at full force. He said:

> I believe that general business in spite of a few disturbances on the surface is decidedly on the upgrade. I not only believe that people will be able to get coal this winter but also manufacturing concerns will get enough coal to operate.
>
> Strikes in any essential line of business are bound to be settled after a short duration. These strikes are too vital to last long. The crops this year are good and I believe the farmer will obtain good prices for them. Factories that have been shut down are gradually opening.

Lynn McNaughton, general sales manager of the company, said business in the past twelve months has exceeded the business of any similar period both in number of cars and in total value.

WELDING SOCIETY TO MEET

CHICAGO, Sept. 15.—The fall meeting of the American Welding Society will be held here from Oct. 2 to 5. Various papers on welding will be presented.

Metropolitan Sales Show Slight Decline

Indications Are That an Upward Turn Will Bring Strong October Demand

NEW YORK, Sept. 15—Although August showed an appreciable falling off in car sales in the metropolitan territory, according to figures based on registration issued by Sherlock and Arnold, there is every indication that the sales curve has taken another turn upward and that September will show an improvement.

The falling off could hardly be characterized as a slump, although there were notable exceptions where some makes reached a point nearly fifty per cent lower than the peak months of April, May and June. However, balancing these in the total sales were others, particularly in the higher price class, whose August sales showed a distinct improvement over July and reached points within striking distance of the boom months.

Closed Cars Gain

September opened slowly following the downward trend of the market during the closing days of August and each day is showing an improvement. The upward trend is expected to gather momentum in October and develop into a strong selling market, especially for closed cars, during the fall and early winter months. The closed car show, scheduled for the latter part of this month, is expected to contribute some impetus.

With but a few exceptions the railroad situation has not affected New York to the extent of actually preventing deliveries. Delivery service between the factories and dealers has been considerably slowed up, however, and some dealers already are organized to make driveaways this fall if conditions do not improve.

Unless weather conditions are particularly unfavorable the fall promises to develop a fairly active used car market throughout the Metropolitan district.

The outlook for truck sales this fall is brighter than in many months but up to the present time there has been no acute upward turn. September truck sales were slightly better than August on the whole and inquiries indicate a stronger demand in October and November, especially in the light delivery car field.

BOSCH ANTICIPATES BIG FALL

SPRINGFIELD, MASS., Sept. 18.—The American Bosch Magneto Corporation is shaping its plans for a heavy fall business. A. H. Bartsch, general sales manager, reports the heaviest August business this year in the history of the concern and the largest single month's sales since March of last year.

Murry Rubber Will Succeed Empire Tire

Organization Which Operated Plant Under Receivership Will Continue Line

TRENTON, N. J., Sept. 18.—Steps have been taken for the organization under the laws of New Jersey of the Murray Rubber Co. as successor to the Empire Tire & Rubber Co., which was purchased at a receiver's sale last week by Campbell, Heath & Co., of New York, and their associates. The purchaser backed the reorganization plan which was offered the creditors by William M. Pepper and J. Cornell Murray.

C. Edward Murray, Jr., will be elected president and general manager of the Murray Rubber Co. The other officers will be: William M. Pepper, vice-president and treasurer; Harvey R. Nason, secretary; Ray H. Paddock, director of tire sales; Robert M. Stuart, director of mechanical sales; W. W. Sanders, factory manager; Albert N. Alexander, comptroller; H. Earl Berrien, assistant treasurer, and Norman S. Conover, assistant secretary.

The directors will include William H. Peck, president of the Third National Bank of Scranton; H. J. Angermeier, vice-president of the National Bank of Kentucky; W. D. Campbell, president of the Van Camp Packing Co.; W. M. Pepper, treasurer of Campbell, Heath & Co. and C. E. Murray, Jr.

This is the exact organization that ran the plant successfully during its receivership. It is also announced that there will be no change in the personnel of district managers.

The Empire products inclusive of tires and tubes will be continued as in the past and in addition the Murray products will be manufactured. The Murray Rubber Co. is simply a new corporate name, the products being continued as at present.

Mayo Approves Twin City for Ford Site

MINNEAPOLIS, MINN., Sept. 16—As the result of an o.k. on the proposed site of the Ford Motor Co. northwestern production center of Ford products at the high dam in the Mississippi River in the Twin Cities by William B. Mayo, chief engineer, a referendum of business organizations, business men and public officials of the two cities, is expected to settle the difficulty now existing as to the use of water power now going to waste. Mayo made a 100-mile radius inspection, including water power on the St. Croix river, a tributary of the Mississippi river. He was impressed with the water transportation facilities available and with the fact that the high dam power is idle, although $3,000,000 has been spent by the Government to advance the head of navigation to Minneapolis by means of the high dam and a previously erected dam. He said the district may become a second Detroit.

Mayo said, among other things: "St. Paul and Minneapolis have abundant transportation facilities in the river, if they only recognize it. Mr. Ford must look ahead not only as to plans for production, but also for his distribution of finished product and the receipt of raw materials. Mr. Ford feels that water transportation must be used wherever in any way possible. The high dam site is apparently the first opportunity for the development of a situation where navigation as well as power can be brought into existence."

Permanent Assembly Plant for Antwerp

DETROIT, Sept. 19—Ford Motor Co. has purchased property in Antwerp upon which it will erect an assembly plant to take the place of the present temporary quarters in use during the past year. The Antwerp plant assembles Ford products for sale in Belgian and Holland markets.

The representative of the Ford company has taken up the proposal to locate a plant in Italy with the Italian Government and negotiations are now in progress.

Courier Motors Sets Production Program

SANDUSKY, OHIO, Sept. 18.—The Courier Motors Co., which under the name of the Arrows Motors Co. purchased the assets of the Maibohm Motors Co., plans to build 750 cars for the balance of this year and has a tentative schedule of from 3000 to 4000 for next year.

The company has a capitalization of 6000 shares of preferred stock divided as follows: 3500 shares, Class A, which were issued to the creditors in accordance with the pro rata amount of their claims against the Maibohm company as allowed by the courts and 2500 shares, Class B, approximately 700 shares of which have been sold for par and the balance held in the treasury for future sale. There are also 5000 shares, no par value, common stock which have been sold to the officers, directors and buyers of the 700 shares of Class B preferred.

It is reported that most of the old Maibohm distributors have continued with the new company, that others have been secured and that an aggressive dealer campaign is now under way. The old Maibohm has been considerably changed in everything except the lines of the car.

MOON REPORTS RECORD OUTPUT

ST. LOUIS, Sept. 15.—The Moon Motor Car Co. reports a record production of 1618 cars for August with indications pointing toward a higher market for September. The company has under construction an extension to its plant, half of which will be used for the factory maintenance division.

Assets of Midwest Engine Transferred

Receivership Ended When New Corporation Acquires Assets at Sale

INDIANAPOLIS, Sept. 16.—A deed transferring to the Midwest Engine Corp. all the assets of the old Midwest Engine Co., its plants, equipment and real estate holdings in Indianapolis and Anderson, Indiana, was filed in the recorder's office here by Frederick Van Nuys who has been receiver for the Midwest Engine Co. The sale of the assets was authorized July 11, by Judge Solon J. Carter under whose direction the receivership was conducted.

Coincident with the filing of the deed Blaine H. Miller, president, and H. W. Griffith, secretary of the Midwest Engine Corp., filed a mortgage deed of trust of all the property mentioned in the deed to the Irving National Bank of New York City as a part of the reorganization plan to secure the issuance of $3,000,000 worth of mortgage refunding bonds.

It is said that the filing of the deed and the mortgage was in keeping with the original plan of reorganization announced at the time of the sale of the property to the new corporation July 11. The price paid for the property was $312,000 subject to mortgage responsibilities said at that time to amount to about $1,750,000. The engine works of the company are located in this city while the pump plant is at Anderson, Ind.

Bingham Will Make Patent Truck Wheel

COLUMBUS, Ohio, Sept. 18.—The Bingham Manufacturing Co., chartered about eight months ago with an authorized capital of $100,000 has been organized by the election of H. N. Bingham, president; F. E. Kocher, vice-president, and G. P. Hinckle, secretary. The company has taken over a part of the plant formerly occupied by the Immel Co., where a patented tractor and truck wheel will be manufactured. The patent is controlled by the company and license arrangements have been completed whereby the tractor rights have been sold. The company will soon start the purchase of machinery for the plant which will be fitted up completely.

The wheel arrangement is along the order of a continuous chain in the nature of a caterpillar, but with a rubber tread. It is expected to get into production about October 15 at the latest.

EMPLOYMENT DECREASES

DETROIT, Sept. 18—A decrease of 2705 in total employment from last week's total of 175,099, is reported by the Employers' Association. In the corresponding week a year ago the total was 116,407.

Tommy Milton Wins Kansas City Race

Drives Leach Special — Sarles Killed When Car Crashes and Catches Fire

KANSAS CITY, MO., Sept. 18.—Tommy Milton, champion driver of the American Automobile Association and winner of the 1921 Indianapolis speed classic, driving an eight cylinder Leach Special, won the 300 mile automobile race held at Kansas City's new $500,000 speedway, Sunday, Sept. 17.

Milton's time was two hours, 46 minutes, 52 seconds. Harry Hartz, driving an eight cylinder Hartz Special, was second in the race, making the required 240 laps in two hours, 47 minutes, 50 seconds. Frank Elliott came out in third place with his eight cylinder Leach Special, doing the 300 miles in two hours, 49 minutes, 46 seconds. Ralph Mulford was fourth, driving a Duesenberg, straight eight special, Jimmy Murphy driving Bennett Hill's Miller special and I. P. Fetterman were next in order.

Roscoe Sarles, relief driver for Cliff Durant, was burned to death when his car caught fire after smashing through the railing of the track. The car hurdled 40 feet and smashed to the ground. His mechanician, C. V. Pickup, was injured dangerously.

Murphy Replaces Hill

Jimmy Murphy was forced to leave the track early when his car threw a tire and he collided with Joe Thomas, but he took Bennett Hill's place when Hill was taken from his car in the 135 lap too ill to continue the race. Peter De Paolos Jr. Special turned turtle and caught fire, dangerously injuring Paolo and his mechanician, Tony Guletta.

Frank Wagner, the veteran, officiated as starter. A crowd of over 60,000 attended the races which were postponed a day because of a heavy rain the day before.

Alena Steam Products Files Suit for $50,000

INDIANAPOLIS, Sept. 15—Officials of the Alena Steam Products Co. of this city, engaged in the construction and development of steam trucks and tractors, have filed a suit for $50,000 against Reece S. Allen of Wichita Falls, Texas, claiming breach of contract. It is claimed that on Feb. 20 Allen received in exchange for an extension of $100,000 credit an option on the common stock of the Alena Steam Products Co., equal to the amount of the loan. The executives are said to have been given the right to draw at will against the credit and to construct five steam trucks and five steam tractors.

Relying on Allen's guarantee, the officials claim they constructed machines at a cost of $30,000 and contracted for the construction of five others to cost $55,078. After these latter contracts were filled, Allen is said to have agreed to extend further credit for production. Later, the petition says, drafts presented against Allen were refused payment. Subsequently, the petition states, Allen refused to carry out the agreements. The net result, it is claimed, will jeopardize the business valued at $400,000 and threaten loss of contracts, patents and machinery.

The plant of the company, its equipment and other assets are said to be worth $400,000. Fred Hamilton is president; George Killman, vice-president, and John W. Cadle is secretary-treasurer of the concern.

Special Jewett Phaeton to Sell for $1,095

DETROIT,, Sept. 16.—A new special Jewett phaeton at $1,095 has been added to the line of the Paige Motor Car Co. It is mounted on the standard Jewett chassis. The body and hood are finished in deep moleskin gray. The color, besides being dustproof in character, brings out the straight lines of the body. A nickeled radiator shell and Tuare disk wheels are fitted, the wheels being finished in the gray of the body with a touch of scarlet at the hubs and nickeled rims. Outside valve stems furnish wood wheel convenience.

Harmonizing with the gray of the body, the upholstery is a gray green Spanish leather, laid over deep sprung cushions. Standard black running gear and fenders are fitted.

New Headlight Laws for New York State

ALBANY, Sept. 16—Manufacturers of 60 of the 100 improved headlight lenses and anti-glare devices which have been approved at various times for use on automobiles in New York State have been cited to appear before the State Tax Commission in the Capitol, Sept. 26, and show cause why the authorization should not be revoked. The action has been taken under the new law, giving the Tax Commission new powers to remedy the glaring headlight abuse.

Coincident with the calling of the headlight hearing, the Tax Commission issued a complete set of regulations regarding lights on motor vehicles and anti-glare headlight devices.

Among the provisions in the new regulations for headlights are those that are given below:

All bulbs must be of 21 candle-power; there must be two white lights in front; both lenses must be alike and only approved lenses or other anti-glare devices may be used; all reflectors must be bright and free from rust and dents; when lighted by electricity the headlights must be sufficient to reveal objects at least 200 feet in front of the car, but must throw their light so as to avoid dangerous glare or dazzle. The 1922 specifications of the Illuminating Engineering Society have been accepted by the commission as the standard to be applied in testing anti-glare devices.

Equipment Makers Enrolling Members

No Thought of a Show But Desire Is for Organization Without Jobber Members

CHICAGO, Sept. 16—An outline of the plans for the expansion of the Association of Automotive Equipment Manufacturers was given at a meeting yesterday by George Fritz, who was recently elected general manager. It was announced that executive offices have been opened at 926 Consumers Building, Chicago.

Enrolment of new members is to be carried on aggressively for the next six months. Fritz said that in addition to the credit and trade information now supplied by the association, other services would be taken up.

Expansion Program

Several of the members discussed the ambitions of the association, which was started among Chicago equipment manufacturers, but now has enrollment in other sections. There are 78 members now and the goal is 150 or more in six months. Members stated that the association has grown out of a demand for an organization of manufacturers who, without other elements in the trade present, could discuss problems and activities exclusive to manufacturing businesses. They hoped for co-operation of other associations in the equipment field.

Some of the members belong to the Automotive Equipment Association, which includes manufacturers and jobbers on an equal active membership footing. The A. E. A. originally was a jobbers' association, which first accepted manufacturers as associate members.

At yesterday's meeting the resignation of Nelson H. Oliver was accepted, and Franklin Mayo was elected in his place.

Special Six Phaeton New Columbia Model

DETROIT, Sept. 18.—A new Columbia model known as the special six phaeton to retail at $1,095, f.o.b. Detroit, has been added to the line of this concern. This body is mounted on the standard Continental 115 in. wheelbase chassis incorporating the Continental 6-Y engine, Timken axle, Durston transmission gearset with Timken bearings, Stromberg carbureter, Borg & Beck clutch, Gemmer steering gear, Spicer universal and Auto-Lite electrical equipment.

Among the features of the special six are nickel-plated Harrison radiator with thermostatically controlled shutters, cowl ventilator, barrel head lamp as well as cowl lamps for parking, heavy weight crown fenders and cord tires. The body is of generous proportions, the rear seat being 46 in. wide and the upholstery is of real leather over deep coiled springs.

New Process Gear Sale Unconfirmed

Court Reserves Decision Claiming Warner Offer Not a Fair Price for Plant

ALBANY, N. Y., Sept. 16—Federal Judge Frank Cooper, at a special term of the United States District Court, today withheld approval of the sale of the New Process gear division of the Willys Corp. at Syracuse. In making the announcement that he had decided to reserve decision for the time being on the application for the confirmation of the sale, Judge Cooper indicated a belief that the price bid by T. W. Warner, president of the Warner Corp. of Muncie, Ind., and Toledo, was not large enough to constitute a fair price, asserting that efforts had been sought to effect the sale "during a period of industrial depression and under unfavorable conditions due to the coal and railroad strike."

Warner Offers $1,904,000

Warner, who was the highest bidder, had offered $1,904,000 for the plant.

The sale of the plant at this price was opposed by the two receivers for the company, Mayor George R. Lunn of Schenectady and former Assistant District Attorney F. E. Caffey of New York City. Caffey contended the plant is worth approximately $500,000 more than the sum offered by Warner.

Mayor Lunn argued that the plant is now doing a large volume of business, and that with the industrial controversies virtually settled the plant could make more money. He argued in favor of readvertising for bids. Caffey also joined in this argument, presenting figures apparently showing that the book value of the concern is $4,000,000 and that the volume of business since Dec. 8 last, when it went into the hands of receivers, has been $340,000.

Majority Favor Sale

Those favoring the sale of the plant to Warner far outnumbered the opponents. Henry S. Johnstone of New York, representing the bank auditors committee, urged the acceptance of the bid. Johnstone also represented the merchandise and construction creditors. H. F. Rindell of New York, representing 60 per cent of the preferred stockholders, also urged the acceptance of Warner's bid, as did J. W. Young of New York City, representing 80 per cent of the common stockholders.

George D. Welles of Toledo, who represented Warner, also advocated the confirmation of the sale.

DUTY PLANT SALE FAILS

ELGIN, ILL., Sept. 18—Elgin stockholders of the Duty Motor Truck Co. were advised that the deal with the American Steam Truck Co. of Chicago to take over the plant was off, at least temporarily.

The stockholders accuse the Association of Commerce of interference and declination to make an assignment of its interests in the land occupied by the plant of the Duty company. It will be necessary to borrow money to pay the Association of Commerce $7,800 for its interest in the land, and efforts to obtain this sum were without avail. The stockholders are not disposed to pay this sum from assessments, and, as a result, there is little likelihood of a transfer being made.

Gray Roadster First Showing This Month

DETROIT, Sept. 16.—Gray Motor Co. will produce the first of its roadsters this month, the price being fixed at $490, the same as the phaeton model. The company is now building 60 cars daily and will increase its production to 150 daily with the completion of its second manufacturing unit which will be ready in November.

The compartment in the rear has been made extra large and the rear deck is detachable so that a small commercial body may be attached when desired.

Packard Adds Two New Closed Models

DETROIT, Sept. 16—Two new closed models have been added to the single six line by the Packard Motor Car Co., a five-passenger sedan limousine at $3,325 and a five-passenger coupe at $3,350. Both are mounted on the 126 in. wheelbase chassis. With these the company has six closed models in the single-six line, four on the short chassis and two on the 133 in.

The new sedan limousine is similar to the seven-passenger sedan limousine, already included in the line, except for the shorter chassis. It is convertible from owner to chauffeur-driven by the raising or lowering of a glass partition between the front and rear compartment. The front compartment is upholstered in black leather and the rear in gray broadcloth.

The new coupe seats three on its rear seat, which extends across the width of the car. It is fitted with a large trunk containing two suit cases and a hat box. Nickel bar fenders are fastened on the rear panel of the body.

TRUCK DEMAND INCREASES

SPRINGFIELD, OHIO, Sept. 18—An average of fifty motor trucks a month are being turned out now at the plant of the Kelly-Springfield Motor Truck Co. Production for the last month was 54 trucks. Reports from distributors show that there is an increasing demand for trucks, representatives of the company say.

Fifty men were added to the sheet metal department during the past week at the plant of the International Harvester Co. Supt. C. H. Smart says the Springfield plant is keeping up with its schedule of 25 speed trucks per day, and shipments are going forward.

Peru Sees Better Year in Prospect

Improvement in General Business Conditions Will Increase Automotive Sales

LIMA, PERU, Aug. 30, 1922 (By Mail).—During August automotive dealers in Peru have been more encouraged by prospects of better future business than satisfied with the month's business actually done. There is always a lull in the automotive line in August, following a burst of business in July, preparatory to celebrating the national holidays on the last days of that month.

There are several indications that general business will be better during the next twelve months than it has been during the last eighteen. And this means that automotive business will be better, for automobile, truck and tractor agents are quick to take advantage of any general improvement in commercial conditions and push for trade.

Among these symptoms of better business conditions may be noted:

1. A trade balance favorable to Peru during the first half of 1922, as opposed to an unfavorable trade balance during first half of 1921.

2. A consequent improvement in exchange; the Peruvian pound having risen to $4.04, and above from a past low level of $3.18.

3. Improved price for Peru's articles of export: cotton, wool, copper.

4. Apparent political and industrial quiet.

5. Government active in promoting irrigation projects and cattle improvements.

6. Better steamship service, the Grace Line having restored one of the boats taken off at the time of the crisis, an act that shows that better times have come.

Better Roads to Help Sales

Of direct aid to automobile and truck agents is a faint sentiment developing in favor of better roads. One of the local papers has opened an automobile page, published twice a week, devoted to good roads, cheaper fuel, and a better understanding of the mechanism and use of the automobile. A page of this kind may be made of great help to automotive agents.

Old automotive stock has been pretty well cleaned out and what is still left will go before Jan. 1, 1923. So American manufacturers should look forward to a better trade in Peru during the coming year.

RECORD SUMMER SALES

CHICAGO, Sept. 18.—After the greatest summer season in its history the automobile accessory business in Chicago is getting back to its accustomed stride. Dealers in accessories everywhere report sales in the past six months as beyond every expectation and preparation.

Men of the Industry and What They Are Doing

McDonald Given New Duty

Stewart McDonald, president of the Moon Motor Car Co., has been elected a director of the St. Louis Chamber of Commerce.

Rickenbacker and Bride Sail

Major Edward V. Rickenbacker, vice-president of the Rickenbacker Motor Co., sailed for Europe on Saturday, to be gone two months. While abroad he will make a tour of the battle fields. Accompanying him is his bride, who was formerly Mrs. Adelaide Durant.

Barker Back from Europe

A. E. Barker, vice-president of the Maxwell Motor Corp., has returned from Europe after making a survey of automotive trade conditions there. Barker states that until recovery is more complete England will not provide a large market for American cars. In France conditions are prohibitive, the same being true in a large measure of the rest of Europe. English business, big and little, Barker states, is fighting vigorously for a return to better conditions.

Lon R. Smith Resigns

Lon R. Smith has tendered his resignation as director of sales and advertising of the Midwest Engine Co. in order to take up other duties, the nature of which has not been disclosed. His plans will not be definitely announced until later and in the meanwhile he will remain in charge of Midwest sales.

McCain Leaves Colonial

George L. McCain, who has for the past year been associated with Colonial Motors, Ltd., of Windsor, Ont., and who has held the office of vice-president and chief engineer of this company, has resigned to take up other engineering work. McCain has for a number of years been associated with the Packard Motor Car Co. as well as the Lincoln, and during the war period was very active in airplane and airplane motor engineering.

New Departure Advances Curry

John J. Curry has been appointed mechanical superintendent of plant D of the New Departure Manufacturing Co. located at Meriden, Conn. Plant D is the newest unit erected by the company. Curry is a graduate of Pratt Institute and has been employed in the tool division of the New Departure plant at New Britain, Conn., for a number of years.

Golden Accepts New Post

William A. Golden, a former post office inspector, has been added to the staff of the National Vigilance Committee of the Associated Advertising Clubs of the World, and will devote his energies especially to fraudulent and deceptive advertising practices in the motor car, tire, battery and motor accessory fields. Golden was formerly associated with the Goodyear Tire & Rubber Co.

Miles Back From Orient

Bruce J. Miles has returned to the United States after spending two years in the Orient as Far Eastern representative for the General Motors Export Co. During the year and a half that he made his headquarters in Manila, Miles served as president of the Philippines Automobile Dealers Association, a position he relinquished when General Motors moved its office to Shanghai. Miles expects to take a few months vacation before going abroad again.

Baskerville Goes to Maxwell

Dean E. Baskerville, body designer and engineer, has been added to the staff of the Maxwell Motor Corp. For the last six years Baskerville has been body engineer of Dodge Brothers. Prior to that association, he was connected with various manufacturers in the automotive industry, among them being the Packard Motor Car Co. of Pittsburgh, the Highland Body Co. of Cincinnati and the Troy Manufacturing Co. of Troy. With these organizations he was engaged in both designing and construction work. His affiliation with the national organization will permit E. W. Goodwin, consulting engineer of the Maxwell body division, to give his entire time to creative work in design.

Wright Makes Transfer

Walter F. Wright, southern division manager of the Willys-Overland Co., has taken over the Cleveland branch of Willys-Overland and will operate it under his own name as a distributor. Wright has been with Willys-Overland for ten years, serving alternately as factory representative, special representative, branch manager, division manager and assistant to the vice-president in charge of sales.

Anderson Joins Stutz

Harry W. Anderson, recently with the Duesenberg Motor Co., has taken charge of the eastern business of the Stutz Motor Car Co.

FRANKLIN'S BIGGEST YEAR

SYRACUSE, Sept. 19—Production of Franklin cars will continue at full speed during the fall and winter months. It is announced by H. H. Franklin, president of the H. H. Franklin Manufacturing Co., that production in 1923 will aggregate 14,000 cars, the largest in the company's history.

Gernandt Oil Engine Developed by Bendix

Ready to Be Offered Industry—Will License It to Manufacturers and Others

CHICAGO, Sept. 20—Vincent Bendix, president of the Bendix Engineering Works of this city and also the inventor of the Eclipse-Bendix drive, announces that his company has developed the Gernandt oil engine, designed for use in automobiles, motor boats and locomotives, to the point where it can be offered to the industry. The Bendix company will not manufacture the engine but license its manufacture by others.

Bendix, Waldo G. Gernandt and Charles Bathrick have been working on this engine for the past five years and the design is protected by a series of basic patents.

Burns All Fuels

The Gernandt oil engine burns crude oil, distillate and kerosene, injected in a spray. It also burns gasoline without alteration or adjustments, it is claimed. The fuel is injected as a spray by means of the Gernandt patented system of super-compressing products of combustion, which contain no oxygen and therefore heats but does not pre-ignite the fuel while forcing it through a spraying slot. The spraying and injection is directly into the combustion chamber. Greatly increased mileage from the fuel is claimed for this device.

The Gernandt engine is designed in both two and four cycle types and also for air as well as water cooling. It is a full Diesel.

Gernandt Long in the Industry

Gernandt, whose idea it is, has long been identified with the automobile industry. In 1904 he assisted in the construction of the first four-cylinder block engine built in America. In 1908 he designed a single-sleeve engine and in 1909 he designed a double opposed motor truck engine. He was an engine designer for Packard in 1913 and from 1914 to 1917 he was associated with Cadillac in the redesigning of its eight-cylinder engine. He became associated with Bendix in 1917, since which time he has been developing the oil engine.

CONFERENCE POSTPONED

WASHINGTON, Sept. 19—Because of the inability of delegates to attend the Highway Conference, which was to have been held at Seaview, N. J., on September 14, 15 and 16, the Conference has been indefinitely postponed, it was announced to-day by Pike Johnson, of the N. A. C. C. Conference Committee.

Coal Distribution Blocked by Order

Northern Shipment Held Up by L. & N.—Government Removes Priorities

DETROIT, Sept. 20—The coal situation with Detroit automobile manufacturers was discussed at a meeting of the fuel committee of the Detroit Board of Commerce yesterday. Ernest Leibold, executive secretary to Henry Ford said at this meeting that the Louisville & Nashville Railroad, which taps the Ford mines in Eastern Kentucky, was using government service order number 23 which prevents the distribution of coal to certain industries as a subterfuge and declared that this order should be cancelled.

Henry Shearer, general manager of the Michigan Central Railroad, said the service on the L. & N. was inefficient and that as soon as this railroad started moving coal into Cincinnati other railroads to the north would get coal in Detroit. He said the Michigan Central and other lines were prepared to meet the emergency. Coal now being offered the Ford company by certain mining companies was not the proper grade, Leibold said, and for that reason the company has declined to make contracts.

Edison Has 15 Days' Supply

Alex Dow, president and general manager of the Detroit Edison Co., told the committee that the Edison company had only 15 days' fuel supply and this would be but 11 days' supply in winter weather. He declared it was dangerous for the company to be forced to go into the winter with less than a 30 day supply.

There was no indication at the meeting that other manufacturing plants might be compelled to follow the Ford closing move, but on the contrary more confidence was expressed in the ability to maintain operations. Difficulty is being experienced in getting steel as well as coal due to the general railroad situation but only temporary tie-ups have resulted from this cause.

Factory operation on a day to day basis as suggested by the United States Chamber of Commerce was declared impractical by John L. Lovett, general manager of the Michigan Manufacturers Association.

Coal operators were declared by Lovett to be using the government service order as a reason for disregarding contracts with manufacturers and coal dealers, and coal that they otherwise would be sending out on contract for $2.20 to $2.50 a ton at the mines, they are selling through brokers at $6 at the mines.

Priorities Removed

WASHINGTON, Sept. 20—Through the action yesterday of the Interstate Commerce Commission in connection with its new service order number 25, petroleum and its products are added to the list of commodities given preferred movement, effective at 12 o'clock to-night.

The order means that there will be a freer transportation movement of gasoline. A number of other commodities also were added to the preference list. The order is based upon the provision that the railroads can move all traffic as required and at the same time it abolishes the priorities created for the benefit of preferred users of coal, except when such preferences may be asked by the commission itself.

Gasoline Added

The adding of gasoline and other products of petroleum to the preferred list has been the source of gratification to automotive interests. The action of the commission is further evidence of the easier transportation and coal situation due to settlement of the strikes.

Ford Closing Only Affects Few Plants

PONTIAC, MICH., Sept. 18—Closing of Ford plants in Michigan because of the fuel situation will not be reflected in any local plants, except those working entirely on Ford parts. The Standard Auto Parts plant, making Ford springs, is practically shut down. The Fisher Body Co., making Ford bodies, has laid off 250 men, but has begun work on Chevrolet bodies, turning out about 300 daily.

The Oakland Motor Car Co. reports no worries over fuel, but some stringency in the transportation situation. No shut-down is anticipated, according to the general manager, George H. Hannum.

The Wilson Foundry & Machine Co. will not have to close, says General Manager Wilson. Fuel for the entire winter is available, and orders justify expectation of running steadily.

W. L. Day, general manager of General Motor Truck Co., says that while strike conditions have affected the market for trucks somewhat, there is no likelihood now of a shut-down.

Michigan Drop Forge Co. will continue day and night shifts in spite of handling Ford orders.

Durant Reports Many Canadian Star Orders

TORONTO, ONT., Sept. 18—Durant Motors of Canada reports progress in the development of manufacture and sale of its product in this country.

The company will produce the Star upon completion of the large new plant at Leaside, near Toronto. Over 1000 advance sales of the Star have already been made and the company expects to sell 18,000 in Canada in the first year. The touring model is priced at $650, basis Walkerville.

The company also manufactures the four-cylinder Durant car at Leaside. The six-cylinder Durant is imported from the factory at Muncie, Ind., and will continue to be supplied to the Canadian trade from that source until other arrangements can be made.

Industry Must Get Needed Coal Supply

Conference Urges Campaign to Expedite Coal Shipments and Control Measures

WASHINGTON, Sept. 18—Need for keeping the automobile industry supplied with coal was emphasized in the discussion in the House to-day, of the conference report authorizing selection of a fuel administrator.

Congressman Chalmers of Ohio stated that the Blue Diamond Mines Co. of eastern Kentucky had defaulted their contract with the Willys-Overland Company for the delivery of 5,000 tons of coal per month at $1.85 per ton at the mines, claiming that on account of lack of railroad transportation facilities the coal operators are not able to carry out their agreement.

Skips Overland Factory

Chalmers charged that with the consent, or at least with the knowledge of the coal distributor, this company is shipping coal to Toledo, right past the Willys-Overland factory to be loaded on Lake boats at higher prices. He insisted that the livelihood of about 11,000 men employed by the automobile company was jeopardized by this default.

Henry Ford's drastic action in connection with the coal shortage has had a salutary effect upon legislators and has materially expedited the passage of control measures.

Relief to the industries which are not on the preferred list was indicated by the opinion at the conference held here recently that mobility will be given to movement with less opportunity for speculation, if the priorities to special uses which have been necessary prior to the re-opening of the union mines should be relaxed and priority parallel with agricultural produce should be given to the movement of all coal without discrimination as to consignees.

Purposes of Campaigns

The three major purposes for which the conference voted to organize voluntary campaigns, were as follows:

1. To induce manufacturers, utility corporations, and buyers generally, not to purchase coal beyond their day-to-day needs until the flow of coal becomes more normal.

2. To persuade holders of coal contracts not to call for delivery on those contracts past their day-to-day needs. It was considered that about one-half of the coal in the country is under contract at normal prices and that a relaxation in the demand for this coal to the minimum daily requirements would allow an increase in supply to the general public.

3. To expedite the movement of coal in every possible way.

The co-operation of the responsible coal operators in these matters will be sought.

Ford Secures Coal: Will Reopen Plants

Price Changes and New Models Indefinite, Depending on Future Conditions

(Continued from page 586)

situation in all parts of the country and having no direct bearing on the closing.

Many other car factories in the district are operating on a greatly reduced schedule. This is especially true of the cars in the low price field, with cars in the middle class field also affected. Many workmen are being laid off in plants and there is considerable unemployment in the industry for the first time since March.

No Cars on Hand

The Ford Company went into the period of closing with its branches and dealers absolutely devoid of any stock of cars and with sales aggregating to the last day of operation all the cars that it was possible for the factory to produce for the past four months. Retail sales were on an equal footing with production running higher than 5000 daily. This condition, the factory points out, made it impossible for any stock of cars to be collected.

In connection with insistent reports that there would be a reduction in prices before operations were resumed it was said that with sales taxing the capacity of the factory, the question of a change in price has not entered into consideration and until satisfactory arrangements are completed for the purchase of coal, steel and other materials, no thought of change will be entertained. If a reduction comes later it will be determined upon business conditions and the terms upon which the company arranges for its materials.

New Closed Car

Whether new models will be introduced with the reopening of the factory, depends upon the progress the experimental department makes with the work upon which it is steadily engaged and upon which it is continuing during the closing of manufacturing operations. One of the models which the company has considerably advanced to this time is a new closed car which will be more commodious than the former model of its type.

The plans of the company for an assembling branch at Tampico, Mexico, are in abeyance because business conditions in Mexico now do not warrant such a plant for the present. The requirements of Mexican dealers will continue to be handled from the Houston, Tex., plant and the plant nearing completion in New Orleans. This latter plant will also supply countries in which there are no assembling branches.

The Philadelphia branch will continue to handle most of the foreign shipments to countries not supplied by foreign branches, property holdings of this branch being recently increased by the purchase of land in southern New Jersey.

Charlotte Plant Operating

CHARLOTTE, N. C., Sept. 18—The Charlotte branch of the Ford Motor Company expects to continue in operation for thirty days, the plant having enough material on hand and in sight to keep in operation for that length of time. The New Jersey branch of the factory will continue to ship material here until Sept. 20. The local plant is now turning out 50 finished cars a day but plans to return to 30 a day, its normal capacity.

Buffalo Plant Closed

BUFFALO, Sept. 16—The local assembling plant of the Ford Motor Co. closed to-day. It will reopen Tuesday to dispose of a shipment of cars and will then close again for an indefinite period.

Cambridge Plant Still Open

CAMBRIDGE, MASS., Sept. 19—The local Ford plant has not yet been closed, but the shutdown may come by the end of the week. If it does, the period of the shutdown will be indefinite.

Kearney Not Closed

KEARNEY, N. J., Sept. 16.—The Ford Motor Co. assembly plant here will not close for the present, according to notices posted to-day instructing 2800 men employed to report for duty as usual on Monday.

Chicago Supplies Replacements

CHICAGO, Sept. 18.—The Chicago branch of the Ford Motor Co. which has been producing 250 cars a day closed Saturday. About 700 employees were laid off. The parts department of the branch will remain open and will supply replacement parts to dealers as long as the supply lasts.

Service Closes Week Later

DETROIT, Sept. 18—The service department at the Ford factory is continuing to work this week, but will close Saturday like the rest of the plant inventory. Ample replacement parts will have been made and distributed by the week-end, it was said, to supply all Ford cars for the period that the factory will be down.

Highway Conference to Announce Program

WASHINGTON, Sept. 19—Details of the program of the Second National Conference on the Educational Aspects of Highway Transport will be announced within two weeks, the Highway Educational Board of the Conference have announced.

Invitations are being extended to all leading professors of Civil Engineering in the United States to attend. Announcement of the program is being held pending definite acceptance of those invited to attend. The conference will be held on October 26, 27 and 28 here in Washington.

All Prices Reduced by Willys-Overland

Overland Cut from $20 to $55—Willys-Knight from $80 to $140

TOLEDO, Sept. 18—The Willys-Overland Co. has announced price reductions effective to-day on all models of Willys Knight and Overland cars, which bring the lists down to the lowest ever quoted. The reductions on the Willys Knight cars range from $80 to $140 and on the Overland from $20 to $55. The new prices include many improvements. The revised list is as follows:

Willys Knight		
5-passenger	Old Price	New Price
Phaeton	$1,375	$1,235
Roadster	1,350	1,225
Coupe	1,875	1,795
Sedan	2,095	1,950
Chassis	1,150	1,125
7-passenger		
Sedan	2,295	2,195
Overland		
Phaeton	$550	$525
Roadster	550	525
Coupe	850	795
Sedan	895	875
Chassis	450	425

John N. Willys, president of the company, is enthusiastic over business conditions and prospects. He said:

We are rapidly settling many of the fundamental problems which have held business back over here and conditions are improving daily. I cannot see anything but a period of increasing prosperity ahead. We are not worrying about coal.

Roamer Makes Price Cut on All Models

KALAMAZOO, MICH., Sept. 20—The Roamer Motor Car Co. announces reductions on its full line of open and closed models ranging from $100 to $500, effective immediately. The new schedule, which is as follows, brings the price of the Roamer lower than it has ever been:

Model 6-54-E	Old Price	New Price
4-pass. Phaeton	$2,585	$2,485
4-pass. Sport	2,750	2,750
7-pass. Phaeton	2,785	2,685
Roadster	2,850	2,685
3-pass. Cabriolet	3,585	3,285
5-pass. Coupe	3,850	3,585
5-pass. Sedan	3,850	3,585
7-pass. Suburban Sedan	4,150	3,950
5-pass. Brougham	4,500	4,000
Special 5-pass. Sedan	(new)	4,250
Model 4-75-E		
4-pass. Phaeton	3,585	3 485
4-pass. Sport	3,750	3,650
4-pass. Sport Sedan	4,650	4 650
2-pass. Speedster	3,985	3,785

Although the price of the 4 passenger sport Model 6-54-E has not been changed, it is announced that extra equipment has been added.

The company is building a special phaeton with wooden wheels, priced at $2,285.

Tariff Bill Will Help Export Trade

Seven Provisions of Great Importance to the Automotive Industry

WASHINGTON, Sept. 19—By a vote of 43 to 28, the Senate late this afternoon adopted the conference report on the Tariff bill, following twenty months of hearings and debate. Its passage is certain, as the President has announced that he is prepared to sign the measure as soon as it reaches him.

Seven provisions in the bill are considered of paramount interest to the automotive industry, affecting to a lesser or greater extent the foreign business of the automobile export business and the industry at home as well.

Flat Duty of 25 Per Cent

Summed up, these seven provisions are:

(1) The measure provides a flat 25 per cent duty on all automotive equipment, vehicles, parts and accessories.

(2) It carries a 90 per cent ad valorem duty on all automobiles re-imported.

(3) A duty of 5 cents per pound on aluminum in the crude, and nine cents per pound on aluminum in coils, sheets, etc.

(4) A duty on ball bearings of 10 cents per pound and 45 per cent ad valorem.

(5) Crude oil to remain on the free list.

(6) Administrative provision authorizing the President to increase or decrease tariff rates to a maximum of 50 per cent in the case of countries discriminating against the United States.

(7) The enlarging of powers for the Tariff Commission and giving that body authority to make factual investigations for the President and Congress in determining the justification of any rate considered unreasonable.

Under the terms of the last two mentioned provisions, both of which are, of course, administrative, the President in substance is given the authority to "render justice where justice is due," and to set up retaliatory tariffs against states and countries which discriminate against this country—even to the extent of placing an embargo against certain items of manufacture.

Could Set Up Embargo

As an example, under present conditions there is an embargo in Germany against the importation of automobiles into that country by the United States. Under the authority given him by the new bill, the President could set up similar embargo against Germany, or if that country should happen not to be a manufacturer of automobiles, the embargo could be extended to any other item as a retaliatory measure because of Germany's embargo on automobiles from this country.

In discussing this phase of the new tariff measure, Pyke Johnson, executive secretary for the National Automobile Chamber of Commerce, declared that it was one of the most salient points in the bill.

He said:

> The automobile industry, as well as many other industries, after spending years of time and a great deal of money have had it happen to them, to wake up and find that one of their chief export markets for certain commodities had been cut off because of high tariffs. Under the provisions of the new bill, this cannot happen, without equally disastrous results to the country levying the excessive tariff or embargo.

The duty of 10 cents per pound and 45 per cent ad valorem on ball bearings is a conference compromise. The bill as it passed the House provided for a 35 per cent ad valorem duty, while the Senate measure carried a 55 per cent levy.

While authority is given the President to make reciprocal changes in the measure, he is not authorized to change dutiable articles to the free list, or vice versa, or specific rates to ad valorem rates.

Drake Sees Stimulus

NEW YORK, Sept. 20—J. Walter Drake, chairman of the foreign trade committee of the N. A. C. C., in speaking of the new tariff legislation, says:

> The newly agreed upon export features of the tariff bill, assuring equality of treatment in non-manufacturing as well as industrial countries, will stimulate American automotive trade abroad.
>
> Under the general export feature the newly lowered automobile rate of 25 per cent, if conditions warranted, could be increased by one-half, bringing it up to a maximum of 37½ per cent. If some manufacturing country were unwilling to allow a duty as low as 25 per cent on American vehicles in return for an equally low rate on its automobiles brought into the United States, steps could be taken to have a higher rate up to 37½ per cent apply.
>
> In the extension of our trade with non-industrial countries the general export feature of the tariff will also prove helpful. Finland is one of these countries. At the present time American manufacturers are at a handicap there, because French exporters pay a duty of 10 per cent compared with 40 per cent assessed on United States automobiles. With means now being provided, such a discrimination would be discouraged either by concessionary or higher duties on paper and other products imported into the United States from Finland.

De Palma Inspecting Pan Motor's Factory

MINNEAPOLIS, MINN., Sept. 20—Ralph De Palma, automobile racer, has been inspecting the plant of the Pan Motor Co. at St. Cloud, Minn., in the interest of a company which considers purchasing it for the purpose of manufacturing cars there. It is stated that he will return in a month with business associates to make another study of the plant. De Palma was accompanied during his inspection by W. E. Merrill of the Lafayette Minnesota Motor Co. of Minneapolis.

Receivers Named for Comet Plant

Court Action to Prevent Foreclosure—Hope to Put Concern on Feet

BLOOMINGTON, ILL., Sept. 20—Receivers have been named for the Comet Automobile Co. by Judge Baldwin, to avert foreclosure proceedings against the property, in behalf of the Citizens National Bank and the Farmers State Bank & Trust Co. of Decatur.

The Millikin Trust Co. and Roy W. Jones of the Comet company have been named receivers at the request of the company, and with the consent of the bankers. They were instructed by the court to make an appraisal of the property before further action is taken by the receivers.

The action is the result of financial difficulties which the company has had in recent months and was taken by agreement in the hope that a receivership might conserve the assets of the concern.

Trusteeship Created

In October, 1920, the company was in need of funds, and the board authorized an issue of $250,000 8 per cent bonds which were delivered to the Farmers Bank in the form of a first mortgage. It was unable to sell the bonds, and on December 15, 1920, an agreement was entered into between the board and the banks, creating a trusteeship for the company to advance money from time to time. This money to be secured by a trustee. All of the money that has been advanced by J. D. Johnson, trustee, under the terms of that agreement has been repaid.

This year the company contracted for $400,000 worth of material for the manufacture of cars, but financial difficulties forced it to cancel all of its orders, and the plant has now practically ceased operations.

President George W. Jagers looks upon the action as a most favorable way out of the financial difficulties and believes that it will be beneficial to stockholders and creditors alike. "The company," he said, "has been trying to refinance its affairs for some time, but has been unable to do so, and the hope is that the court, through receivers, will be able to put the company on a sound financial basis again."

Not to Wind Up Affairs

The company's property is worth $400,000, which is sufficient to take care of all claims in the event that the property is liquidated to settle the affairs of the concern. It is not planned, however, to wind up the affairs, but it is hoped rather that the concern may be financed and given another opportunity to proceed with the manufacture of cars. It has a well equipped factory building for that purpose.

Conference Assists All Tire Industry

Tire Dealer and Rubber Associations Meet—Co-operate to Abolish Abuses

CLEVELAND, Sept. 18—R. F. Valentine, president of the National Tire Dealers Association, to-day made public through an official statement what had been accomplished at the meeting of a special committee of the tire dealers' association and the ruling board of the Rubber Association in New York City on Aug. 9.

Horace De Lisser, acting president of the Rubber Association, is quoted as saying: "This conference has been productive of incalculable good to both the manufacturer and the dealer, and it has seldom been my privilege to sit in a conference holding more interest, and where there was such evidence of clear understanding.

Re-equipment Sales Considered

In the matter of adjustments, the rubber association assured the committee that all available means were being used to acquaint the public more thoroughly with the new policy, which calls for the elimination of mileage guarantees. The rubber men also agreed to endeavor to induce certain manufacturers giving such guarantees to discontinue the practice.

Re-equipment sales were considered, and on this subject the manufacturers pledged the use of every possible precaution to prevent the purchase of larger quantities than actual equipment requirements and that resale of equipment stocks through car agencies will be discontinued.

A discussion of the topic, "The Car Manufacturer," developed that a few companies are now supplying five tires on equipment orders, instead of the regular four tires. Future contracts will, in all probability, be based on four tires, leaving the fifth to the dealer to be supplied.

Certain Accounts Stopped

The national and commercial accounts have been a problem to the tire dealer, and when this subject was reached, one of the largest tire manufacturers announced that he had discontinued such accounts, with the exception of a few that run until the end of the year. The dealer representatives argued that there was no justification for such accounts and the rubber men agreed that this matter would be given the closest consideration by the sales organization.

The dealers' committee asked that the publication of all price lists other than the consumer lists be eliminated. They stated it would save money for the manufacturer and eliminate misunderstandings for the dealers. It was the consensus of opinion that if manufacturers found it necessary to issue lists other than consumer lists, their distribution should be carefully controlled.

Regarding the production of more than one line or grade of tires in one plant, the dealers questioned the practice of any company producing more than one line and grade and marketing the products under separate agreements and contracts. This brought the statement from some manufacturers that in the future, or just as soon as practicable, their products would be offered through one channel and the same policy would apply on all lines.

Several manufacturers reported that dealer practices would come in for consideration and close scrutiny, and that the flagrant abuses indulged in and practiced by a great many dealers would not be tolerated. Other companies reported that they already were enforcing many needed restrictions. The dealers promised every co-operation possible in the correction of these abuses and demoralizing practices indulged in by some dealers.

Makers Still Feel Tire Price Upset

CHICAGO, Sept. 15—Tire manufacturers speaking at the monthly meeting here yesterday of the Midwest Rubber Manufacturers' Association declared that eight out of 10 of the small tire manufacturers are selling tires for less than the cost of production. It was the opinion of the speakers that probably half of the eighty per cent do not know that their selling price is below the cost of production because they are not able to figure manufacturing cost.

The price situation was said to be seriously affecting the tire makers in the Midwest group, but some hope of improvement was seen in the business trend. It was pointed out that most of the manufacturers have discontinued the shipment of tires on consignment and are now requiring cash on delivery.

The tire trade is greatly hurt, it was said, by the frequent failures of tire manufacturers with the result that in the liquidation process car loads of tires are dumped on the market at a fraction of the production cost. One manufacturer went so far as to declare that that there are no longer any legitimate retail tire dealers. "The 'gyps' are the only ones who can make money enough to stay in the business," he said.

It was decided to hold the November meeting of the association in St. Louis.

CONVENTION DATE SET

CHICAGO, Sept. 20—The Hardware Association will hold its annual convention at Atlantic City from Oct. 17 to 20. The motor accessories meeting will be held on Oct. 16 and 17. During the week a show will be staged at the Ambassador Hotel where the conventions will also be held. It is expected that the accessories meeting will be especially well attended for the reason that this year the Automotive Equipment Association has closed its doors to all but its members.

Will Settle Milk Transport Project

Producers' Committee May Adopt Automotive Equipment for Milk Transportation

WASHINGTON, Sept. 19—The use of automotive transportation by the Nation Milk Producers Federation will be taken up in November, when the Executive Committee of that association meets early in the month.

For more than three months the association has had under advisement the advantages of automotive transportation of their milk products over rail transportation. Because of excessive freight rates (all milk carrying a passenger freight rate), the Federation is seeking the establishment of its own milk transports, if it can be done economically and satisfactorily.

Data on the subject, submitted to the Federation by the Truck Committee of the N. A. C. C. will be placed before the Executive Committee at its coming meeting, which will be held either in Utica, New York or Boston.

Says Trucks "Shake" Milk

Preliminary consideration of the milk producers' trucking problem was taken up last week in a meeting in Philadelphia. No definite decision, however, was made as to the establishment of milk transports. Charles W. Holtman, executive secretary of the National Federation, said:

> The outstanding feature of the Philadelphia meeting was the development of the fact that milk shippers find that their product is shaken up too much when transported by truck and the belief was expressed that milk and milk products did not arrive in the city in as good a condition as when shipped by rail.

Whether or not this "shaking up" was of such proportion or under such conditions as to prejudice the use of trucks and would not be more than offset in the freight saving, Holtman stated that he was not prepared to say. He stated that:

> We are giving the matter serious consideration and it is to be hoped that we can definitely make some decision at the November meeting which will lead to the establishment of automotive transports, at least in sections where they are favorable and thus relieve our membership from the millstone of freight rates which at the present time is consuming all the profits of our members.

SPICER AT CAPACITY

PLAINFIELD, N. J., Sept. 20 — Charles A. Dana, president of the Spicer Manufacturing Corp., states that the plants of the company are working at capacity. Orders for 1923 delivery, it is stated, are already being received in good volume. No trouble is experienced from the fuel situation, as the company is well supplied with coal.

FINANCIAL NOTES

Hendee Manufacturing Co. has declared a regular quarterly dividend of $1.75 on the preferred stock payable Oct. 2 to stock of record Sept. 23. The company for the new fiscal year has laid out a schedule for 20,000 motorcycles as compared with a production of 8,500 last year. The solution of the national unemployment problem has been a big contributing factor in the increased demand. Of the 20,000 machines about 8,000 have been ordered for foreign delivery.

American LaFrance Fire Engine Co., Inc., has declared the regular quarterly dividend of 2½ per cent on the common stock payable Nov. 15 to stock of record Nov. 1 and a dividend of 1¾ per cent on the preferred stock payable Oct. 2 to stock of record Sept. 25.

Keystone Tire & Rubber Co. will offer common stock to holders at about $7.50 a share. The corporation has authorized a common issue of 5,000,000 of which 3,035,000 are outstanding, the balance being in the treasury.

Saxon Motor Corp.'s recently authorized 200,000 shares of common stock and 200,000 previously outstanding has been underwritten and will be offered to stockholders, the proceeds to supply working capital.

Auburn Automobile Co. has declared the regular quarterly dividend of 1¾ per cent on the preferred and $1 per share on the common stocks payable Oct. 1 to stock of record Sept. 20.

Hudson Motor Car Corp. has declared the regular quarterly dividend of 50 cents a share on the capital stock payable Oct. 5 to stockholders of record Sept. 25.

Yellow Cab Manufacturing Co. of Chicago has distributed $246,922 to employees as profit sharing bonuses from net earnings for the first half of this year.

Hupp Motor Co. has declared the regular quarterly dividend of $1.75 on the preferred stock payable Oct. 1 to stock of record Sept. 20.

Velie Motors Corp. has declared the regular quarterly dividend of 1¾ per cent on first preferred, payable Oct. 2 to stock of record Sept. 15.

Nash Motors Co. has declared a quarterly dividend of $1.75 on the outstanding preferred stock Nov. 1 to holders of record Oct. 20.

G. M. C. Has 48,554 Common Shareholders

NEW YORK, Sept. 19—General Motors Corp. had at the end of August 48,554 common shareholders. There were 41,144 common stockholders owning 100 shares or less while only 7,410 own more than 100 shares. Stockholders owning from one to ten shares number 14,774; eleven to 20, 7,460; 21 to 30, 5,315; 31 to 40, 2,094; 41 to 50, 4,036 and 51 to 60, 1,404.

JORGENSON REORGANIZING

WAUPACA, WIS., Sept. 18—The Jorgenson Mfg. Co. of Waupaca, Wis., manufacturing priming devices and other automotive equipment, brass castings, etc., which recently was declared bankrupt, will be reorganized immediately and the business continued. A group of stockholders have acquired the resources for $18,000 in cash and assumption of obligations of $10,000. Lack of adequate working capital after the enlargement of the plant was effected caused the proceedings in bankruptcy to be instituted. Waupaca business men, it is stated, have come forward with sufficient new capital to rehabilitate the industry.

Packard Report Shows Large Net Earnings

NEW YORK, Sept. 20—The annual report of the Packard Motor Car Co. for the year ended Aug. 31, 1922, will show that after setting aside adequate reserves the net earnings will be more than $1,000,000. If no reduction in inventory is called for the company's net earnings for the period may reach $1,500,000. In a statement issued preliminary to the annual report, the company says:

This showing does not reflect the true operating condition of the company at the present time, for it was not until May, the last month of the third quarter, that the company began to receive benefit from the sales of its new single six car and from products manufactured from materials at current low prices.

Net earnings at present are running in excess of $500,000 monthly and there is no indication of slackening of business. The company is now on a production basis of about 2000 cars monthly and is planning a considerable increase in production.

Hearings on Gasoline Situation Postponed

WASHINGTON, Sept. 19—The subcommittee of the Senate Investigation Committee on Manufactures, which is investigating the gasoline situation, will postpone further hearings until the reconvening of the new session of Congress in December, it has been announced by Senator LaFollette, Chairman of the Committee.

Further hearings are being postponed until a sufficient number of replies to questionnaires sent out have been received and digested, thus allowing the committee to get a line on subsequent procedure. Gilbert E. Roe, attorney for the sub-committee, who is conducting the investigation, states that replies are coming daily.

WILLS RUMORS DENIED

DETROIT, Sept. 20—Denial was again made to-day of the report that Henry Ford will take over C. H. Wills & Co. and that C. Harold Wills, its president, will become general manager of the Ford plant when it reopens. It is stated that the Wills company is in an excellent position, and that there is no basis for the rumor of a consolidation.

ASSOCIATION MOVES

NEW YORK, Sept. 20—The Motor and Accessory Manufacturers Association announces the removal of its office to the Fisk Building, 250 West 57th Street, at Broadway.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

The strikes, which have rendered the business outlook uncertain for the last several months, are virtually past, and business generally is expected to feel soon the economic improvement which this will effect. Much, however, will depend upon transportation facilities. While considerable traffic congestion on the railways is expected by some observers, there is good reason for thinking that it may not be so serious as anticipated.

Unemployment in the country has become practically normal. About this time last year it was estimated that approximately 5,500,000 workers were out of employment. To-day it is estimated that only 1,500,000 are seeking work, while another million and a half are on part-time work. Reports from all parts of the country point to labor shortages in certain districts and trades.

According to the Association of Railway Executives, 195,142 cars of coal were loaded during the week ending September 16. Of this total, 175,326 cars were loaded with bituminous coal and 19,816 with anthracite. Coal production last week amounted to approximately 10,633,000 tons, of which 9,650,000 tons consisted of bituminous coal and 983,000 anthracite, based on these statistics.

High Prices Predicted

As the coal strike, in both the bituminous and the anthracite fields, has been settled on the basis of the former wage scales and as the wages of employees in the steel industry have been increased, we may expect, even after the fuel shortage has been overcome, the continuance of a high level of prices for coal, iron and steel products for some time.

Nevertheless, in view of the declines which have been taking place in other commodities, notably certain agricultural products which have been protected by the Emergency Tariff Act for more than a year, it is doubtful whether such a level can be maintained for any great length of time. This is especially true of the iron and steel industry, in which the larger part of the purchasing orders are placed only when buyers are convinced that prices are reasonably low.

WHITE CITY FOR OVERFLOW

LONDON, Sept. 8 (By Mail).—Due to the fact that extensions to Olympia will not be completed in time for the annual automobile show in November, it has been decided to use the accommodation available at the White City to supplement that at Olympia.

As was the practice put into force last year the Society of Motor Manufacturers and Traders has specified that the retail prices of chassis and of cars must be declared by noon on Monday, Oct. 16. No change in prices will be permitted after that date or during the exhibition.

INDUSTRIAL NOTES

L. H. Gilmer Co., Tacony, manufacturer of automotive equipment, is producing 20,000 fan belts every twenty-four hours, according to Ludwell H. Gilmer, president. This department is operating at two-thirds of capacity, while other departments are running twenty-four hours a day. The plant is shipping approximately 150,000 fan belts and 1,000,000 feet of brake bands a month to the Ford Motor Co. The company has approved plans and is about to award a contract for the erection of a new power plant and a storage house at a cost of approximately $200,000.

Walworth Realty Co., a subsidiary of the Walworth Manufacturing Co. of Boston, has awarded a contract for the construction of a warehouse, pipe shop and garage in Long Island City. The main building will contain the offices, city sales department, shipping room, and space for the storage of fittings and materials. The pipe storage building is to be 60 x 214 feet.

P. J. Janssen, Ltd., exporter of automotive products with offices in New York City, Singapore and Bandoeng, Java, has opened offices in Amsterdam to handle the business in Holland, Belgium and Scandinavian countries of American automotive manufacturers.

Springfield Commercial Body Co., Inc., has been formed in Springfield, Mass., to manufacture, repair and deal in automobile bodies. Charles B. Ring is president and L. Philip Smith is treasurer of the concern, which has an authorized capitalization of $200,000.

Racine (Wis.) Metal Stamping Co. has changed its corporate title to Racine Screw Works, to better designate the present nature of its principal business. Albert O. Falkenrath is president, and Jerome J. Ritter, secretary.

Holbrook Co., manufacturer of automobile bodies, announces plans to double its present capacity at the Hudson, N. Y. plant. The company now employs 120 men. An addition to its present plant to cost $100,000 will be erected.

Mueller Electric Co. has completed its new building at 1583 East 31st Street, Cleveland, which will permit it to expand its activities in the manufacture of electric specialties.

No Settlement Reached on Pan-American Claims

DECATUR, ILL., Sept. 18—Claims against the Pan-American Motors Corp. amounting to more than $100,000 have been objected to by the receivers of the defunct concern, and threatened litigation may long delay a settlement of its affairs.

The total amount claimed is $212,855, and more than half will be objected to. The real estate of the corporation has not yet been sold, as conditions have not been right to dispose of them, except at a great sacrifice. There was a time when it appeared as if ten cents would be realized upon the dollar but it seems likely now that nothing will be left for the stockholders.

SAMPSON ASSUMES PRESIDENCY

TORONTO, ONT., Sept. 16—W. T. Sampson was elected president of the Automotive Industries of Canada in succession to R. S. McLaughlin, president of General Motors of Canada, Ltd., etc., at the annual convention in Toronto Tuesday—the largest in the history of the A. I. C.

T. A. Russell, president of Willys-Overland, Ltd., etc., was elected vice-president, and the board of directors was re-elected, W. R. Campbell, vice-president and general manager of the Ford Motor Car Co. of Canada, Ltd., filling the chair left vacant by the death of the late Gordon McGregor.

Sampson is vice-president and general manager of the Gananogue Spring and Axle Co., Ltd.

Bureau of Standards Advances Tire Tests

WASHINGTON, Sept. 16—Endurance tests conducted by the Bureau of Standards with 15 tires show consistent results.

The mileages obtained on 30 x 3½ fabric tires have ranged from 1000 to 4000 miles. A direct current motor has been installed so that the machine may be run at night as well as during the day, thus shortening the time necessary for a complete test.

Several more tests on the power losses in tires have been completed, and some of this work is being conducted in co-operation with the automotive laboratory of the bureau, which has been carrying out road tests on complete cars.

One tire manufacturer has requested a series of dynamometer tests on tires of several different constructions, and it has been agreed to carry out this work, as the results will be of interest in connection with the general power loss investigations.

Durant Plant Will Make 3000 Bodies Next Month

NEW YORK, Sept. 20—Following the announcement of the determination of Durant to build bodies for the Durant four and the Star for the eastern territory in the Elizabeth plant, the company states that 3000 of these bodies will be built there during the month of October so as to be ready for assembly work on Nov. 1. At the present time there are 165 men on the Elizabeth payroll, but it is hoped to increase this to 3000 by March 1.

BUYS CANADIAN SITE

TORONTO, ONT., Sept. 18—The Ford Motor Co. has just purchased fifteen acres of land from the Grand Trunk Railway on the eastern border of the city for $175,000, and will erect thereon a one-story car-assembling plant, having 150,000 feet of floor space.

This is the first property in Toronto or its vicinity sold by the Grand Trunk for more than forty years. This particular property has been owned by the railway for 36 years.

METAL MARKETS

Activity of the sort that would furnish a key to the attitude of buyers toward the higher price levels that pass as quotations in the steel market is utterly lacking. Transactions are all for immediate shipment and whatever prices apply to these are irrelevant in so far as concerns the major market for the reason that the prices which they carry include a premium for early shipment. A somewhat better pace in production is being gradually attained but the dent being made into the backlog of orders is not sufficient so far to cause producers to come out into the open and actively compete with one another for new business. Some producers have let it be understood that they will carry enough business over into the fourth quarter to enable them to continue operating at the present rate up to November, even though no new business of consequence should be forthcoming in the meantime.

While some of these estimates of unfilled tonnage on order books are obviously more optimistic than accurate, they are not injurious to the producers' cause. Conditions are such that just now the most energetic quest after steel orders for shipment in November and December would be love's labor lost. The only result of such activity would be to weaken the psychological effect of the widely advertised advance in steel production costs and selling prices. From their point of view producers are pursuing the only logical course in sitting back, taking whatever orders for rush shipment which come their way at fancy prices, and permitting the demand for deferred deliveries to develop without displaying eagerness for orders which would be playing into buyers' hands. There are those who say that with the shrinkage of the steel mills' backlog of orders during the year's last quarter and the seasonal contraction in demand prices will gradually shed some of their adipose which these observers claim should be looked upon as nothing more than premium on immediate deliveries. This view leaves out of consideration the actual enhancement of production costs and the general uncertainty of the entire industrial situation. He indeed would be a brave man who at this time would say whether steel prices, or for that matter prices of any commodity, will be higher or lower three months hence than they are now. It would be very gratifying to flash the "buy now" signal at this time if developments over the next three months were to vindicate such counsel.

Pig Iron.— Automotive foundries are buying from hand to mouth, if at all. Production is increasing, but it will be some time before anywhere near normal conditions are restored.

Aluminum.— Some importers are holding aluminum at virtually the same prices as those quoted by the domestic producer, but they are not making any sales at these prices. Once the duty of 5c. on ingots and 9c. on sheets becomes effective, the market's attention will center on the price program of the domestic producer. An early price advance by that interest would enable holders in the outside market to liquidate at a profit. The longer such an advance is held in abeyance, the greater will be the number of tired holders. Some consumers are protected by contracts over the remainder of the year.

Copper.— The market is steady with domestic consumers more interested.

Calendar

SHOWS

Sept. 23-30—New York, Closed Car Show, Grand Central Palace.

Oct. 7-14—New York, Electrical and Industrial Exposition, Grand Central Palace.

Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8-13 — New York Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Sept. 1922 — Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Associação Automobilista Brazileria.

Oct. 4-15 — Paris, Automobile Show, Grand Palais.

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 9 - 19 — Buenos Aires, Argentina, Annual Exhibition, Sociedad Rural Argentina.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

November—Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

CONVENTIONS

Sept. 18-23, 1922 — Rome, Italy, Second Annual Meeting of the International Chamber of Commerce.

Oct. 2-7—Detroit, Fourth International Steel Exposition and Convention of the American Society for Steel Treating and the American Drop Forging Institute, General Motors Building.

Oct. 7-14—Detroit, Second National Aero Congress and National Airplane Races.

Oct. 9-11—Chicago, Annual Convention of the American Gear Manufacturers Association.

Oct. 18-20—Chicago, National Association of Farm Equipment Manufacturers, Congress Hotel.

Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

S. A. E. MEETINGS

Sept. 22—New England Section, Engineers Club, Boston, Starting and Lighting Equipment, Louis Ehrlich.

Sept. 29—Detroit Section, Lubrication, A. A. Bull.

Oct. 6 — Aberdeen Proving Ground, Md.

Oct. 26-27 — Detroit, General Motors Building.

Jan. 9-12—New York, Annual Meeting.

USL Effects Economies Under Miniger Control

NIAGARA FALLS, N. Y., Sept. 20—A financial statement issued by the U. S. Light & Heat Corp. shows that the interests headed by C. O. Miniger, which have been in control since Feb., 1921, have effected such economies in operation and developed so much business that the affairs of the company are in creditable shape at the present time. Administrative and selling expense for June, 1922, showed a reduction of approximately 24 per cent over June, 1921, and June, 1921, showed a reduction of approximately 27 per cent over June, 1920.

Profits Satisfactory

Miniger reports that for the first seven months of this year the corporation has been on the right side of the ledger, with the profits very satisfactory to the officers of the company. Important new contracts have been entered into for supplying initial battery equipments on Maxwell, Gray, Star, Columbia, Elgin, Stevens-Duryea and several others, in addition to those the company had last year.

Train lighting equipment orders have been obtained from Boston & Maine, Pennsylvania, Santa Fe, Wabash, Norfolk & Western, Chesapeake & Ohio and other roads.

FORD SEEKS HARDWOOD SUPPLY

MILWAUKEE, WIS., Sept. 18—That Henry Ford and son are in the market for 60,000,000 feet of hardwood logs to supply the immense sawmills, body plant and other woodworking shops established in the last two years at Iron Mountain, Mich., was the authoritative statement made at the annual convention of the Wisconsin and Upper Michigan Loggers Association, held in Milwaukee. This is in addition to the log supply from camps operated directly by the Ford interests. The material wanted consists of birch, maple and elm, with some hickory, walnut and hemlock. The requirements appear as probably the largest of any single concern so far as Wisconsin and Upper Peninsula hardwoods are concerned.

Hermann Chosen to Head New Tire Machine Co.

ST. MARYS, OHIO, Sept. 19—The Hermann Tire Building Machine Co. of Columbus, which produced and marketed certain lines of tire building equipment, has been sold to W. H. Hermann, who has also acquired the former plant of the A. R. McDonald Co., of this place. The latter plant will be equipped with machinery for the manufacture of casing and tube making tools.

The reorganization of the company has been brought about by the election of W. H. Hermann, president and treasurer; F. Stanley Crooks, vice-president; E. H. Brocker, secretary, and O. E. Larsen, plant manager.

DEMAND MIRRORS ON TRUCKS

WASHINGTON, Sept. 13—A uniform law, in the interest of safety, requiring mirrors on motor trucks is being sought by the American Automobile Association. A survey of the existing automobile mirror laws had been made by the Association and submitted to Secretary Hoover of the Department of Commerce with the recommendation that he use his office to bring about a uniform state law.

RESTRICTING RUBBER

NEW YORK, Sept. 14—Advices from London are to the affect that the British Rubber Growers Association has endorsed the recommendation of the Government's restriction of production in all British possessions.

California August Sales at High Mark

SAN FRANCISCO, Sept. 16—California automobile dealers had next to the best month of their history during August, 1922, though they did not reach the number of sales made in June of this year, when they smasned all records by selling 14,180 cars. August registrations showed sales of passenger cars totalling 13,893, which is 287 cars short of the June record, but enough to indicate that the sales curve is again rising, since the August volume of sales exceeds that of July by 882 cars. There is more than a possibility that September sales will equal, or even surpass, the June high-water mark.

Aggregate sales for the month of August, 1922, were 4398 cars more than for August, 1921, a gain over the same month as last year of 46 per cent. Southern California keeps its lead over northern California in number of sales, 7515 for the south, and 6378 for the north. Sales for the past August in the south were 2131 more than in August, 1921, a gain of 40 per cent; while northern California sold 2267 more cars in the month this year than last, a gain of 55 per cent.

BIG ACCESSORY SALES PREDICTED

ATLANTA, GA., Sept. 18—Tire and accessory jobbers in Atlanta covering the Southeastern territory advise that practically all wholesalers in the larger cities of the district are now carrying bigger stocks than they have at any time within the past three years. This is due to the fact, they say, that indications promise an unusually large demand during the next six or eight months. This business is expected to reach the high water mark in the history of the automotive industry in the Atlanta section during this period.

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South American Market Ripe for Sales Expansion

General Motors' executive paints optimistic picture of present automotive conditions in Latin-America. Lower prices stimulate buying. Stock models gain in popularity. Highway building makes rapid progress. Service facilities being extended everywhere.

By J. D. Mooney*

AUTOMOTIVE sales conditions in Brazil, Uruguay, Argentina, Chile and Peru are everywhere tending to become more favorable. Distributors, jobbers and dealers in these countries are more confident than they have been since the financial depression became so serious eighteen months or two years ago. This was plainly evident in Rio de Janeiro, Sao Paulo, Montevideo, Buenos Aires, Cordoba, Santiago, Valparaiso, Lima and other localities which are the automotive centers of the eastern and western sections of South America.

A great automotive business, firmly founded and efficiently managed, has been built up in these countries. Motor cars, motor trucks, motorcycles and farm tractors are being operated in large numbers. Efficient sales organizations, functioning with energy and merchandising ability, are hard at work promoting the sale of the automobile and its attendant equipment. Service facilities have come into being on a large scale and service is being rendered in a manner deserving of the highest commendation.

These are a few of the significant facts presented by a study of the automotive trade in these sections. This trade has grown to large proportions already and there is every reason to expect a gradual but certain enlargement of sales in the months to come, along sound and progressive lines. The automobile is such a transportation necessity and the esteem with which it is held is so high that this development is certain to come and it will accompany the restoration to normal of all the business forces of these countries.

General business has gone far in overcoming its

THE writer of this article has just returned from a three months' trip through the principal South American countries. The purpose of his visit was to analyze automotive market possibilities.

Here he gives to the readers of Automotive Industries his conclusions drawn from this first-hand investigation. He talks from the standpoint of the American executive interested in increasing foreign sales.

His comments will be of interest to executives throughout the industry.

*Vice-president and general manager, General Motors Export Corporation.

troubles. So has the automotive trade. National industries of the various countries in most cases have gotten back to a much better basis and the feeling is evident that from now on there will be a gradual building up of trade and commerce to levels probably appreciably higher than before the war. Readers of AUTOMOTIVE INDUSTRIES are familiar with the economic influences that are at work, not only favorable but those which are unfavorable. What the expected betterment will mean to them in terms of automotive sales can be well understood by saying that the old stocks of cars and other equipment have been almost entirely disposed of and the buying of new equipment has begun.

PRICES have been brought down in keeping with factory reductions and with the level of exchange values; the result being that motor cars, trucks and tractors of undoubted excellence are being offered at what can only be considered as very low prices.

One thing that the industry must keep clearly in mind is that costs should be brought down to as low a level as possible. Whenever reductions can be made in the selling prices of the new vehicles, these should be passed on to the owner and the user. It is to the credit of the industry that these reductions have been carried on to the ultimate user in nearly every case. The lower the price of the car, truck or tractor, the greater will be the number of persons who can own and use automobiles of every character. This is an axiom of the industry that is being proved in every locality. We must look with favor upon anything that tends to lower the cost of motoring, whether this be in the first cost of the new vehicle or in service and maintenance work.

There is plainly in evidence a trend in favor of the stock model, equipped just as it comes from the factory. Special bodies, special equipment and special finish add materially to the cost of the cars and any added costs therefore limit the number of possible users. The special car, of course, is and will continue to be sold to those users who can afford them; this is good business and the industry is prepared to furnish cars in whatever finish or with whatever equipment may be specified. Nevertheless, the stock model, the cost of which has been brought down to a low point through efficient production methods, is the vehicle that is being sold in the largest volume. This is another favorable tendency, which indicates that the automobile is being considered more widely as a transportation utility vehicle.

The countries of Brazil, Uruguay, Argentina, Chile and Peru have to-day a large mileage of roads usable for automotive vehicles. This is perhaps not widely recognized, as it is usually stated that only a few roads in these countries are passable for motor traffic. The fact is that many localities have not yet developed the automobile as far as the present roads would warrant.

The roads, streets and boulevards of Rio de Janeiro are so fine that many more automobiles should be using them than are now in operation, despite the fact that it is impossible to drive away from the city any distance. The roads of Sao Paulo are excellent and the opening of the new highway to Ribeirao Preto is an automotive event of the first magnitude. This great road stretches some 450 kilometers into the interior and automobiles can be driven over it for hours without shifting gears. A tremendous automotive traffic will soon be using this highway, as will also be the case over other fine roads in this district.

Existing roads in other localities do not halt automotive traffic. In Uruguay and Argentina, for example, automobiles can be driven almost anywhere. Even in the middle of winter we drove many kilometers through the interior of Argentina without difficulty. The road problem in Chile is difficult but the automobile is being introduced there with ability and energy. We may expect much from that country in the next few years. Peru already has some excellent roads and a campaign for further improvement should soon begin to bear fruit.

The automotive representatives in these countries are keenly alive to the road necessities and are taking a leading part in the campaigns now under way for road betterment. These campaigns promise much for the future but we must not overlook the opportunities at present existing for automotive transportation.

The motor truck is slowly winning the position it should occupy in many localities. A motor bus development is now getting under way that should bear the closest attention of the automotive trade. Buses are being put into operation and there is a large demand springing up for such transportation facilities. Successful operation is a proven fact in many centers and this is leading to expansion throughout all these territories.

Operating costs have worked against truck operation for general haulage purposes. Nevertheless, many opportunities exist for truck use and this part of the market is deserving of more attention than it has received.

Much has been said about the subject of service and dealer organizations. It would be well to add here that excellent maintenance work is being done in a large number of localities. Dealer establishments and garages are being opened—or are already in operation—in even the smaller towns and this evidences the widespread use of the automobile, which no longer is confined to the cities.

ARGENTINA, for example, is dotted with service and sales stations. A similar network is being built up in Brazil. These stations are generally well equipped; frequently with excellent facilities for electrical and storage battery maintenance work. Many more cars than formerly was the case are being equipped only with batteries for ignition purposes.

MOONEY makes the following points in connection with his analysis of the automotive market in South America:

Dealers, distributors and jobbers are more confident and prosperous than at any time during the last two years.

* * *

General economic conditions have improved materially and are still getting better.

* * *

Service facilities have been extended beyond the confines of the big cities.

* * *

Utility use of motor vehicles is distinctly on the increase.

* * *

Motor bus development should be watched carefully by American manufacturers.

Low-Priced Bodies Dominant Feature of Closed Car Show

Nine companies exhibit special low-priced jobs at New York Closed Car Show. Seventeen new body models shown by eleven manufacturers. Utility value of closed cars emphasized. Good crowds attend opening. Dealers sponsor successful show.

LOW-PRICED utility closed cars comprise the chief feature of the New York Closed Car Show which opened September 25 in the Grand Central Palace. The whole atmosphere of the show emphasizes the utilitarian character of the closed job. All the new models of this type brought out in recent months are assembled in this exhibit, which gives a striking visualization of a trend in body design that has been evident throughout the industry for some time past. Several new models of the low priced type are being shown for the first time, chief among which are the Maxwell club coupe and the Reo model C coupe and sedan.

Luxurious models are still in evidence, of course, and the higher priced closed jobs predominate in numbers. Even in the case of these models, however, the appeal of color and setting is chiefly utilitarian. Seventeen new body models are shown by 11 manufacturers.

Fairly good crowds are attending the show, although nothing like those which pack the big New York automobile show in mid-winter. The visitors to this exhibit, however, seem to be composed of interested people, most of whom have some idea of purchasing an automobile. The doors of the cars are being opened and shut frequently, and the inside trimming as well as the outside lines are being carefully inspected.

There is every evidence that this show will be a distinct educational force in selling the closed car idea to the general public. Many prospective buyers have wanted closed cars for some time, but the high prices have made it impossible for them to realize their desires. The lower prices of all models, however, together with the large number of business and utility closed jobs on exhibition, undoubtedly will stimulate buying interest materially. Even the casual visitor is sure to be impressed with the fact that the automotive manufacturer has really set himself to the task of providing an all-weather car at a price not too far above the open job to fit the average pocket-book.

More Cheap Models

A year ago the Essex coach caused considerable comment as the first low-priced closed model. This year some ten or twelve models of similar type are being shown. Nearly all of the lower and middle-price car manufacturers have now developed closed jobs of this character. Oakland, Studebaker, Chevrolet, Maxwell, Essex, Hudson, Reo, Dort and Dodge are among those who are now marketing a low-priced closed car.

The show presents the current closed models of nearly all types of the 54 manufacturers represented by metropolitan agencies. Especially noticeable, in addition to the soft top models, were cars showing a trend toward two-door sedans and coupes with the wider windows made possible by this arrangement. Novelties included a Pierce-Arrow limousine with two windshield cleaners and a Dodge Brothers town car, a special job, with the sunshade built integral with the top. A number of exhibitors had special body and paint jobs, the latter decorating the show with frequent bright spots of color.

A new Club Coupe is shown by *Maxwell*. It has quarter windows which drop full length in place of the solid, fabric-covered quarter sections which are generally used in connection with two-passenger coupes. The result is that the car is free from the usual "blind" corner. The driver may signal through the adjustable quarter window instead of through the door.

New Maxwell

The seating space is arranged the same as in the Maxwell roadster. The ventilation features have been given particular attention. A special type of windshield has been adopted for all the Maxwell closed cars. Both sections of it swing outward the upper half being hinged from the top and the lower from the bottom. To keep the windshield weather and water tight the entire assembly is set around a rabbet.

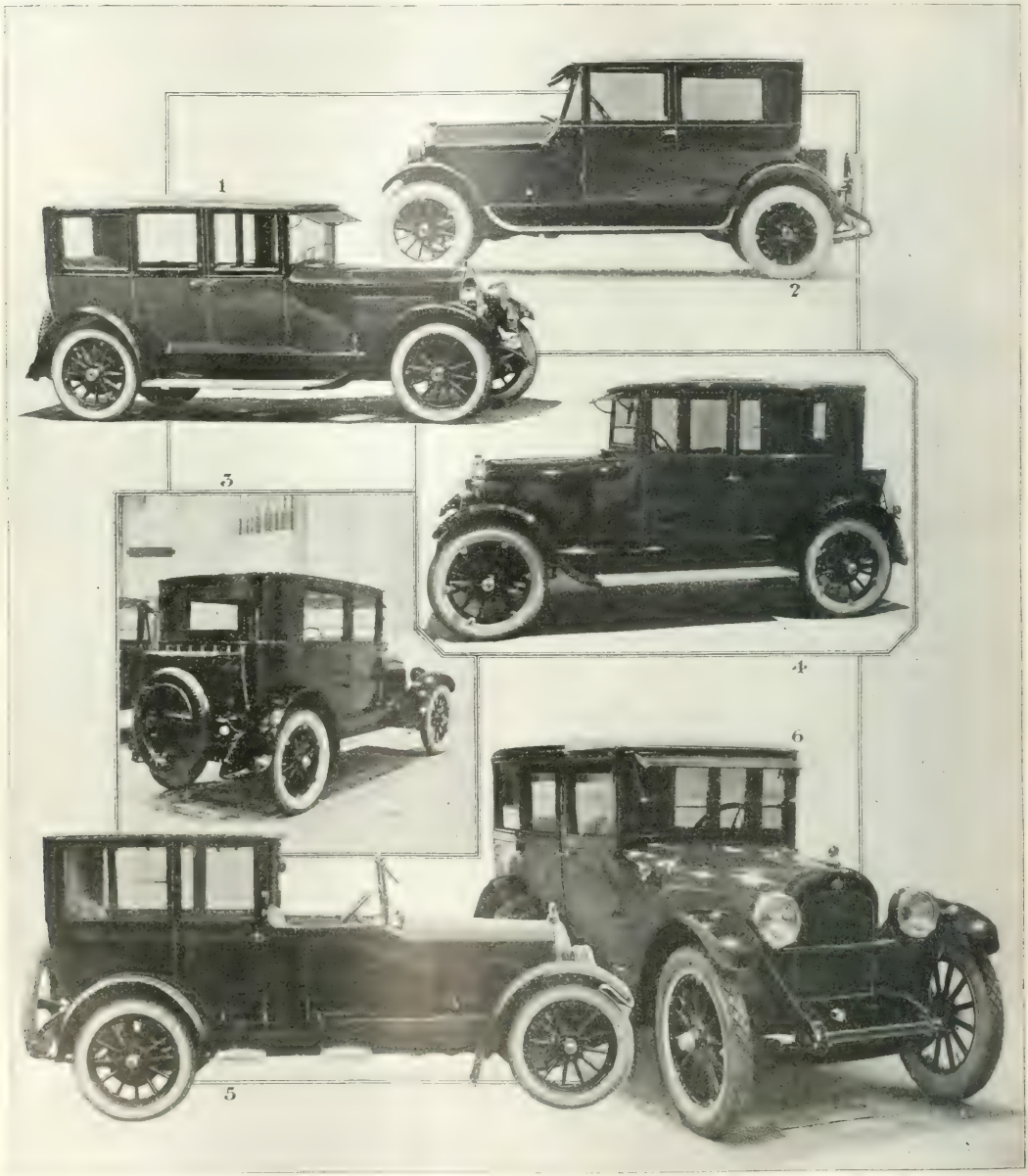
Genuine leather upholstery is employed for the seat and back and the upper section is covered with broadcloth. The hardware is of satin finished nickel and the doors are provided with Yale locks. There is a heavy roller curtain for the rear light. Room for sample cases or luggage is provided under the rear deck which is also equipped with a Yale lock. Another deep compartment for small parcels is located inside back of the seat.

Standard equipment includes a rear vision mirror, windshield wiper, adjustable visor, and ventilating type heater. Price is $985 f. o. b. Detroit.

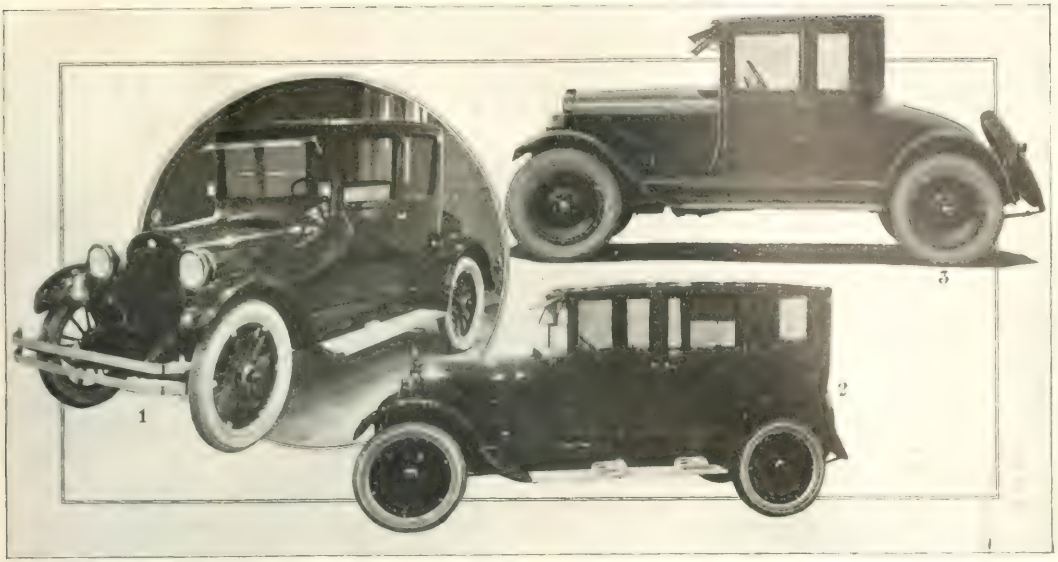
Two new *Chandler* bodies are the limousine at $2895 and the town car, $2895. Both these models are fitted with what has become generally known as "sport" equipment, including aluminum steps with individual fenders and splashers, drum type headlamps and so on. Sliding glass panels divide the driving compartment from the rear compartment and a locking device prevents shifting of the panels. The limousine carries five passengers in the rear and is equipped with all the usual fittings of a car of this class and also has a dictaphone for communication with the driver.

The *Nash* chassis has been changed slightly and a new four-door, 5-passenger sedan is added, this being $2,040. Among the chassis changes are the addition of five cross braces in the frame which still further prevent frame weaving. Although these braces were added primarily to pre-

New Closed Models Making First Appearance at the Show



1—*Packard five-passenger limousine-sedan, a newcomer to the single six line.* 2—*Lexington two-door brougham with chair type front seats.* 3—*Stephens five-passenger, two-door sedan with tilting front seats.* 4—*Oakland five-passenger coupe, featuring a Fisher-built body.* 5—*Chandler town car, seen for the first time at the show.* 6—*Nash four-door sedan, mounted on the six-cylinder chassis*



1—Reo coupe. 2—Reo sedan, both Reo bodies are built of steel and are offered in addition to the aluminum body models. 3—Maxwell Club Coupe which gives clear side vision to the driver

vent flexing of closed bodies, the open bodies are fitted to the same chassis. Another feature of the closed jobs is the copper guttering of the windshield sides to prevent leakage of water at all points.

A new *Oldsmobile* body is the brougham at $1,425. This is a two-door body with a seating capacity of five and uses the tilting front seat. A feature of the design is the rear carrying compartment which is reached from the outside. A cover, curved to conform to the body lines is hinged at the top and can be locked. A strut holds it open when access is desired. The tools are all buttoned to a board which drops from this cover and beneath this is space for a considerable amount of luggage.

Two new steel bodies are added to the *Reo* line, a sedan at $1,885 and a coupe at $1,835. They are to be known as model C and will be produced along with the aluminum bodied coupe and sedan which have been in production for some time at a higher price. The price of the aluminum bodies remains as before at $2,355 and $2,435. The new steel bodies are being built in the Reo shops and an option of either wood or disk wheels is offered.

A new five-passenger, two-door sedan is added to the *Stephens* line, this being priced at $2,195. The tilting front seat arrangement is used and the equipment throughout is of the sport class including drum type headlamps, a trunk with double suitcase in the rear and aluminum bars on the rear of the body.

Four Door Oakland

The new *Oakland* sedan and coupe, both Fisher built, make their debut at the show. The sedan, a four-door job, is priced at $1,445 and the coupe, which has a five-passenger seating arrangement with tilting front seat is $1,545. The coupe, which is $100 higher in price than the four-door body has considerable additional equipment, including a platform for a trunk, aluminum back rails, etc. Equipment on both the models is of the sport character.

The *Packard* line is augmented by the addition of a coupe and a five-passenger limousine-sedan to the single six chassis. The coupe has a seating arrangement for four and is priced at $3,175. All window and door glasses lower flush with the sills. The limousine-sedan is $3,275.

A new seven-passenger sedan, to be known as Model 27, fills out the *Willys-Knight* line. The price of this job is $2,195. The chassis is identical with the regular model and the fittings of the car are quite complete and of the latest sport type.

A two-door brougham is added to the *Lexington* body selections. The rear seat is quite wide and deep and has an unusually high back. The two front seats are of chair type, the right being of the tilting type. There is a trunk at the rear which contains two removable suitcases.

A new cabriolet to be known as the Commander is added to the *Liberty* closed models. The price is $1,695. The dash is finished in walnut and a walnut molding is used on the interior. The interior finish is gray with leather upholstery. The exterior finish is maroon. The equipment includes clock, cigar lighter, windshield cleaner and cowl ventilator.

THE sale of agricultural tractors in England is not likely to show any improvement in the immediate future, for of all British industries agriculture, which still remains the most important, is probably the most depressed.

In 1920 the number of British farmers who were forced into bankruptcy was but 44, in the second half of 1921 there were 171; in the first half of the current year 135 receiving orders were issued, and it is predicted that they will reach an unprecedented figure in the second half, which is always by far the heavier in this respect.

The great majority of British farmers are at the present time living on their capital, and this being the case they are less likely than ever to consider the expenditure necessary to install tractor outfits. Even in the good years immediately following the end of the war their conservatism forced them to hold back; add to this their financial stress at the present time and one sees why the prospects of tractor sales are not bright.

Prospective Prosperity in South Makes Good Automotive Market

Development on industry and diversification of crops will make South more stable market. Scientific farming methods needed. Bankers consider economic outlook bright and are ready to handle automotive paper. 10,575,000 bale cotton crop due this year.

By James Dalton

PROBABLY no section of the country can point to a greater improvement in morale in the past year than can the South. Even the bankers are almost enthusiastic over the situation and southern bankers are notoriously conservative.

Generally speaking, the impression has prevailed that the South was hit harder by the depression than other sections, but this is an illusion. Its industries suffered no more than did those in the East and Middle West and in some cases not so much. Its farmers are not starving and never have feared that they would. They are not as thrifty as those in some other districts and they had to borrow a little more from the banks.

The South as a whole is well worthy of study as an immediate market for automotive products but its cultivation as a market on a long swing basis is even more important. It is not a foreign country but part and parcel of the United States and it should be treated as such.

From a market point of view the chief difference between the South and other sections is that longer credits are asked. Even this difference is not nearly so marked as it was two years ago. The fallacy of long credits is one lesson the slump taught the South.

We have tried to point out in previous articles that the automotive market is ready at hand in the cities and towns of the South although it is more or less dormant for trucks in the rural districts. It may not be amiss to give some facts of general conditions there.

While recent years have brought a spectacular industrial development, agriculture still exerts a determining influence on sentiment. In the South agriculture still means cotton. A shoe dealer in Atlanta, for example, may not sell four pairs of shoes a year to persons connected either directly or indirectly with the growing of cotton, but if cotton prices are up he is cheerful and if they are down he is glum. This would be the case even if his sales were mounting month by month. He and his neighbors, even if profits were steadily increasing, would tell you that business was bad and shake their heads sadly. They would go right on buying motor vehicles, however.

It is a mistake to assume that there can be no business in the South if the cotton crop is not a huge success. The value of the manufactured products of the South is greater than the value of its crops. No matter what the crops may be, some automotive products always can be sold in the larger centers of population. Manufacturers who went for many months on the theory that it was impossible to sell anything in the South lost a lot of money.

Two factors will make the South less dependent in future than it is at present on cotton. They are:

Development of industry.
Diversification of crops.

There is greater room for development in the South than in other sections and consequently the prospective market is larger. In some respects it resembles the middle west of 25 or 30 years ago but the population is already there. All it needs is development and many districts now devoted almost exclusively to agriculture are rich in natural resources. These resources will be exploited in the near future.

The South always will be great in agriculture, however, and scientific farming will do marvels for it. This applies both to crop raising and crop selling. The cooperative marketing movement has gripped southern farmers and is making rapid progress.

When M. B. Wellborn, governor of the Atlanta Federal Reserve Bank, was asked what the South needed more than anything else, he replied laconically:

"Good farmers."

Amplifying this statement, he explained that much fine land which can be purchased cheaply now, is going to waste and that agricultural possibilities have not been developed to anything like a maximum. He added that any farmer intending to settle in the South should have some capital. Best results could be obtained by combining a few small farms of from 30 to 60 acres and stocking them with some good cattle. There is a good field for dairying in the South.

There also is a crying need for scientific farming. Comparatively few southern boys go to agricultural colleges. When they stay on the farms they are content to apply the methods of their fathers. It will seem almost inconceivable in other sections, but there are thousands of farmers in the South who do not even raise the grains and vegetables they need for food. The South still imports a good share of its foodstuffs. There are not

enough market gardens and dairies surrounding the larger cities to supply local needs. Many farmers devote all their land to some one money crop.

Wellborn hasn't changed his ideas about the folly of southerners buying automobiles when they can't afford them but he insists that he is not in any sense any enemy of motor vehicles. In fact considerable of his own money is invested in an automobile business. A motor car is a good thing for the farmer to have, he declared, if the farmer can afford it. A car makes him and his family happier and more contented. He believes also that most Southern banks will assist a farmer in financing the purchase of a truck or tractor if it can be shown that it will be good business to buy.

There was a look of contentment on the banker's face as he handed over a sheaf of letters from member banks reporting on general conditions in their sections. Almost without exception these reports were optimistic. It was evident these hard-headed business men were trying to exercise constraint when they told of the favorable outlook for crops, of busy factories and of decreased indebtedness.

Cash reserves in city banks are high and country banks are in good condition. Farmers won't pay all their notes this fall, but they will go far toward wiping out their obligations. All of them will keep some cash, however, and they will be in the market for the things they need most. Automobiles are in this category.

With a cotton crop estimated by the Department of Agriculture at 10,575,000 bales when the minimum needs of the world are at least a million bales greater, it is evident the crop will bring an excellent price and that growers will have more money to spend than they have had for two years. This can't fail to make prosperity for automotive merchants.

Backing up Wellborn's personal opinions, here is an extract from the latest review of conditions sent out by the Atlanta Federal Reserve Bank:

"Member banks throughout the Sixth district are distinctly optimistic in their reports regarding conditions in their localities. Only a small number of the larger city banks are borrowing from the Federal Reserve Bank and borrowing by country banks is very much less than a year ago. Some of the banks have surplus funds and deposits show a satisfactory increase over those of a year ago. Some of the reports indicate that while liquidation of last year's indebtedness has not been completed, A LARGE MAJORITY OF THE FARMERS IN SOME PARTS OF THE DISTRICT HAVE PAID UP ALL OF THEIR DEBTS AND ARE NOW BORROWING REASONABLE AMOUNTS FOR USE IN MAKING THE PRESENT CROP."

That doesn't present a very sad picture of the position of the farmer. As a matter of fact, credit conditions in the South are distinctly easier and it isn't hard to borrow money for any legitimate purpose if you have reasonable security to offer. It is significant that sales of farm implements in the Sixth Federal Reserve district increased 7.4 per cent in July as compared with June and 158.6 per cent as compared with July, 1921.

Banks in the larger cities even now are financing about 40 per cent of the time sales of motor vehicles and finance companies the remainder. The banks are glad to meet the credit needs of the able, well-established dealers. Banks also are willing to finance substantial farmers in the purchase of trucks for they are looked upon as a good investment. Much missionary work must be done, however, to induce farmers generally to buy trucks. They insist that they must have mules anyway and that it is cheaper to raise mule feed than to buy gasoline.

T. R. Preston, president of the Hamilton National Bank of Chattanooga, and one of the leading bankers of the South, as well as president of the Southern Commercial Congress, is just as optimistic as Wellborn over the future of the South. His interest, however, is more from an industrial than an agricultural angle. All of Tennessee, he says, is a good potential automotive market. The banks now have more money than they can loan to advantage.

Chattanooga is fairly typical of the larger industrial cities of the South. It is becoming a textile center and for years has had important iron industries. More boilers are made there, for example, than in any other city in the country, with one exception. Preston cited the case of T. C. Lupton, who made a fortune in a soft drink to which the entire South is addicted, and now is spending $10,000,000 for spinning mills to supply yarns for mercerized fabrics. Production of hosiery is an important industry in Chattanooga.

"CONDITIONS are far better than they were a year ago," Preston said. "Shorter credits are being asked and there is plenty of money to loan. Farmers are getting their debts paid and will keep something to buy the commodities they need. The next ten years will bring a tremendous industrial development to the South, and as I see its future it is brighter than that of any section of the country."

Birmingham, at the moment, is in a class by itself industrially. Its soft coal mines have been producing every pound of coal possible since the strike began and all its steel and iron plants have been running at capacity. The miners' unions in the South were crushed in the strike some two years ago and there have been no labor troubles in the entire territory except the shop men's strike.

The South has been hard hit, however, by the rail strike, and it has caused a sharp slowing up in business in the past few weeks because of the virtual collapse of all but one of the important Southern roads, so far as freight traffic is concerned. Lumber interests have suffered severely. In fact, shippers of all kinds of commodities have had many cancellations because of their inability to get deliveries over the railroads. Incoming merchandise also has been seriously delayed.

They will tell you in the South that the center of gravity of the steel and iron trades of America is shifting toward the rich ore, coal and fluxing stone beds of north Alabama, Georgia and Tennessee. It is reported, apparently on good authority, that the Jones & Laughlin Steel Co. is negotiating for the purchase of huge iron ore tracts south of Chattanooga and coal lands in the north. In addition, there is the regular crop of reports that Ford will buy ore and coal lands in the same district.

Within the last year title has been passed to four syndicates on 300,000 acres of iron ore land on Sand and Lookout mountains, near Chattanooga. The price amounted to more than $5,000,000. The North American Steel Corporation, resulting from the merger of the Mid-

vale, Inland and Republic companies, will manufacture on an extensive scale at Birmingham. The Great Southern Steel Corporation proposes to establish a plant at Guntersville, Tenn.

Transcending all other developments is the possibility that Ford's industrial dreams for Muscle Shoals will come true.

Railroads will follow industrial development. The Tennessee, Alabama & Georgia has decided to open up a rich untapped ore field by an extension from Gadsden to Odenville. Naturally, industrial development will bring a good market for motor trucks. They already are being used extensively by manufacturers of all kinds as well as in connection with iron and coal mining.

Another factor in the future development of the South is its wealth of developed and undeveloped hydro-electric power.

INDUSTRY presents only one side of the picture, for agriculture will keep pace with it. Diversification of crops and scientific farming have been preached so long that the missionary work is beginning to bear fruit. For example, more than 100 Mississippi planters and business men attended the pageant of progress in Chicago after a two weeks tour of the corn belt. The primary purpose of the trip was to gather information from livestock, grain and dairy farmers preparatory to the diversification of farming in their own State. They also visited several agricultural colleges.

In any consideration of agriculture in the South it must be remembered that the farm population is approximately 17,000,000, of whom only 5,000,000 are negroes. These people constitute a tremendous potential market for automotive products. Crop diversification and co-operative marketing will bring them larger and more stable earnings.

Co-operative marketing of cotton already has assumed large proportions. For example, the American Cotton Growers Exchange, with headquarters at Atlanta, represents 150,000 planters who will produce 2,500,000 bales this season. It recently authorized the opening of a European sales office in Liverpool as well as sales offices in the textile mill centers in the Southeast, such as Greenville and Spartanburg, S. C., and Greensboro and Charlotte, N. C.

The exchange has arranged for advances of $51,000,000 from the War Finance Corporation, while more than 250 banks in the Southeast have promised an equal amount to insure the profitable marketing of this year's crop. Bankers believe these co-operative agencies sound in principle financially. Members of the Cotton Growers Exchange, for example, can take their cotton to warehouses and then borrow on warehouse receipts from the banks up to 60 per cent of the current value. They get the rest of the money when the crop is marketed. Much of the cotton sold in this way goes to mills in the South.

Business is good in the South to-day, and you can't find a Southerner who wouldn't be willing to wager his last cent that it will be better a year from to-day and still better two years hence. There are many factors which favor the immediate sale of medium-priced cars. Living costs in the South are not as high as they are in some sections and the man with an income of $3,000 a year can well afford to have one. The service given by traction lines generally is atrocious, and an automobile is almost a necessity.

If the automotive industry doesn't get its full share of present and prospective prosperity it will be its own fault. All the market needs is a reasonable amount of cultivation. The soil is rich.

Motor Cars and Trucks in Successful Operation on German Railways

SUCCESSFUL operation of motor cars and trucks on German railways has aroused the interest of the American automotive industry. The Automotive Division of the Department of Commerce received many inquiries asking for details concerning the equipment used by the Germans. A detailed description received from C. E. Herring, the American Commercial Attache at Berlin, gives a comprehensive outline of the rail car situation in Germany.

The following types of motor cars and trucks are operated on the Federal German railways:

(a) Accumulator-Driven Cars (Speichertriebwagen) one, two and three parts. These are passenger cars, which derive the necessary current for the motors from an accumulator battery fixed in the car. They are capable of running 180 kilometres at a speed of 60 kilometers an hour. They are only employed for carrying passengers and luggage.

(b) Benzol-Electric Cars (Benzolelektrische Triebwagen)—passenger cars, fitted with a benzol motor, coupled directly with a continuous current generator. This continuous current generator furnishes the current for the axle motors under switch control. Speed 60 kilometers per hour. They are used also for passenger and luggage carrying.

(c). Cars Driven Directly by Benzol Motors. They are light railway passenger cars, fitted with benzol motors, which, by intermediate switching of speed and worm, drives controlled by compressed air, rotate the axles directly. Speed 60 kilometers an hour, and passenger and luggage carrying.

(d) Automobiles running on railway tracks are employed for service runs. They are similar to passenger automobiles, but have wheels with flanges. They are used on normal-gauge railways.

(e) So-called motor velocipedes (Motordraisimen) are used for service runs. They are light four-wheeled, two-seater cars, propelled like motor-cycles by one or two-cylinder motors. Maximum speed 30 kilometers an hour, and capable of carrying 4 to 5 persons.

There are no freight-carrying vehicles on German railways of the types described above.

Comparative Tests of Fuels Produce Interesting Results

Less volatile fuels show about the same economy as the more volatile grades where carbureter is given best setting in each case, but relative performance in cold weather has not yet been determined. Tests show more dilution of lubricant with less volatile fuels.

By Herbert Chase

FUELS of higher average boiling point than are now commonly marketed appear to yield about the same ton miles per gallon as more volatile fuels, providing the carbureter is given an equally good setting in each case. This applies to relatively warm weather operating conditions. The effect of cold weather on the relative economy of volatile and non-volatile grades is yet to be investigated.

Tests made thus far indicate that more dilution of lubricant occurs with the less volatile fuels but further investigations along this line are needed before final conclusions are to be drawn.

These, in short, are the findings to date in comparative fuel tests arranged through joint action of the Society of Automotive Engineers, the National Automobile Chamber of Commerce and the American Petroleum Institute. A preliminary report in this connection was made at a joint meeting of committees representing these three organizations held last week at the Bureau of Standards in Washington.

It will be recalled that the first preliminary report covering tests arranged by the joint committee in question was made at the last summer meeting of the S.A.E. at White Sulphur Springs and that the results reported at that time referred to tests made on a fleet of Post Office Department trucks operated in Philadelphia and Pittsburgh. The findings in that case were substantially identical with those recorded in more recent tests made under more definitely controlled conditions by investigators on the Bureau of Standards staff.

The recent tests were made on a level stretch of road forming apart of the Washington Speedway along the Potomac River. This course was marked off in divisions one-tenth mile in length. Each division was covered at a predetermined speed which was held as nearly constant as possible over each division. For example, one-tenth mile was run at 15 m.p.h., another at 25, the next at 10, a fourth at 30 m.p.h., etc., thus involving accelerations and decelerations. In accelerating the throttle was opened wide immediately and then closed the necessary amount to maintain the desired speed once that speed was attained. Decelerations were made by closing the throttle quickly but without applying brakes. The fuel used during each tenth mile was measured carefully by using graduated burettes arranged in parallel and connected through quick acting pinch valves to a common fuel line. These were all filled to the top mark before starting. The first burette was opened at the start and closed at the end of the first tenth mile, the second at beginning and end of the second tenth mile, etc., to the end of the course. Time for each tenth mile was noted by use of stop watch with split second hand.

At the end of the course the decrease in quantity of fuel in each burette was noted, this quantity being that used during the corresponding tenth mile. The driver was guided as to speed by markings on the tenth mile posts and the observers changed burette cocks and operated the stop watch on passing the posts.

The fuels used were designated A, B, C and D, and had distillation curves which varied from that of a quite volatile fuel such as was generally marketed several years ago, grade A, to that of a fuel which is now thought to be about the least volatile which can be used in the average automotive engine of to-day, grade D. Grade B corresponds closely to the average gasoline now marketed in the country and is used as the standard or reference fuel, while grade C is intermediate between B and D.

In all tests made to date each of the four fuels has been employed successively. In the speedway tests which have already been completed on Ford and Dodge cars and are to be made soon on a Chevrolet four and Buick six. A standard carbureter setting made with fuel B is first tried. This setting is one which has been found to enable the car to climb most rapidly a certain test hill after repeated tests with numerous settings varying from over lean to over rich. It is thus a maximum power setting or one slightly on the lean side of the maximum power setting, and has been found to be the leanest setting which can be employed and still give rapid acceleration without back firing when the throttle is suddenly opened with the car running on a level road.

AFTER this standard setting with B fuel speedway runs are made with the same carbureter setting successively on A, B, C and D grades and results noted. These runs show, in general, a considerable variation in miles per gallon. Further tests are then made using an optimum setting for the particular fuel obtained in a hill test identical with that used in obtaining the first standard setting on B fuel. With this optimum setting in each case the variation in miles per gallon has thus far proved practically negligible—well within the limits of experimental error.

Much the same condition was found in the Post Office truck tests already referred to, and in a series of tests made by several of the large car manufacturers, the results of which have not yet been published.

The simple conclusion is that, providing the carbure-

ter is set to best advantage in each case, the distance the car will travel per gallon of fuel is, within the range of fuels tried, practically independent of the volatility of the fuel. This condition was not generally expected, at least by a considerable number of those connected with the tests.

The meeting at the Bureau was called to discuss the results obtained to date and to decide upon further tests which appear to be desirable.

There was, on the whole, but little criticism of the methods thus far followed or of the results obtained, but it was quite generally agreed that further tests, especially under the lower temperature conditions which prevail in northern states during the winter months, should be undertaken, and that in further tests such factors as ease of starting, ability to handle well under conditions of changing load and speed and extent of dilution of lubricant by fuel should be given careful consideration.

Certain tests covering factors of this kind have already been made or are included in the schedule already tentatively decided upon. The extent of fuel dilution of lubricants has been observed in some of the tests now completed, and factors involving the handling of cars under load and speed change have been noted, to a certain extent, in the speedway tests and in the tests of cars by various factory organizations, but there is more to be done in this direction, especially under lower temperature conditions than have obtained during tests thus far completed.

The tentative schedule of future tests includes, besides completion of tests on the Speedway, longer runs with the same cars operating over rolling country between Washington and Frederick for the purpose of determining the quantity of dilution resulting from the four fuels, and also tests for determining starting characteristics to be made in the altitude chamber at the Bureau where the desired temperature can be maintained by artificial means.

It was suggested that Speedway tests now made at a series of varying speeds might be extended to include tests at certain constant speeds in order to determine whether the speed for maximum economy is the same for all of the four fuels under consideration. There was also some discussion as to the desirability of runs with the leanest feasible mixture, some contending that the more volatile fuels, while showing little advantage over the less volatile ones on a ton mile per gallon basis with a maximum power setting, might well prove superior on a maximum economy basis. In this connection it was pointed out that the setting used already was about the leanest possible for good acceleration with the throttle suddenly opened, but it was not clear that a leaner mixture could not have been used, still with good acceleration, had a more gradual throttle opening such as is used under most circumstances in normal practice been employed.

Another suggestion was to the effect that runs be made with the carbureter settings made by an average service man, in order to determine how nearly correct such an average setting is and how such setting will be affected by the volatility of the fuel. O. E. Berry contended that a mile per gallon test alone is not of much value unless it is coupled with a general performance test which shows how the car handles under variations of load and speed such as are encountered in normal service. Others took the view that, while such tests are desirable from an educational standpoint, they are not essential as a means for comparing fuels. .

In reply to a question concerning the effect of spark advance a member of the Bureau staff pointed out that, for a given quality of mixture and spark position, it had been found that the best timing of the spark is the same for all fuels.

It was agreed, and especially emphasized by the men from the oil industry, that the fuel characteristics which determine ease of starting are of great importance. In this connection various speakers mentioned the desirability of measuring with care the quantity of fuel used in starting and the time required to warm the engine after starting until the temperature is high enough to pull a load steadily without missing. It is desirable to learn also whether the initial or the average boiling point of the fuel is the more important as affecting starting ability.

FACTORS pertaining to dilution of lubricant in the crankcase by fuel which has passed the pistons were considered at length. The tests in which measurements of dilution have been made to date indicate that it increases as the fuel becomes less volatile but it is not known how far dilution can proceed without causing undue wear. The best method to use in determining the extent of dilution is also in doubt. Change in oil viscosity is probably a satisfactory index of dilution, but tests which depend upon fractionation may lead to erroneous results due to cracking of the lubricant in the still into lighter fractions, which are then improperly considered as fuel diluent.

Oil dilution is a well recognized evil and is believed to become increasingly pronounced as the fuel used becomes less volatile. It is believed to lead to rapid wear, but how severe the action becomes with loss in viscosity is uncertain. Low temperatures and often repeated or difficult starting may greatly increase the quantity of fuel which passes the pistons. Consequently cold weather tests are needed in arriving at test results of proper significance.

H. L. Horning expressed the view that the serious trouble attributed to dilution is due to the change it makes in oil viscosity. The more viscous oils leave thicker films on cylinder walls and decrease wear. Dilution tends to make the oil less viscous and the films thinner and consequently increases wear, ultimately causing complete failure of lubrication. Horning believes that the per cent of oil dilution is of secondary importance, but the viscosity of the diluted oil is of great moment.

Many further tests dealing with fuel diluton of lubricant are proposed, especially in cold weather, but the drafting of a definite program covering this and other work considered desirable was left to a sub-committee to be appointed in the near future.

New Import Duties on Trucks into Angola

THE Provincial Government of Angola, Portuguese E. Africa, has recently established the following import duties on trucks:

Trucks weighing:	Escudos Each
Less than 1 metric ton each and equipped with pneumatic tires	50.00
From 1 to 2 tons, with pneumatic or solid tires	500.00
From 2 to 3 tons, with pneumatic or solid tires	1,000.00
Over 3 tons with pneumatic tires	2,500.00
Same with solid tires	5,000.00

Duties on most products imported into Angola vary from 19 to 33 per cent ad valorem according to port of entry.

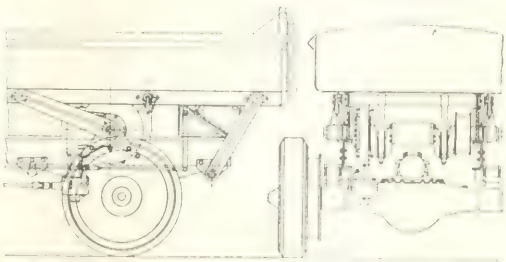
A Combined Mechanical Hoist and Winch for Trucks

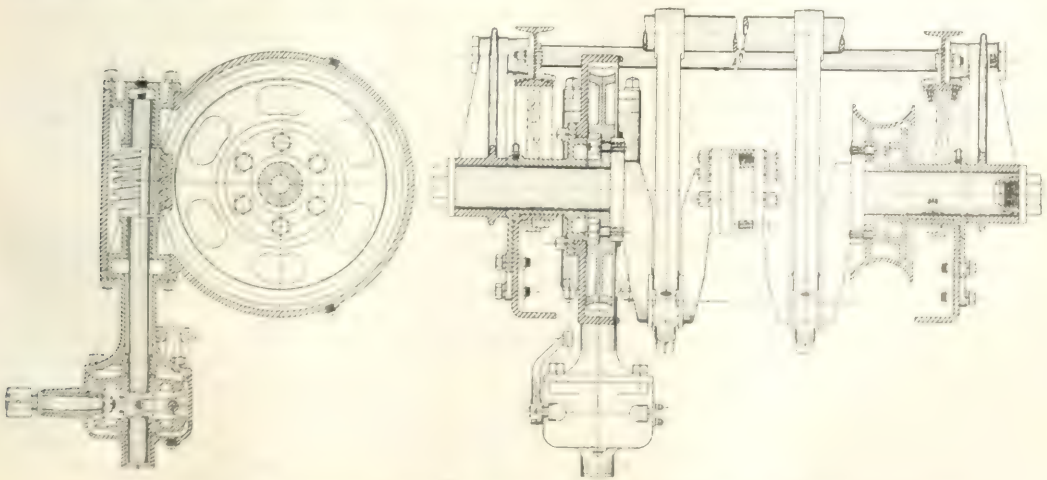
Is intended for use with dumping type of bodies or on trucks employed in service requiring power loading, hoisting and the like. Cranked shaft driven by worm and bevel gearing is provided with capstan and can be rotated in either direction by power take-off.

AMONG the useful items of equipment for motor trucks are those intended to provide quick loading and unloading facilities. For certain classes of work winches are great labor and time saving devices and dumping hoists are also widely used for trucks carrying coal, building materials and the like. A device known as the Pyramid Mechanical Hoist-Winch, which combines these two functions, has recently been placed on the market by the Pyramid Engineering Corp.

This device consists primarily of a cranked shaft operated through worm and bevel gears from a shaft connected to the power take-off of the gearest. The cranked shaft is mounted transversely on the frame of the truck chassis just forward of the rear axle. On each end of this shaft is a heavy arm the outer end of which is pivoted to the body in such a way as to raise the forward end of the latter as it moves toward the rear. At the same time connecting rods attached to the cranked portions of the shaft displace the body toward the rear in such a way that its center of gravity describes a rather flat arc and the load is therefore lifted through a short distance only thereby minimizing the power required and lessening the stresses on the mechanism.

When it is desired to use the device as a capstan, the wrist shaft pins, which are provided with handles are removed. This permits the wrist shaft to slide in the I-beams which form a part of the body structure as the capstan pulley, which is rigidly mounted on the cranked shaft, rotates. A rope passed once or twice around the capstan and the free end held taut by the operator can be made to do a variety of operations, such as loading or hoisting heavy machinery or even pulling the truck on which the winch is mounted out of the mud. A block and falls can, of course be employed if desired. The hoist can be operated in either forward or reverse direction and is self locking.





Views of the Pyramid Mechanical Winch-Hoist showing details of construction and method of mounting

Trend Toward Greater Stiffness in Crankcase Design

Better disposition of metal and greater attention to ribbing tends to counteract the bad effect of stresses imposed by frame warpage without material increase in weight. Periodic vibrations are also eliminated or rendered less apparent.

By J. Edward Schipper

ONE notable trend in recent engine design has been that toward the use of stiffer crankcases. Although unit loads on bearings have decreased, due to the increased diameter of the crankshaft of modern engines, as well as longer bearings, the bearing supporting structure has been increased in rigidity until now a great many crankcases are as much as 400 or 500 per cent stiffer than in similar engines of three or four years ago. The demand for structural stiffness has affected the design of many chassis parts. Much stiffer frames have been made during the past few years, and all engineers are familiar with the increased rigidity in crankshafts.

The stiffer frame has come about through the demand from car users for bodies which will remain in good condition after years of service, and which will not warp or become racked when the car, for instance, rests on an incline with one wheel higher than the other three.

The stiffer crankshaft has, of course, resulted from the use of higher speed engines and the demand for less vibration, while the stiffer crankcase has been developed as a result of the same causes which have rendered necessary the stiffening of the frame and the crankshaft. It is well recognized that even with three-point suspension, certain of the stresses, due to weaving of the frame, are transmitted to the crankcase. This is true because, although the crankcase support is theoretically at three points, it is in practice not really a three-point suspension because there is considerable area of contact as distinct from the theoretical point contact with which there is no area.

Although it is a fact that the three-point mounting, as commonly used, decreases the stresses on the crankcase to a considerable extent, they are, nevertheless, not altogether eliminated and distortion of an improperly stiffened crankcase is not only possible, but is known to actually occur. Distortion of the crankcase tends to destroy the bearings, consequently causing bind and wear, and sometimes, even crankshaft distortion.

Higher rotative speeds have called for care in engine balancing which was never necessary at the time when engines developed maximum power at 1400 r.p.m., or at least well below the 2000 r.p.m. mark. As engine speeds began to mount and critical periods of vibration became very evident at certain speeds, the benefits of a really rigid crankcase began to be realized. More than one apparently chronic case of periodic vibration which was modified to some extent by a stiffer crankshaft, has been practically removed by the use of the stiffer crankcase.

There are some interesting problems of sound vibrations which are mixed up with crankcase construction. An example of this may be pointed out in connection with the redesigned Oakland crankcase. Fig. 1 shows this crankcase, which is marked to indicate the various points which the Oakland Motor Car Co. has reinforced. The rib at A was added, while at B the web was carried across the corner formerly being shown as indicated by dotted line. The rear main bearing wall ribs shown at C and D formerly tapered back so that they became tangent to the wall at the top, but as will be noted from the drawing, they are now carried straight upward.

On the front main bearing wall, this was also the case except that the rib stands only half way up. It was found by the Oakland company in making laboratory tests that a rib in this position produced a drumming sound. By the use of two ribs instead of one and by carrying them practically parallel to the top of the crankcase or as far upward as possible, material strength was gained. The ribs shown at F are on the bottom face of the crankcase and join the ribs to the side walls to the rear main bearing wall. This formerly was as shown in the dotted line. The effect of all of the stiffness at the rear end tended to eliminate the deflection existing due to the over-hang of the gearset and clutch bell housing.

Ribs at G and H are reinforcements added to take care of handling the castings, since it was found that fractures occurred particularly at H on this account. According to the engineers of this company, it is practically impossible to make a crankcase too stiff from a performance point of view.

Obtaining Stiffness

The example which has been pointed out by the Oakland company is only one of a great number of instances which can be given of where the ribbing has been changed to gain stiffness and eliminate the drumming sound due to a membranous structure of the crankcase. An examination of the drawing of this case shown in Fig. 1 shows a good example of the proper ribbing methods to fully take up bearing stresses. Another good example of ribbing is that used in the light eight Oldsmobile crankcase, Figs. 2 and 3. It will be noted that this is the latest type of barrel crankcase, the barrel formation being completed when the oil pan is connected. The bearings are carried in ribs which form a box section, which is the strongest section to withstand the

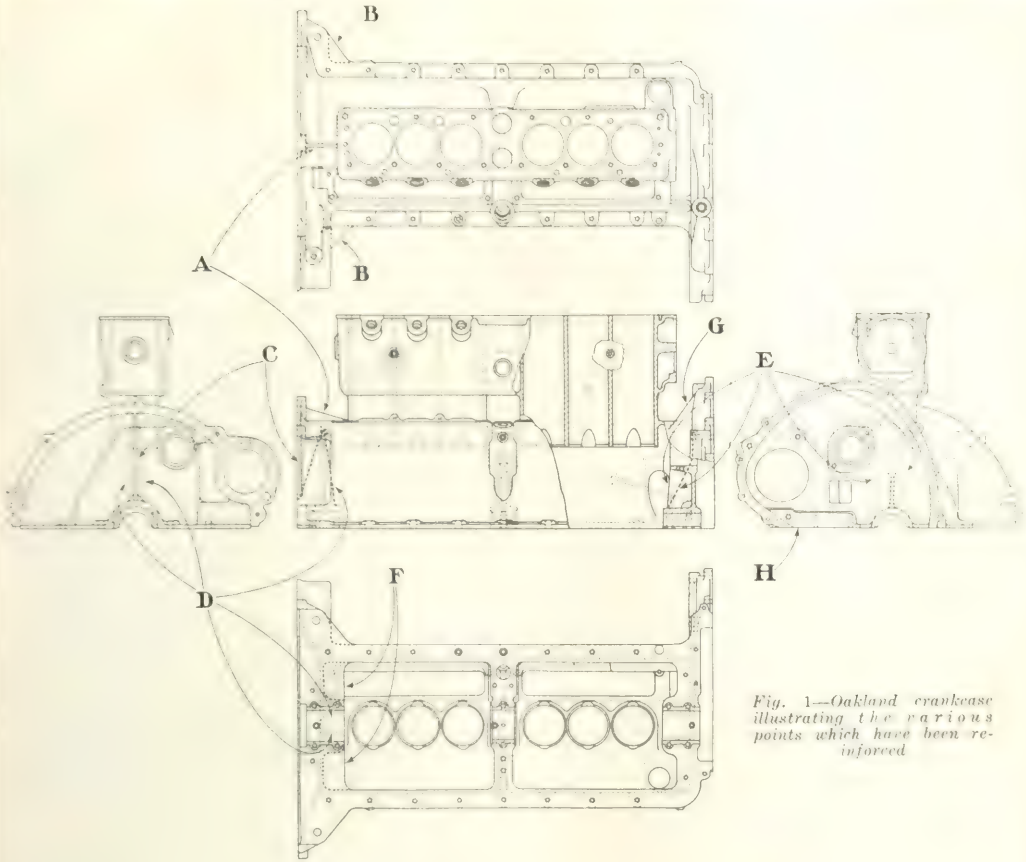


Fig. 1—Oakland crankcase illustrating the various points which have been reinforced

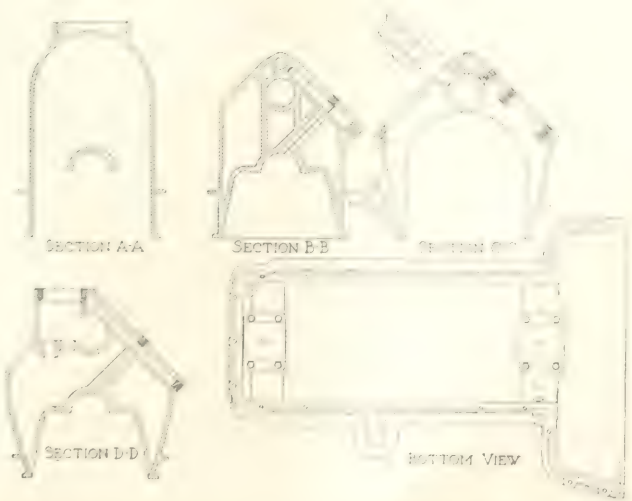


Fig. 2—Latest type of barrel crankcase used on light eight Oldsmobile

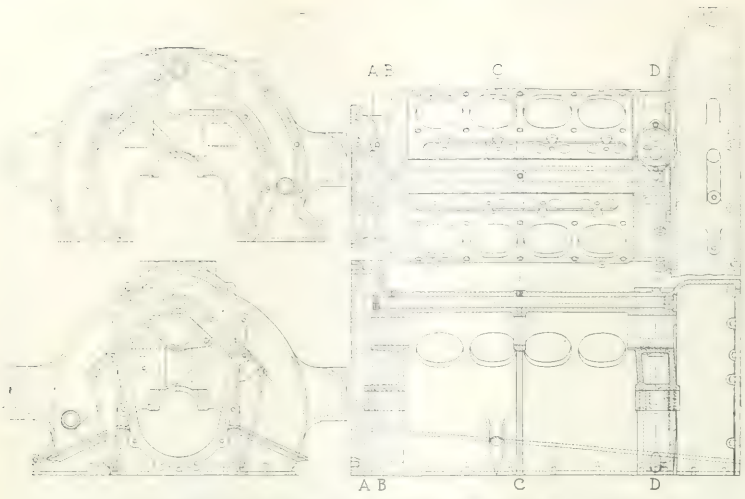


Fig. 3—Oldsmobile bearings are carried in ribs which form a box section

stresses imposed on these bearings. The camshaft is also carried in box section ribs. The oil ways are also so arranged as to form additional backbone and entirely eliminate the use of separate oil pipes which are always objectionable. This type of crankcase is adaptable to engines of any number of cylinders. The short overall length is a factor in securing longitudinal rigidity.

Regarding the question of bearing supports and ribbing for this purpose, E. A. Johnston, chief engineer of the International Harvester Co., states that he has always held to the belief that the bearings should be substantially enough supported to keep the crankshaft in alignment, rather than using a weak crankcase and depending upon the crankshaft to hold the bearings in alignment. While it may be quite evident that it would be far more desirable for the crankshaft bearing to support the shaft than for the shaft to support the bearing, there have been a great number of instances where the shaft was considerably more rigid than the bearing supporting surfaces after the shaft had been stiffened to meet the requirements for the higher rotative speeds. In other words, for a considerable length of time, the development in stiffer crankshafts outstripped the development of more rigid crankshaft supports.

It might be anticipated that a limit would soon be reached in rigidity because of the additional weight of the crankcase, but practical experience has shown that although it is, of course, desirable to keep the weight down to the minimum, especially for automobile installations, no one has really found that the small additional weight necessary to properly stiffen the crankcase is objectionable. For tractor and truck installations, rigidity is even more important and weight is correspondingly less important, so that an engineer is justified in going to an even greater extent in this field than in the passenger car field. Even in the latter, however, 25 to 50 lb. could not be expended more advantageously if it would make a rigid crankcase out of a weak one. However, it is rarely necessary to add so much weight if the material in the crankcase is properly disposed to meet the stresses imposed. Figs. 2 and 3 which illustrate the crankcase used in the light eight Oldsmobile show clearly the box-like support for the bearings in this car. The drawings also show the advantage which is taken of the material necessary for the drilled oil leads to add structural strength to the crankcase.

One of the concerns which has been noted for a great many years for the rigidity of its crankcase is the Locomobile Co. For years this concern has been the only company in the business which has used a bronze crankcase, not only for its greater stiffness, but for its greater strength and freedom from distortion in service. This concern has recently undertaken the development of a new engine with an aluminum case. In order to make this case just as stiff as the bronze case, they state that it has been necessary to make the section of the upper half of the case very deep and to split the case well below the main bearing section. In the bronze crankcase, which the Locomobile company is now using and which is shown in Fig. 4, the engine oil pan is considered as part of the reinforcement of the case. The Locomobile crankcase shown in Fig. 5 shows the upper half of the aluminum crankcase proper. This has just passed the design stage and is not as yet in production, being purely experimental. In this case, it will be noted, the oil pan is merely an auxiliary and the upper half of the crankcase is amply stiff to keep the bearings in line and free from distortion. According to the engineers of this company, one of the facts which has been brought home to them in their studies of crankcase design is that it is essential that the brass liners of the main bearings as well as the connecting rods, be very heavy in order to prevent breathing of the bearing boxes in service. This breathing effect has a tendency to distort the bearing out-of-round once every revolution of the crankshaft and results in the cracking of and breaking down of the bearing surfaces. It has also been found that to further prevent this condition it is desirable to heavily reinforce the main bearing caps and rod caps.

A point of importance in relation to production is the suggestion that the webs which traverse the crankcase and carry the main bearings of hollow box section, should be smooth on the outside. This enables the scrapers who have to clean out the inside of the aluminum crankcase, to do the work very easily. In fact, on an aluminum crankcase of any design, it is desirable to avoid internal ribbing on the surfaces exposed to the oil. As far as possible these surfaces should be made smooth and to conceal the ribbing, either in the box section or on the outside of the case. Experience shows that in order to get all of the foundry sand out of the aluminum casting it must be scraped by hand. No other method, it is believed, is quite as satisfactory and the scraping is essential to long life of the engine.

This point, which is brought up by Locomobile engineers, is important. It is the practice in some very good engine plants when iron cases are used, to first thoroughly clean out the crankcase and then to coat the inside with a crankcase sealer in the form of a paint which takes on a sort of celluloid texture after it dries. This paint firmly cements any loose pieces of core sand or chips in the case, preventing them from afterwards working their way into bearings, etc.

A point which may be noted in the illustrations shown herewith is that there is an undoubted tendency towards separating the crankcase well below the center line, thereby adding to the stiffness of the case, even though it is done at the expense of added machining cost. A great many engineers have been led to believe that by casting the upper half of the crankcase in unit with the cylinder block, it would be possible to lighten the crankcase and take advantage of the cylinder block stiffness. This has not worked out as satisfactorily as would appear on the surface.

One of the new six-cylinder engines which illustrates up-to-date practice in crankcase design and also brings out clearly some of the tendencies which have been mentioned is that used in the Jordan-Continental engine. This case is illustrated in Fig. 6. It will be noted that this crankcase is not split on the center line of the main bearing. This makes it possible to obtain a much better support for the gearset housing and also to give an additional support to the bearings themselves, as well as to provide a stiffer crankcase. The case is also stronger in the vertical section. This case is made just as strong as possible without running too heavily into weight and, therefore, a good example of just about how far it is desirable to go in the weight matter in passenger car design.

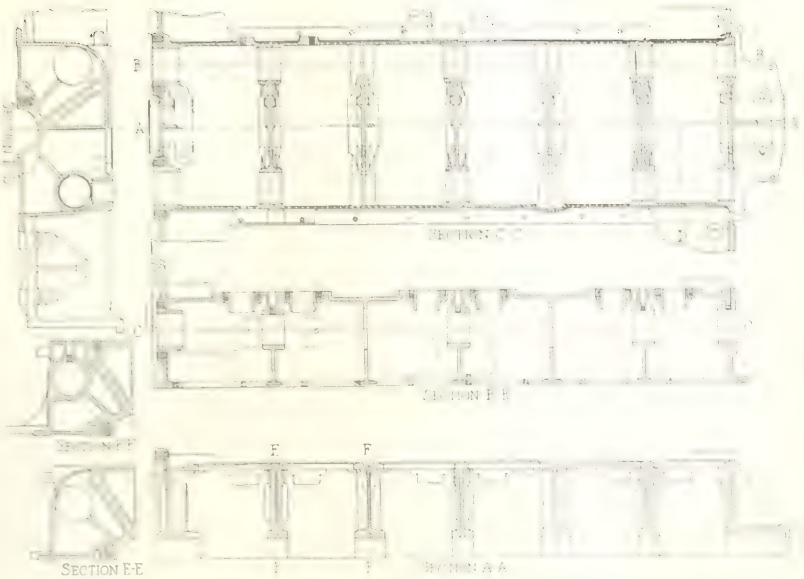


Fig. 4—Locomobile bronze crankcase in which engine oil pan is considered part of reinforcement

When the first experimental engines of this make were built the number of ribs in the crankcase were increased until the fifth one, which was so heavy as to be out of the question for production was tried. As a matter of fact, this extremely heavy crankcase made the best engine of the entire group, but it was entirely too heavy for passenger car use. The crankcase illustrated in Fig. 6 was finally selected as a happy medium, giving sufficient rigidity without too much weight. It will be noted in this case that there are no flat side walls. In the opinion of Jordan engineers, there is no question but that flat side walls should be avoided as much as possible, because any flat surface, unless properly ribbed and braced, will tend to pick up vibration and accentuate it. There is no doubt but that vibrations which do not originate in the crankcase itself or immediately adjacent, are transmitted to the crankcase and accentuated through it as a sort of sounding board. The question of resonance is nowhere so important as it is in the crankcase because of the sounding board effect which may be secured through any large, flat, unribbed surface.

Summing up the matter of crankcase design with the various angles of rigidity and freedom from resonance in mind, probably the most important fact is that the crankcase should be able to stand alone from a structural standpoint. In other words, it is a mistake to allow the crankcase to depend upon the cylinder block to any extent for rigidity. One engineer, who is in charge of design for one of the largest producers in the industry, recently said "our case is not particularly deep in section and we have to depend to a considerable extent for rigidity upon the cylinder block which is bolted to it. In view of past experience, no doubt, if we were designing this motor anew, we would endeavor to get a deeper section crankcase." From this it is quite apparent that at the time this case was designed, about 4 years ago, it was not considered so important to have the crankcase as rigid as is now known to be desirable. The crankcase should be of independent, rigid structure, fully capable of performing the work which it is supposed to do without leaning upon other members for structural support.

Like all other rules, however, the above may have its exception, where the cylinder block is particularly designed to function as an integrally cast crankcase stiffener. Speaking generally, however, engineers will probably agree that the crankcase should stand alone.

The Moline Plow Co., manufacturers of the Stephens car, uses a semi-barrel type of crankcase integral with the cylinder block. This block, in other words, is designed to contribute toward the stiffness of the case. The engineers of this concern claim that this feature, together with a heavy main bearing support, provides means of bearing support which has given them no trouble and, in fact, exceptionally long bearing life. A large part of the credit of this is given to three-point suspension. This concern states that from time to time it has experimented with four-point suspension, the front end of the engine being held with a cross-arm forging, and in each case the frame distortion has been transferred into the engine to such an extent that it was almost impossible in extreme cases to turn the engine over with a hand crank. The Moline crankcase is illustrated in Fig. 7. An interesting feature which is shown in this illustration is that the crankcase interior is ribbed longitudinally.

Another concern which relies to some extent on the cylinder block for the rigidity of the crankcase is the

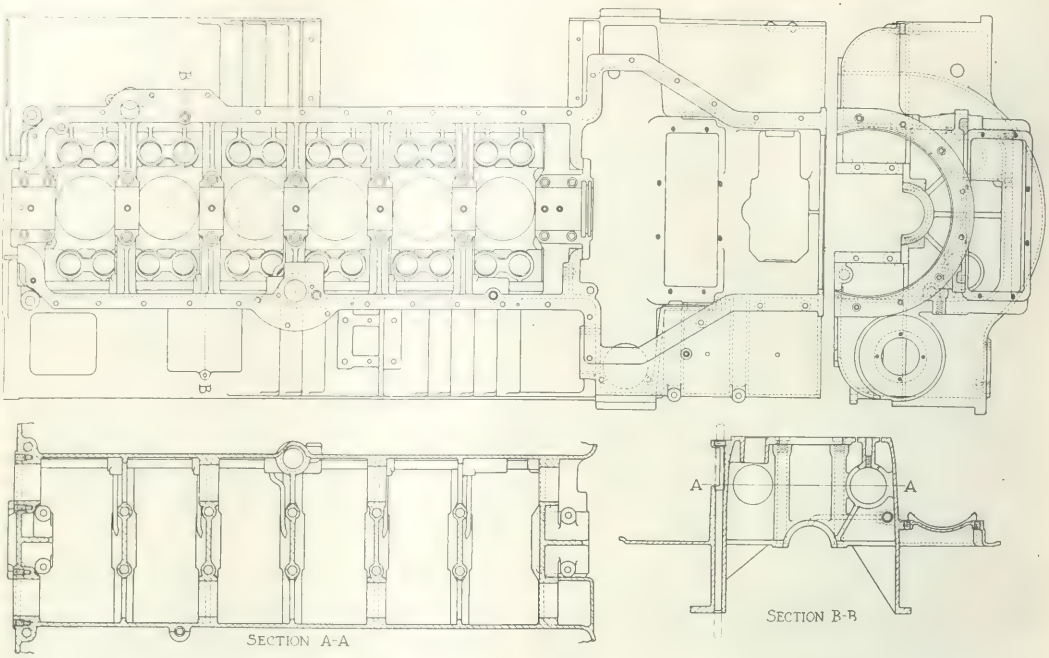


Fig. 5 (above) — Experimental type of aluminum crankcase designed by Locomobile company

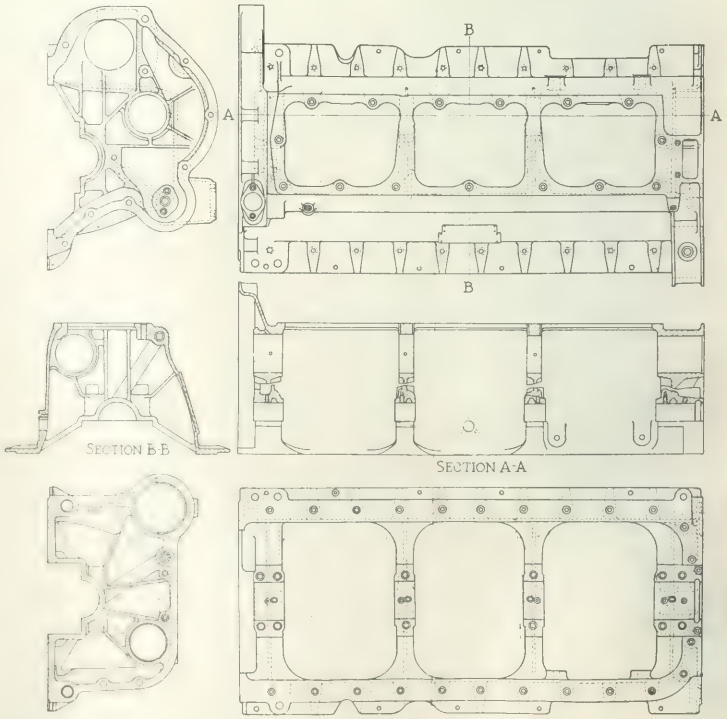
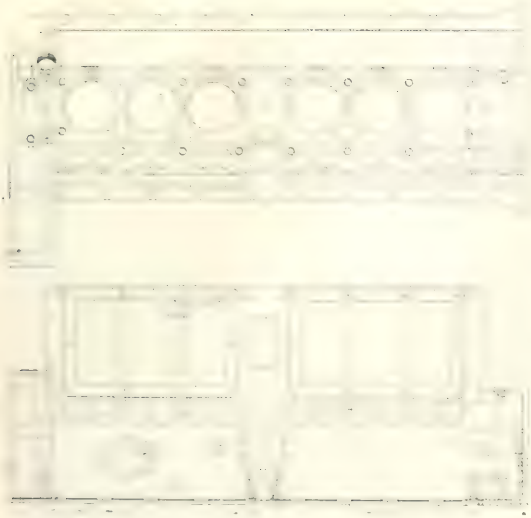


Fig. 6 (right) — Crankcase used on Jordan Continental engine. Note that the case is divided well below the center line of the main bearings



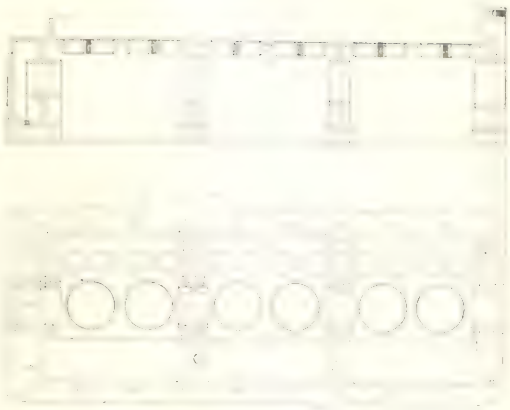


Fig. 7 (right)—The Moline crankcase showing the system of longitudinal ribs

Fig. 8 (left)—Liberty crankcase showing how a cylinder block which is integral helps to increase rigidity of the case

Liberty Motor Car Co. As shown in Fig. 8, this design takes care of rigidity by the use of the integral cylinder block and crankcase. This is a four-bearing case and rigidity is assisted by the use of four studs to hold the bearing cap on each main bearing. It is claimed by this concern that the use of two studs does not contribute nearly so much to the stiffness of the case as four and with this number there is greater certainty of maintaining crankshaft alignment.

As far as the material is concerned, whether it is aluminum or iron, the strength is only one consideration. The disposition of the material is of far greater importance than its actual inherent rigidity. The proper arrangement of the internal ribbing, not only for bearing supports, but also to break up flat surfaces, is the most essential factor. It is, of course, much more simple to have a multi-bearing crankcase rigid than it is for one which has two or three bearings. In a seven-bearing crankshaft there are five intermediate ribs or webs supporting the bearing, which also acts as a structural member for the stiffness of the case itself. The Dorris Motor Car Co. states that these reasons are responsible for their concern going to seven-bearing crankshafts in 1915. At certain critical speeds there was a period which they traced to lack of crankshaft support and to longitudinal and torsional vibration. This concern found that the use of a seven-bearing shaft eliminated this trouble.

A New Spring-Damping Device

LEMOINE, the leading spring maker of France, has placed on the market a shock absorber which forms an integral part of the spring. On a six-leaf spring, leaf No. 5, normally the next shortest leaf, is cut short and the portion removed is replaced by a Ferodo strip as far as the extremity of leaf No. 3. This strip of Ferodo is riveted to leaf No. 6, which is thinner than all the others and is equal in length to leaf No. 3.

A U-clip is riveted to the extremity of leaf No. 6, and over it is placed a second U-clip, which is not riveted, but is fitted with a cross bolt. In the space between the bottom of the two clips there is fitted a short leaf spring equal in length to the width of the main leaves, while a setscrew with a lock nut passes through the bottom of the outer clip and bears against the inner clip, thus providing means for varying the pressure on the brake lining.

In addition to damping rebound, the Lemoine device makes it possible to vary the flexibility of the spring considered as a whole. With the adjusting screw right home, the leaves are solidly clipped together, and as this screw is released the movement of the leaves becomes freer. Manufacturers who have used the Lemoine device report that it is effective.



Lemoine spring damping device

Producing Spur and Bevel Gears With Hot-Rolled Teeth

A description of the machines used and the methods followed in manufacturing hot-rolled gears. Teeth are said to be more accurate and considerably stronger than cut teeth. Herringbone type of bevel gear among the varieties made by this process.

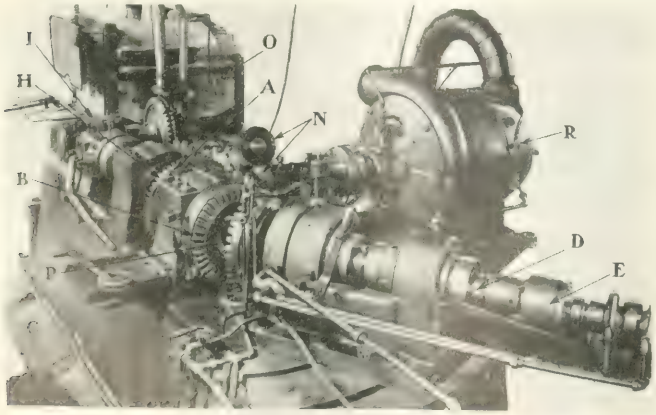
EVER since the first use of toothed gearing there has been a demand for more and more accuracy in gear forming. Silence and life, the two great requirements in gears, are both materially increased by accuracy in the tooth form. Consequently, any developments which secure greater accuracy are of interest to manufacturers in the automobile field where the requirements for silence and life are probably greater than in any other.

One of the most interesting developments of recent years in gear forming is the method now in use by the Anderson Rolled Gear Co. As the name of the concern indicates, the gears are rolled instead of cut in the blanks. This concern claims that when teeth are cut from blanks in gear-cutting machines, certain inherent defects are found. When the teeth are cut from the blank in one operation the wear on the cutter is said to be so excessive that it is difficult to maintain the cutting edges, and when the teeth are cut in two operations, double the amount of equipment is necessary and there are many delays incident to the double set-up.

For a great many years experiments have been made with the idea of forming the gear teeth by rolling a plastic gear blank in mesh with a rigid, accurately formed master gear. As early as 1872 John Conley attempted to roll teeth in gear blanks, heated, to render them plastic, by a knurling process. A number of other unsuccessful attempts to do the same were made at later dates. In all of these experiments only one of the functioning shafts, either the blank shaft or the die shaft, was positively driven, the other shaft being driven through the die and blank and the resulting gears were deformed and inaccurately spaced.

The latest endeavor to so form gears has met with success and is now in productive use by some of the largest automobile concerns. It is the invention of H. N. Anderson, who has developed the fundamental idea of positively driving both functioning shafts through timing gears separate from the blank and die and held continually in full mesh. These constrain the forming gear or die and the plastic blank to roll on one another in positive synchronized contact, without transmitting any driving power, thus eliminating slippage and tooth distortion, which are said to account for failures of the earlier attempts.

The first successful gear rolling machine embodying this idea was built during 1910, the inventor being awarded the John Scott legacy medal by the Franklin



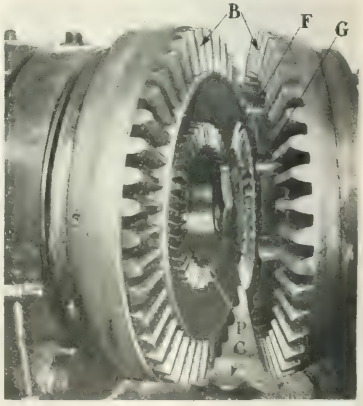


Fig. 1—Front view of the Anderson machine for hot rolling bevel gears with 30 to 90 deg. angle. Fig. 2—Detail of same machine showing timing gears, die, rolled blank and blank holder

Institute in 1915. Since this time the idea has been developed until recently a line of three machines covering a wide range of spur and bevel gears has been completed. These machines finish the teeth completely in one operation, leaving only the cleaning up of the diameters, backfaces, etc., by the customary automatic machine operations. The teeth are formed by the molding-generating action of a hardened, accurately ground, master gear die that leaves the tooth surfaces highly polished and free from scale. These hot-rolled teeth are claimed to be superior to the cut form in finish, accuracy and wearing qualities.

These gear rolling or forging machines, as illustrated by the bevel gear machine in the photographs, are built with the rigidity and strength necessary to withstand the forging strains without the deflection of any part, and also with the precise accuracy of the best modern machine tools. The elements of the mechanism of all three machines consist of two quills mounted in heavy roller bearings on a very rigid bed. One of these quills receives the driving power from the motor through a pair of bevel gears, shown at "A" in the photograph, Fig. 1, and transmits it through heavy and correctly formed timing gears, B, (Figs. 1 and 2) to the other quill.

Means are provided for adjusting the timing gears in mesh, so that there is no back-lash between them. In the two bevel gear machines, one quill can be swung around the pitch cone center, C, for various gear settings, the angular adjustment of the two machines overlapping to provide for the full range of from 0 deg. to 90 deg. A blank shaft D is slidably mounted in one quill and is keyed to it.

A pneumatic or hydraulic cylinder E is mounted on the end of this shaft and actuates a piston extending through the shaft to positively clamp the gear blank F in a blank-holder G, Fig. 2, on the other end of the shaft. Means are provided for adjusting this blank shaft endwise in its quill to accommodate different thicknesses of blanks and blank-holders.

A die shaft H is slidably mounted in the other quill and is keyed to it. Means are provided for adjusting this shaft endwise in its quill to accommodate various thicknesses of dies. A cam and roller I, Fig. 1, are also provided to advance the die shaft gradually in its quill with a smooth, positive action. The end thrust on both shafts is taken on heavy roller thrust bearings.

Main Shafts Oscillated

To build up the structure and profile absolutely symmetrically on both sides of the teeth, it was found necessary to oscillate the two main shafts by repeated reversals in the direction of rotation. At first this was done by mechanical means, but the engineers of the General Electric Co. have designed a special motor equipment that now gives the desired motion entirely electrically. It is an adaptation of their planer drive equipment, modified to meet the rather unusual requirements of the rolling process. A control board, with three push button boxes provides a very elastic control. With one box the machine can be driven continuously either forward or in reverse and stopped at will.

Another box jogs the machine slowly either forward or in reverse to provide small movements of the shafts during die set-ups, etc. The third box controls the automatic operation with its oscillating motion. Pushing the start button causes the motor to turn automatically a pre-determined number of revolutions in one direction, stop, turn in the opposite direction, stop, reverse, and so on until the stop button is pushed. A limit switch driven by a one-way moving part of the machine, controls these automatic reversals. Its segments are arranged so that the die makes one and a fraction revolutions on the blank in each direction, but one of these overlaps is longer than the other, so that the point of reversal on the blank moves around the blank as it is rolled. This distributes uniformly the slight cooling effect of the reversals around the blank.

The time required to start the motor, bring it up to speed and stop it, varies from ½ sec. to 1 sec. in the two different forms of the equipment used. The motor rating is 12½ hp. at its full speed of 150 r.p.m. The corresponding shaft speeds are 100 to 150 r.p.m. In the slower equipment a dynamic brake is used to stop the motor before applying the reversing current; but in the



Left—Section of rolled gear tooth and, at right, of cut tooth, showing difference in the structure of the metal. The rolled tooth is said to be considerably stronger

other, this brake is used only for the final stop, the motor being thrown directly into reverse and a resistance momentarily cut in to prevent a short circuit. Interlocking protections are provided to make the equipment fool-proof.

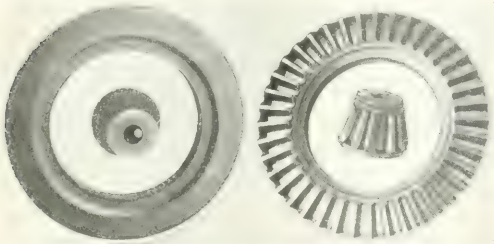
The motor is entirely enclosed and is equipped with forced ventilation and lubrication. The tremendously quick reversals are effected quietly, with no jarring. The total time cycle of rolling a gear has been materially decreased by this equipment and the current consumption is small.

The drive O for the cam is taken from an oscillating shaft at N and passed through a ratchet mechanism, which changes it to one-way motion. Thus the advance of the cam is proportional to the movement of the main shafts, so that when they slow down and stop during reversals, the cam does likewise. The action of the cam is to advance the die rapidly to contact with the blank; to advance it gradually to full depth; to hold it at full depth while the tooth is taking permanent form and is cooling below its critical temperature; to stop the die back slightly for one revolution; and to withdraw it quickly. The withdrawal is effected by a spring or by a return cam. During the displacement of the metal, the advance of the die per revolution is slight, so that the metal is worked and kneaded into proper form, and is allowed to flow into position easily and without strain. The total cam cycle for rolling one gear is about 20 sec.

The blank-holder is cooled with water during the brief space between rollings. While rolling, a baffle plate is interposed between the die and the blank, and a heavy flood of water is directed on the face of the die. This cools the die and keeps it at a temperature at all times bearable to the hand. The water acts to wash all scale from the die and the film retained on the die teeth as they enter the blank tends to loosen the scale on the blank, while the speed of rotation, aided by a blast of air from behind the intersection of the die and blank, throws off this scale entirely. The rolling is timed to continue until the blank is cooled below its critical tem-

perature, when no more scale is formed. The temperature contrast between the hot blank and the cool die causes the rolled gear teeth to be formed with a tough, highly polished surface.

The gear blanks are used just as they come from the drop hammers with commercial forging tolerances. It is not necessary to maintain sharp edges, consequently the hammer dies can be used for longer runs. The blanks are designed with a thickness about equal to that at the pitch line of the finished gear, as the metal is displaced both ways. This effects a 20 to 40 per cent saving in material over a cut gear blank. The edges are beveled so that the advancing die will cut through the metal and cause it to be extruded endwise



Left—Blanks for rolled bevel gear and pinion. Right—Bevel gear and pinion after rolling operation, showing shroud of extruded metal left after the rolling is completed. No machining of the teeth is required

along the die teeth, the blank-holder allowing a certain space for free egress of the metal beyond the ends of the teeth. The blank is heated to its most suitable forging temperature—ordinarily about 2000-2100 deg. Fahr.—and is quickly and positively clamped in the holder so that there is no possibility of slippage. The holder restricts the expansion of the blank while it is being rolled, and allows its quick removal.

The die, P, is in the form of a master gear with plane surface tooth profiles similar to those of involute rack teeth. Teeth of this form can be machine hardened and ground true to profile, by simple mechanical means, with the utmost precision, making possible their accurate redressing at minimum expense. The die teeth are constrained to enter the blank on radial lines and in the same relative position at each successive revolution, hence there can be no distortion of the teeth formed.

In the design of all dies are incorporated the basic considerations of having plane surface profiles for the teeth, and making allowance for year so that one die can be redressed many times. As the temperature of the die is not appreciably raised during the rolling of a gear, the proportions of the die teeth are based on the expanded dimensions of the rolled gear at its critical temperature. This allowance for the shrinkage of the gear while cooling after being rolled, is so simply and accurately determined that absolute duplication of results is said to be assured.

Bevel gear dies are made with the nearest whole number of teeth less than the crown gear. Theoretically this tooth should have a slightly curved profile, but it is ground to the plane surface. Thus the die tooth is correct at and near the pitch line, but is slightly too thick at the top and bottom. This rolls a tooth with the slight clearance above and below the pitch line, which is said to have been found so desirable in practice. It is simple to make the true octoid crown die shown at A, Fig. 1, but the relieved die shown at B rolls a better gear. The die is redressed by grinding .010 in. off the tops of the teeth and bottom of the spaces and the proper amount off the sides to restore the correct tooth proportions. One bevel gear die, as ordinarily designed, can be dressed down ½ in. As 300 to 500 gears can be rolled with one dressing, one die will roll 30,000 to 60,000 gears or more.

Spur gear dies are made in the form of a circular rack 2 ft. in diameter. As the pitch of the average quantity production spur gear is rather small, when it is divided into so large a circumference the resulting tooth profile so nearly approximates a plane surface, that the difference is just sufficient to provide the requisite clearance above and below the pitch line of the rolled gear. Dressing these dies reduce their diameter, but this is compensated for by reducing the thickness of the teeth and spaces in proportion to the reduction in diameter. The blank and the die are constrained to travel together in fixed synchronized engagement by their timing gears, which are not affected by the change in the diameter of the die. While the reduced die thus maintains its relative angular velocity, its reduced peripheral speed introduces a slight creep which is said to just compensate for the reduced thickness. This die can be reduced ¼ in. or more in diameter without effecting the absolute interchangeability of the gears produced, and because of the large number of teeth in the die the intervals between dressings is several times that of the bevel die.



Hot-rolled gears of various types and some of the dies used in rolling them

On completion of the rolling operation, the faces and diameters of the gears have to be finished, but no additional work of any kind is done on the teeth themselves. The rolled gears are chucked on their rolled tooth surfaces and the finishing operations are performed on standard automatic machines. This establishes the correct relation between the finished surfaces and the pitch line of the gear and insures its proper mounting.

During the rolling of a gear the hot metal of the blank is gradually worked by the advancing die under 5 to 20 tons pressure, causing, it is claimed, an advantageous rearrangement of the structure of the metal. The makers claim that a dense fibrous structure is forged into a trussed formation about the periphery of the blank, serving to tie the teeth to the body of the gear, to help equalize warpage in subsequent heat treatment and to give a tough, hard wearing surface to the working faces of the teeth.

In the two cross-section photographs herewith furnished by the Anderson Company, this structure is contrasted with that of a cut gear in which the rough forged surface is first turned off, after which the teeth are cut through the lines of flow of the metal, leaving them weaker in the direction of the greatest strain. The Anderson Company states that laboratory tests have shown that a rolled gear tooth is 25 per cent stronger and 20 per cent harder than a similarly proportioned cut tooth of the same metal.

The strength of rolled gears can be still further increased by retaining the shroud, which is normally formed at the ends of the teeth. It is claimed that the strength of gear combinations could, in many cases, be increased 50 to 100 per cent by this means. Besides strengthening the gears, the shroud helps retain the lubricant and acts as a gear guard. Any form of gear can be made by this process.

Moving a Village by Motor Truck

THE Acme Motor Truck Co., Cadillac, Mich., has just built a trailer of unusual design that is being used in a unique and unusual job—moving practically an entire village a distance of eleven miles.

The town of Jennings, founded about twenty-five years ago by the Mitchell Bros. Lumber Co., is being moved to Cadillac, Mich.

The houses to be moved vary in size from 24 by 30 ft. to 24 by 40 ft. The weight of the houses varies from 15 to 35 tons and the 11-mile trip is made in about four hours, which includes all necessary stops to wait for traffic to pass before entering upon a stretch of road too narrow to allow passing.

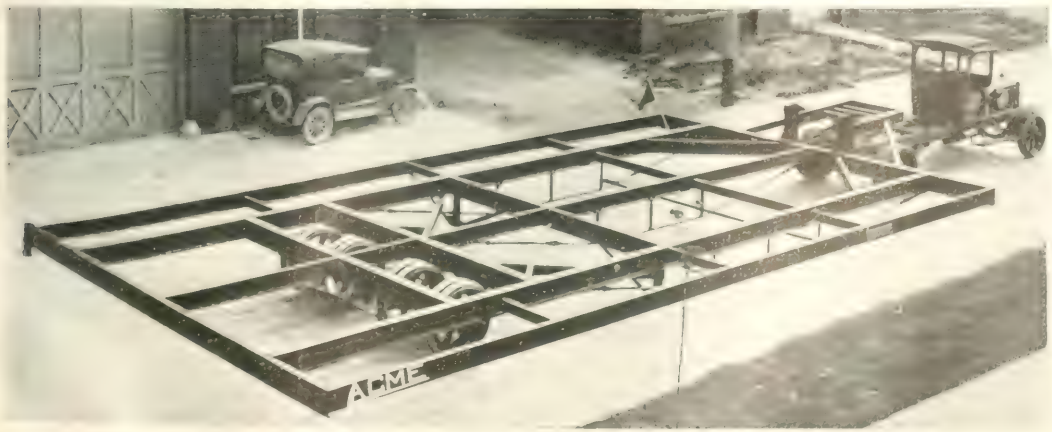
The trailer is constructed with a framework of heavy structural steel beams. A channel and I-beam platform, raised 18 in. above the trailer frame and rigidly connected to it, transfers the load at the forward end of the trailer to a rocking fifth wheel mounted on the truck. This construction eliminates all twisting stresses from the trailer proper.

The trailer frame is supported at the rear by four steel truck wheels abreast, equipped with solid rubber tires. Approximately 75 per cent of the weight of the trailer and load is carried on the wheels. The complete unit weighs approximately five tons.

Motor Vehicle Lighting Problems

IN Bulletin No. 63, mention was made of the work which the Bureau has been conducting in co-operation with the various states on the proper illumination of automobile license plates and their visibility under different conditions of illumination. During the past month this work has been continued, but the observations made up to the present time are merely preliminary and include only a few of the conditions under which plates must be legible.

This work is being conducted in connection with a committee of the Illuminating Engineering Society and with officials of several states. A large number of license plates have been obtained, and the work will be continued as soon as possible. Along this line, it is expected that later some investigations will be undertaken to determine the best form of numerals for these plates.



Special Acme trailer used for moving the homes and mills in Jennings a distance of 11 miles to Cadillac, Mich.

Selling American Tires in Great Britain

British use 1,200,000 casings per year, of which about 200,000 are American-made. Michelin holds first rank in replacement market, but Dunlop sells majority of tires for orginal equipment. Selling costs can be reduced by use of warehouses.

By P. L. Palmerton *

PRIOR to the World War the automobile tire trade of the United Kingdom was principally divided between Dunlop of Birmingham, England; Michelin, of Clermont-Ferrand, France; and certain American companies. There were also on the market automobile casings produced by Pirelli, of Milan, Italy; Continental, of Hanover, Germany; and Provodnik, of Riga, Russia, as well as by many of the smaller British and French companies. The aggregate trade of these lesser units, however, was not comparative to the share enjoyed by the two leading competitors, Dunlop and Michelin, who were trailed by the American companies. These two main companies held almost equal shares of the trade, with Dunlop, perhaps, somewhat in the lead. This statement pertains to replacement pneumatic-tire business and does not concern the original equipment business in which Dunlop had, and continues to hold, by far the leading share.

To-day, three and one-half years after the armistice, the British tire market is supplied mainly by Michelin. There is no escaping the complete ascendency of the well-known French tire. Some factors in the trade declare that Michelin alone is doing more than one-half of the total replacement business in motor-car tires, and observation in motoring circles finds evidence to substantiate such an estimate. The tires are imported from both the French and Italian factories of the Michelin Co. In second position to-day are found the American tires, if they are taken in the aggregate. It is not thought that any one American company is doing a replacement business equal to Dunlop, but it is altogether likely that the total of American tires imported easily surpasses the number which that premier British company supplies to the trade.

None of the many British tire companies other than Dunlop is of great consequence, their products being seen far less frequently than any one of five or more American makes. Pirelli ranks to-day with the lesser British companies, being followed by smaller French and Belgian companies. The reentrance of Continental has been so recent that it is not easy to assign its place at this time, but it is positive that not a great many German-made pneumatic tires have yet been put on the market here. A prominent distributor, with headquarters in Manchester, has taken up the line. The tires are handsome in appearance, having a jet-black tread in an attractive nonskid pattern and cream-colored side walls. It is not yet possible to find any of these tires which have run for a sufficient length of time to judge their quality.

One factor in the trade was willing to offer the following percentages as representing the shares of the replacement tire market now enjoyed by those competing: Michelin, 60 per cent; American companies, 15 per cent; British companies, including Dunlop, 16 2/3 per cent; other non-British companies (Pirelli, Continental, Bergougnan, etc.), 8 1/3 per cent. Tires from Canadian factories of American companies are counted as American tires in this estimate. But before looking into the actual amounts of trade enjoyed by the above competitors and the reasons for their ascendency or descendancy, it may be best to consider the size of the market and the things affecting it.

Size of Market

The London branch houses of American tire companies estimate that there are at this time 300,000 passenger automobiles operating in the United Kingdom; approximately 75,000 of these are taxicabs in steady use.

One of the oldest sales managers in the British tire trade states that tire consumption per car per year in this market has not fallen far from six tires, where it was acknowledged to stand some two years ago. The large consumption of tires by the taxicabs (it will be noted that they account for one car in every four), especially of the shorter-lived steel-studded tire, operates to keep the average high, but the improved quality of tires, and especially the introduction of the cord tire, has tended to pull the average down to a point where many conservative factors in the trade are willing to figure on four tires per car per year. If we adopt this figure we then put the potential British market for automobile casings at 1,200,000 per annum. Since America's greatest share of the tire trade of the United Kingdom is estimated to be approximately one-sixth, it should supply in the neighborhood of 200,000 tires to this market during the present year.

Since the detailed figures of imports of motor-car tires into the United Kingdom have been published in full by the Rubber Division, they will not be repeated here.

As has been indicated above, Michelin at present holds the prominent place in the market, followed by the American companies, the British companies, Pirelli and Continental. Since the failure of the home companies to dominate the market must surely be the leading contributing reason to the ability of other companies to hold the premier place, the reasons for such failure should be understood.

* Special Rubber Trade Commissioner, Bureau of Foreign and Domestic Commerce

In the first place, attention may be directed to the fact that automobile tires enter the United Kingdom free of duty, so that imported tires enter competition without any assessed handicap other than ocean transportation.

The decline in the business of the British tire manufacturers has really been the decline of the business of Dunlop. This fall from favor has been almost altogether due to variability in quality. Following the war, Dunlop brought out what was reported to be an improved fabric tire, the Magnum. Its failure to perform as Dunlop users had come to expect led them to change makes, and Dunlop has never succeeded in bringing them back. The potential strength of the Dunlop Co. must not, however, be underrated. There are indications that their tires are regaining more and more of their old popularity with motorists, and recent notable additions to the directorate of the company should not be without their beneficial effect. In a few months the market value of the ordinary capital stock of the company has recovered from £3,750,000 to £6,750,000.

The Dunlop Co. has always figured prominently in the original equipment business of England and continues to do so, particularly in connection with the larger cars, such as Rolls Royce, Sunbeam, and Vauxhall. Several light cars have been driven by competition to secure original tires at prices below those of Dunlop, and are accordingly appearing on various other makes. American companies who bid on some of the business report that it was awarded at very low figures.

British tires other than Dunlop did not do such a large share of the business before the war that their present status can be said to be lowered very much. The fact is that practically all of them undertake the manufacture of a wide range of rubber products without any particular specialization on tires, and accordingly the lack of prosperity in their tire departments is not a matter for such great concern. This division of interest may account for the fact that British tire manufacturers are often accused of being unprogressive, both in the matter of perfection of product and greater efficiency in production. The natural conservatism of the Britisher toward newer processes or types of products surely enters here. It may be said without prejudice that British tires to-day are not equal in quality with the leading American makes.

Value of Quality

American tires and Michelin tires are both regarded as of high quality, even Americans in Great Britain being willing to concede the high and consistent quality of the Michelin tire, although not regarding it as the equal of the best American makes. The Britisher, however, sees little choice between them. This recognition of the merits of tires imported from at least two countries naturally hurts the sale of British-made tires and has caused the British Tire Manufacturers' Association to ask the Government to put into effect the 33 1/3 per cent import duty as proposed in 1915; but no such action has yet been taken, and it is not believed that it will be.

The Ascendancy of Michelin

There are two or three reasons to account for the strength of Michelin in this market. In the first place, Michelin is a pioneer manufacturer of automobile casings and has sold in the British market for many years. The Michelin sales organizations have always been keen, energetic, and well managed. The policies have been carefully chosen and, under the tutelage of the one leading spirit of the company, have been religiously followed out.

The main point in Michelin's strength has been unvarying quality. New products or improvements in old ones have apparently been so well tested before being offered for sale that the many fiascos common to so many companies have been almost totally absent. Thus we have a pioneer company which has surrounded itself with a reputation for dependability, and any conservative buyer is naturally slow to abandon the use of its products.

The early appearance of the Michelin beaded-edge cord tire also is a big factor in the present ascendency of the company in this market.

Before the war Continental's strength in the market lay in solid tires rather than pneumatic, and the same apparently will hold true to-day. It is noticed that although the British sentiment against German-made goods is gradually dying out, the plainness with which an automobile casing is branded advertises the use of a German tire far too much to suit the average British motorist. This feeling is stronger in provincial England and Scotland than in the city of London. There is less sentiment in business and less tire prominence also, with the result that the truck-tire user will more readily readopt the Continental solid tire. It is assured, however, that very few German-made tires have entered the British market this year, but the solid tire especially can be expected to regain a good part of its former trade. Such Continental tires as are now being sold here are on a price level with other makes, but the dealer is rewarded with slightly better discounts.

Pirelli are to-day doing fairly well in this market. The quality is regarded as common, and the prices are about the same as all others. The lesser British and French makes enjoy a fair sale. The Hevea tire of Holland is just being introduced.

Most of the British business in American tires is done in five makes. Other makes are represented, but are seen only infrequently. In the aggregate American tires stand in second place in the market. This position is theirs on account of the pioneer work of certain American companies, the high and usually consistent quality of American tires, and the war and early post-war periods which gave them a chance to become firmly intrenched.

P. L. PALMERTON is chief of the Rubber Division of the Bureau of Foreign and Domestic Commerce. Last spring he went abroad to get merchandising facts about foreign markets for American manufacturers.

* * *

This report on the British market is the first to come back. It is one of those rare reports which presents all of the essential facts and figures, but includes as well a brief, comprehensive interpretation of them.

* * *

This story tells about trade practices in the tire business of England, outlines the chief competition, shows where American products now stand, and shows how American marketing methods can be improved. Merchandising cost figures are given.

A fair part of the recent imports of American tires into Great Britain has not been of the makes usually found here, but has consisted of various lots of tires cleared out of American factories at very low prices. Similar lots of Canadian tires have also appeared. These tires are nearly all fabrics, principally in 30 x 3½ and the most popular metric sizes. This deluge of clearance stocks has tended to demoralize the legitimate market, since they have been sold at very low prices. Their appearance is accounted for largely by overproduction and the resulting large inventories in the United States. The metric sizes come to a large extent from factories which were equipped in the post-war period with metric molds and which to-day are finding export markets more difficult.

The desire to clear out fabric stocks to make way for cords has also had its influence, although a larger quantity of special brand and second-grade stuff has been included. The exporting has been done largely by tire jobbers in New York. The stocks have not always been fresh or of good quality, and both the sales and prestige of American tires have suffered as a result. Disappointment with these more unreliable products, however, is leading the British motorist to refuse to buy them even at their low prices, and the influence of these stray stocks is subsiding as a result.

Sales of American tires are effected largely through branches of the parent company located in London. From these main offices branch offices are spread through Great Britain and Ireland; these may number from five to a dozen, each controlling sales in a certain section and stocking the surrounding dealers. The number of travelers from these branch offices is often large. Some of the branch companies handle Scotland and Ireland through branch offices, while others assign the territory to agents in Edinburgh, Glasgow, Dublin, or Belfast. There is also a fair amount of direct importing done in Scotland and Ireland, either by import dealers or by distributors. The tire trade in Ireland is largely dormant at this time, the largest demand coming from the military establishments.

How the Tire Trade Is Handled

The American tires not self-represented are in the hands of agents, usually selected for their familiarity with the tire market, gained through experience with British or other makes. They are commonly given from 35 to 40 per cent discount from the consumers' list. Time is given them up to 120 days in some cases.

The branch houses and manufacturers' agents commonly sell or consign to the tire dealers or traders at 20 per cent off consumers' list; in straight sales 5 per cent additional is allowed for cash in 10 days and 2½ per cent for cash in 30 days. It is admitted that the time limit, however, is not closely drawn, and if payment is made within six weeks the trader is apt to claim and be allowed the 2½ per cent discount.

The practice of consigning tires to dealers, or selling "sales or return" as it is more commonly expressed, is still in force, fully two-thirds and possibly as much as three-fourths of the tire business being done on that plan. Under its provisions the dealer is stocked with tires, for which he does not remit and which remain the property of the manufacturer, the dealer becoming only a sales agent for them. At the end of each month the stock is checked and the dealer pays the manufacturer for the tires sold during the period, retaining, of course, the difference between the manufacturer's and the retail price.

The "sales or return" system naturally appeals to the dealer, because he has no investment in stock. Thus it becomes a sales aid to the manufacturer, who uses it for that one powerful advantage, in the face of the disadvantage of having a tremendous investment in stocks scattered all over the country. Since the dealer has no investment in the stock, he has no particular interest in turning it and may often be encouraged to purchase on time at a slightly greater discount a second or third stock to whose sales he will devote the greater part of his energy, since it pays him better, and he is forced to get his money out of the stock in order to pay his bills. Thus the aggressive dealer may prefer to avoid the "sales or return" system, while the more slow-moving conservative dealer, who sells goods only on popular demand, prefers it.

The use of the "sales or return" system is declining slightly, but, as has been said, at least two-thirds of the business is still done under it. All the American houses having branches in the market, place stocks with dealers on a consignment basis, but the practice is not so readily adopted by agents for American tires. About one year ago an agreement was made among the tire distributors for the abolition of the practice, but since some companies did not adhere to the agreement it naturally disappeared. To-day consignment is regarded as almost inevitable.

Tire Advertising

Under the keen competition in the market some American companies have not found it possible to send in tires at the common market price and still allow sufficient discounts to interest a distributor in handling them. The result has been the elimination of the distributor and the entrance of direct importing on the part of important dealers. The sales are effected by a factory representative or by a salesman on commission. Shipments are made to the dealers' nearest port, payment sometimes being made by draft against documents.

American tire companies are spending less to-day on advertising than formerly. To keep their prices on the same level with Dunlop and Michelin, they do not find a sufficient margin to enter into extensive advertising campaigns. Dunlop and Michelin are apparently making greater investments in advertising and are keeping their names more prominently before the public. This is done in part through road maps and guides, which are exceedingly elaborate and detailed. Large enameled road signs are commonly used. These tires are also prominently advertised on the many omnibuses on the streets of London. The many motoring journals of London, as well as the London and other daily papers, are freely used, a good representation being made by the smaller British tire companies. British tire advertisements are commonly flavored with a patriotic appeal for the readers to use British products in order to give employment to British workmen; it is also suggested that such action will reduce the motorists' taxes, since it should mean a shrinkage in unemployment.

It is common practice for agents for American tires to ask for and secure a special discount for advertising purposes. This discount often is set at 2½ per cent of the gross purchases. In some cases the agent or the dealers to whom he sells agree to put in an equal sum.

Automobile casings are not commonly guaranteed for any specific mileage in this market. Some of the less prominent makes are still sold with definite mileage guaranties, but the effect is not so noticeable. One exception to the custom of selling with guaranties toward defective workmanship and materials only is that of a well-known American tire handled by an agent who guarantees it for 5000 miles' service regardless of abuse or accident. This broad guaranty is used as an introductory feature.

The keenly competitive condition of this market has raised the question of cheaper distribution, of which the direct importing by large dealers mentioned above is an outgrowth. The distribution of imported tires is commonly effected through representation by a native firm or through a branch office of the parent company; the first demands a comfortable margin on all purchases for expenses and profits, while the second is admittedly extremely expensive.

Direct importing by dealers after sales have been effected by a traveling representative of the factory eliminates the usual office expense or the margin to the native distributor, and the direct importer can accordingly be allowed a greater discount from the consumers' list. The goods are forwarded c. i. f. dealers' nearest port. The greatest fault in this scheme seems to have been the length of time intervening between the placing of the order and the receipt of the goods. This delay necessitates the dealer anticipating his wants far in advance, and he feels most keenly the lack of flexible delivery. This disadvantage may be avoided by backing up the factory representative with a stock of tires in an inelaborate warehouse, from which shipments can be made to his order.

This warehousing of tires may be accomplished in either of two ways—first, the renting of warehouse space and the installation of a very small staff for handling stock, or, second, through a warehouse company already established which will receive goods under bond and make shipments on order for a set charge per tire.

Under the first plan of operation a warehouse of sufficient size to permit the stocking and handling of 8000 to 10,000 tires may be secured for approximately £400 per annum. A responsible clerk may be secured at £200 per annum to direct the receipt and dispatch of goods and to keep the stock record. Two stock handlers at £150 per annum and an errand boy at £50 would complete the necessary staff. Thus for £950—say, roughly, £1000, or $5000—the company's representation could be backed by facilities for deliveries as convenient as British or any other manufacturers could offer. The cost of warehousing and handling tires through an existing warehouse company is not yet definitely established, since the conditions of each contract are apt to differ, and the practice is not one with which warehousemen are very familiar. Estimates as to cost can be readily secured, however, when all details are outlined.

Tire Prices

In what may be called the "legitimate" tire trade in Great Britain there is no price war, and there is none in prospect. Michelin has largely controlled the price situation in this market. American prices have usually been a little higher than those asked for British or French tires. The price scale in effect at present was introduced almost simultaneously by Dunlop and Michelin with very slight variations between their consumers' lists. The American tires have followed the lead of one of their number and have put their prices on what is practically a parity with all standard makes.

The progress of the cord tire in the British market has been very rapid. It was introduced later than in America, but it has come to dominate the market fully as quickly. The almost total disappearance of the fabric tire is claimed to be a matter of a year or very little longer.

The Michelin beaded-edge cord tire was the first to appear and has derived a great advantage therefrom. Practically all the British companies now offer beaded-edge cord tires in metric sizes, although certain ones are still delinquent, to the great disgust of their agents. American companies generally were slow in getting on the market with such a tire, and, in fact, the list offering the cord tire in metric sizes is small indeed. Several American companies which have operated prominently here are not yet ready with a metric cord, a fact which causes the greatest dissatisfaction and impatience on the part of their agents.

Certain American companies report their present sales to be 80 per cent cord. In the face of such demand the companies offering only fabric tires are naturally at a great disadvantage.

Certain importers of American tires report that American metric cord tires were too highly priced when introduced, a fact which they account for by the desire of the companies to mitigate the high first cost of mold equipment for producing the tires. This condition has now remedied itself, but it made the introduction of the tire more difficult.

The Straight-Side Tire

The straight-side tire is used in the United Kingdom on cars of American manufacture which have been imported on straight-side rims. It is impossible to ascertain the number of cars so equipped, but it is small, since many American cars were imported with beaded-edge metric tire and rim equipment. Such prejudice as existed to force the importation of American cars on other than their usual tire equipment has largely disappeared, and there are to-day only two American cars taking tires larger than 30 x 3½, which are steadily coming in with beaded-edge tires and rims.

The percentage of straight-side tires among all those sold is not high; it is commonly admitted that 5 per cent is a generous estimate. A good share of this straight-side tire business is in the size 32 x 4½, used on the rear wheels of Ford vans.

Clincher tires in inch sizes, principally 30 x 3½, account for a greater percentage (usually placed at 10 per cent) than do the straight sides. This leaves 85 per cent as the estimate of beaded-edge metric tires in use, and it is agreed that it is not too high.

The Dunlop Co. believes firmly in the principle of the straight-side tire and has been active in the manufacture of both straight-side tires and rims to offer to the motor trade of the United Kingdom. Dunlop is said to furnish about 90 per cent of the original tire equipment for the British motor cars, and their belief in the straight-side tire can be expected to have an effect on their customers. Some of these have already fitted some cars with straight-side rims, but only in occasional cases. The satisfaction they have given supports the belief that before long certain British cars will appear on straight-side tires.

Contrary to the case in America, the motorist here has a distinct feeling against the greater weight which accompanies the straight-side tire and rim as it is used in the United States.

If the British car accepts the straight-side tire on a detachable rim the split rim will of course be eliminated, just as it is eliminated to-day in America where detachable wire or disk wheels are used. The straight-side tire will benefit thereby, for no one thing has aroused greater ire against the straight-side tire than the split rim, which has never been easy to operate. The British detachable wheel is already perfected, and the rapidity with which a chauffeur can change wheels is something of a revelation.

The adoption of the straight-side tire as original equipment by the British motor-car manufacturer would naturally lead to an elimination of the metric tires alto-

gether, since the smaller beaded-edge tires which are British standard are in inch sizes. The 760 x 90 size, which is an important one, is apparently the same as the 30 x 3½ and would likely be entirely replaced by it. The most important size having no present American standard equivalent is the 710 x 90. It is anticipated that the 28 x 3½ will replace it, for, in fact, that size is already a standard for light cars in Great Britain and is already offered.

Popular Tire Sizes

The 815 x 105 and the 820 x 120 are the most popular sizes of tires on the British market to-day. In the light-car sizes, 710 x 90 and 760 x 90 are the leaders. The size 810 x 90 is going out, and the 870 x 90 has already been discarded. Size 765 x 105 is important, but probably five times as many of size 815 x 105 are sold. In the 120-millimeter range the 880 and 820 are apparently of equal importance, but the popularity of the 820 is increasing as the former decreases. The advent of cord tires has decreased the popularity of oversizing, which accounts for the decline of the 150-millimeter ranges.

The most popular straight-side size is the 32 x 4½, for the reason explained above. The 32 x 3½ is probably second in importance along with 33 x 4.

The British market shows such a strong preference for the red tube that it is almost impossible to sell any other. Gray tubes are sometimes used as original equipment, but practically every motorist insists on having a red tube for replacement. A red tube of bright finish is the best seller. The inability of American manufacturers to supply red tubes for some time and their failure to give their first red tubes an attractive finish have kept them from securing a better place in the market. Michelin has always produced a red tube and a good one, and so has risen to an enviable place in the trade. The sale of "unknown" tubes, many of them of domestic manufacture, is also a feature of the trade, as it is in the United States. In the face of these conditions it is plain that only a high-quality red tube of good finish can hope to succeed. The tube prices, like those of tires, are without serious differences.

Predict Big Future Sales

All American companies operating in the British tire market are optimistic concerning their sales during 1922 and in the future. The invoiced value of automobile tires shipped from the United States to the United Kingdom in 1921 stood at $3,357,239. This total is more than double that of any pre-war year and was surpassed only in 1916 and 1920. The war of the first of these years and the hysteria of the second have gone. The total of $3,357,239 was reached in 1921 with very conservative buying and bids fair to be equaled or even surpassed in the current year, which is the basis for the optimism mentioned above.

American sales may have been increased but American prestige was certainly not affected in the same manner by the indiscriminate selling of stray stocks of blemished or clearance stocks which has been discussed herein. For the most part they have not been satisfactory, and the conservative British motorist, tempted by price to change his usual procedure and buy according to something other than established reputation, again changes makes, with more or less indiscriminate disgust for American tires.

It is said that sporadic sales of special brand or clearance stocks tend to surround all American tires with an air of unreliability or instability. Since the tires which appear irregularly are necessarily sold on a low-price basis, the market is demoralized by them and the ire of British tire manufacturers against all American tires is aroused. Americans who hold regular places in the trade are plainly relieved at the tendency of these stray stocks to subside.

Irregular Policy

The irregular appearance of various tires on this market, at times when it is thought to be more convenient than profitable for their makers, is perhaps a reflection of the irregular policy which some American companies have followed in exporting to the United Kingdom. Their practice of definitely putting their domestic business first in development or supply, sometimes to the entire neglect of their British business, has a particularly malicious reaction on their agents or representatives, because the British motorist buys largely on reputation, which can not be built without regular or complete stocks of those goods particularly suitable for the market. Some agents and representatives still find themselves handicapped by slow and irregular deliveries, the lack of cord tires in metric sizes, the lack of red tubes instead of gray and so on. It must be believed that these things and the attitude back of them are cheating the American tire trade in Great Britain of some of its rightful growth to-day. The keenness of competition should be sufficient demand that handicaps be removed wherever possible.

Since the total tire business in any territory has natural limits, the growth of American tire sales in Great Britain depends upon the ability of American branch houses or agents to take business away from their present European competitors. These competitors have natural advantages arising from location and age, but where they are in superior positions it is partly due to persistent effort, less variability in product and policy, and alertness as to the needs of the market. American companies have met them in prices, and there is no doubting their intention to meet them in practicing the above policies in order to enjoy the increasing volume of business upon which substantial or worth-while returns can be based.

American Sales in England Increase

THE serious dislocations caused by the engineering lockout during the first part of this year in the British automotive industry have proven very difficult to overcome, according to Asst. Trade Commissioner Park of London.

The export trade continues to decrease, while imports of foreign cars have steadily increased since the first of the year, despite the 33⅓ per cent import duty. The United States and Canada remain well in the lead in British imports of passenger cars, which are dutiable, while France and Italy are ahead with respect to complete motor trucks, which enter the United Kingdom free.

Sales of American cars in the British market have improved steadily and will continue to hold a good market as long as they can give a better value for less money, as is true at the present time in many cases. Recent price reductions have been made by the representatives of several American cars on the market due to satisfactory increases in business.

Will the "All Loss" Type of Lubricating System Return?

This possibility among the items discussed at the recent lubrication meeting of the Metropolitan Section of the S. A. E. Well fitted pistons and rings and true cylinder bores considered essential for proper functioning of any oiling system.

MANY angles of lubrication were discussed at the meeting of the Metropolitan Section of the Society of Automotive Engineers in New York last week. Two papers were read. Finley R. Porter described and criticised the different oiling systems that have been and are being used, and George A. Round added some new data to the paper he gave at the Summer Meeting of the Society at White Sulphur Springs last June.

Porter expressed strong preference for the force feed system of lubrication, especially in combination with an external reservoir which gives opportunity for screening and cooling the oil in the most efficient way. He also stated that the now abandoned system of feeding each point in an engine with fresh oil which is not recirculated has advantages worthy of consideration, in which view he was supported by the discussion. With respect to this system Porter said:

"Contrary to the general trend, there is one type, that of the "all loss" system, which the writer believes worthy, with modifications, of further development, which is fast disappearing from use in general practice. The "all loss" system is defined as one wherein the oil distributed to the several surfaces to be lubricated is intended for total consumption, either by leakage or burning, and is supplied in as nearly the right quantities as possible to prevent undue waste.

"Early practice along these lines shows every indication of, and did, without doubt, follow the lines of steam engine lubrication, since the majority of designers at that period were graduates from the steam engine school. Following the period of hand filled sight feed oilers in connection with this system, mechanical oilers directly connected to the engine came into use, and were very effective except for the fact that the supply control being a function of engine speed, great difficulty was experienced in maintaining a proper supply over the full range of engine speeds.

The Splash Lubricating System

"Owing, no doubt, to the difficulty and intricate apparatus necessary for keeping the rate of supply within the limits of consumption, this system was abandoned largely in favor of the "straight splash system," wherein a given quantity of oil was placed in the engine base and renewed from time to time, thereby maintaining a more or less constant level. This system, known as the "splash system" is still in use to some extent, but in the writer's mind is not deemed worthy of consideration in connection with future development."

Porter then described various systems of force feeding with respect to the several types of automobile and aircraft engines and finally summed up as follows:

"A brief review of the motor vehicle field discloses the following distribution of systems:

	Pass. Cars	Comm. Veh.
Straight Splash	9	69
Force, or Dry Sump	72	364
Force and Splash	83	229
Total models	164	662

"The above figures disclose the straight force feed, or dry sump system predominating in the commercial vehicle field, while the combined force and splash predominates slightly in the passenger car field.

"In the nomenclature of the automotive fields, the dry sump systems are designated as forced feed systems, but for the sake of comparison and discussion will be referred to hereafter as dry sump systems—which it is believed will more clearly designate them when compared to splash, and force and splash systems.

"The ideal would be an all-loss system wherein fresh oil at a temperature not to exceed 150 deg. Fahr. would be supplied to timing gears, vertical shaft and camshaft bearings, main bearings and connecting rod bearing and wrist pins, with all returns collected and distributed in proper proportion to the cylinder walls at a temperature not to exceed 160 deg. Fahr.

The Dry Sump System

"Since this is obviously impossible, it is proposed to consider a dry sump circulating system with initial pressures ranging between 80 and 100 lb. and oil temperatures being maintained between 100 and 160 deg. Fahr. A separate reservoir should be employed connected to the suction end of the main circulating pump of the gear type with a cooler located between the reservoir and pump with radiator outlet water used as a means of controlling the temperature.

"The discharge or pressure line should lead directly to all main bearings, gear and camshaft compartment. The supply to connecting rod bearings should be through a hollow crankshaft with properly drilled ducts to the crankpins controlled by partial registration at the main bearing. Supply to the wristpins should be through a small tube, or hollow connecting rod, to the inside of wristpin. The wristpin bosses should be the closed-end type with distribution holes drilled through the wristpins to the working surfaces.

"Control should be had by proper length radial grooves that register only on the top stroke, since the registration would be direct with oil hole from main bearing. Sufficient lubricant would be assured regardless of the big end bearing fit or the amount of oil being fed to the connecting rod

bearings. In effect this would be at extreme outer stroke, a direct connection to the pressure feed on main bearings.

"The supply to all gears should be through a high pressure jet of sufficient size sprayed directly on the meshing side of each gear train, with the overflow, or return so conducted to the main sump as to avoid contact with main crankcase compartment.

"A separate sump pump should be utilized with an excess capacity for the return of all oil to the main reservoir."

Maintenance a Problem in Pressure Systems

Round took a different view from that of Porter, stating that, in his opinion, the force feed system is seldom justified for passenger car work. In the course of his paper he explained that one of his principal reasons for holding this view is the inability of the average repair shop to properly maintain force systems.

His paper dealt mainly with troubles encountered and he said that there are two general classes of complaint: that of excessive carbon deposit and that of excessive oil consumption, the two not necessarily going together. With either of these the fault might lie in design or workmanship, the latter of course including the workmanship of repair shops. As an example of faulty design he mentioned the use of extremely thin piston heads which, by reason of their lack of conductivity, would heat up to knocking point with quite light carbon deposits. Where very thin sections are used he said "the slightest carbon formation blocks the flow of heat from the charge and raises its temperature to the critical point. From our experience we feel that fewer complaints of knocking would be received if designers would give more consideration to this point."

LUBRICATING problems appear to be more difficult and numerous than ever, due in part to failure to properly fit pistons and rings, to cylinders which are not machined to a true circular form and to dilution of lubricant by fuel. These problems are felt keenly in the service station and return to perplex the manufacturer when they are due to carelessness on his part.

In this report some troubles are outlined and certain remedies suggested. The subject is one which deserves much study and should have careful consideration by executives as well as by engineers. Discussions pointing the way to overcoming lubrication troubles and intended for use in the Forum will be welcomed.

Troubles with all forms of oiling are due, of course, to improperly fitted pistons or rings, and this phase was discussed most of all. However Round described a way in which splash systems could sometimes give trouble due to design alone. He said:

"Recently we received from several different points reports that a certain car was giving a great deal of trouble from fouling of plugs and carbon deposits. Investigation showed that through some mistake, extra long connecting rod bolts were fitted. These dipped into the oil and created an abnormal splash. Dropping the oil level effected a temporary remedy. To our knowledge this apparently minor detail seriously affected sales of this car because of the reputation for oil pumping which it was acquiring. The loss in this way would seem likely to be much greater than the cost of seeing that such errors do not occur.

"In cases of oil pumping which cannot be attributed to an oversupply of oil reaching the pistons, defective and worn rings are mainly responsible. While the latter are to be expected in used cars it is surprising to find a large percentage of defective rings in new cars. A typical example of what has been found in regard to this was reported in the Summer Meeting Paper.

"Working loose of the rings in their grooves gives rise to much of the oil pumping troubles experienced in worn cars. Where aluminum pistons are employed it is particularly advantageous to use narrow rings in order to reduce the hammering action on the softer metal and consequent widening of the grooves. The use of a type of ring which stays tight in the groove throughout its life is also advantageous. Where a plain ring is fitted initially with the correct end clearance, little trouble is experienced due to an increase in this clearance in comparison with that from the change in groove clearance.

Regarding the proper ring tension, some have recommended a higher figure than we suggested; viz. 2 lb. per sq. in. of diameter for a ¼-in. ring. In some cases this is undoubtedly helpful but in the average passenger car the high tension ring wears much more rapidly. The ring having a slightly beveled face is an example of this. In most cases such rings come to a full seat after a thousand miles or less when their advantage ceases.

"There is a wide difference of opinion regarding the merits of oil return grooves. Our experience indicates that they are of value when provided with adequate drain holes. In many instances they have cut the rate of oil consumption in half. Only in rare instances have they proven a positive detriment.

"As to the new type of constant clearance aluminum piston, the absence of the large number of oil pumping reports received with the old type piston seems to indicate a decided improvement. In a few cases trouble has been experienced but could be attributed to other causes."

In opening the discussion A. Ludlow Clayden reminded the meeting that the all loss system is still used on the British truck Albion and that total consumptions are claimed for it comparable with that for other systems. Dealing with the quantity of oil required he said:

"We are liable to forget the oiling systems of two decades past, but many here will recall the Bosch equipment and the similar device fitted to many of the early European machines. The Bosch, which was the most elaborate, consisted of a combination pump and distributor which supplied oil through individual leads to each bearing and to each piston. The preferred method of drive was a worm actuated crank with a long connecting rod, the oil container and pump being mounted on the dashboard and the crank situated somewhere near the rear end of the camshaft.

The "All Loss" System

"This system was intended to replace the previous method of mounting a long row of drip feeds with sight glasses on the instrument board and was an improvement in so far as the pump was more positive than the gravity feed to the drips. The intended function of both was the same; to furnish each point with a supply of new oil at regular intervals in proportion to the speed. It was a complicated, messy and troublesome system, but then nearly everything about a car could have been similarly stigmatised at that time. No doubt the individual feed arrangement could have been simplified and cheapened had not the circulatory system come along and displaced it.

"Probably few engineers know that one of the most successful British trucks—the Albion—has always used this system and still does so. I have a recent letter from the

chief engineer of the Albion company telling me that no changes are anticipated for the near future and that the economy of the system is quite comparable with that of conventional circulating types. Of course, in the Albion system as in the old Bosh and Panhard the oil once used in bearing or cylinder never returns to the tank; it is dropped into an empty oil pan and allowed to escape.

Oil Consumption 100 Drops Per Mile

"When one has got out of the habit of thinking about such oiling systems it seems extraordinary that anything like reasonable economy could be possible, so it is perhaps instructive to figure oil consumption in a rather unconventional way. Assume a six-cylinder passenger car having a normal performance of 500 miles per gallon of oil. It is safe to say that of this gallon, one third at least is lost by leakage and in vapor through the breather, so we have to account for two thirds of a gallon as being actually consumed by the engine.

"Allowing for all low gear work the average revolutions per mile on a passenger car are about 3150, and with a six, this means over 9000 power strokes every mile, or about 5,000,000 each 500 miles. A gallon contains between 75,000 and 80,000 drops of oil, which means that two-thirds thereof contains close to 50,000 drops so the consumption in terms of power strokes is 100 power strokes per drop, or in miles 100 drops per mile. A hundred drops is approximately 5 cc. The object of quoting these apparently uninstructive figures is to show that if we returned to a system supplying fresh oil only, without circulation, the minimum possible supply to be striven for would be not far removed from 5 cc. per mile.

"The real trouble is that we have acquired the habit of using oil for all sorts of purposes other than lubrication. It is to be doubted whether a system like the Albion would keep sufficient oil in various parts of the engine to quiet the action to the degree to which we have become accustomed. A heavy oil covers a multitude of tolerances. Also we have come to rely upon oil to act as a cooling agent and probably without a circulating stream of it we would be unable to attain the rubbing speeds and loads now common in passenger car work, although, of course, fresh oil would always be cold oil. I do, however, believe that the system is well worthy of study and re-experimentation for tractor engines and that the cooling of bearings could be accomplished by means other than rapid oil circulation. For instance in many engines, especially of the heavier type, there would be little difficulty and probably no added expense in arranging to water jacket the upper halves of the main bearings.

"The continuous feeding of comparatively small quantities of fresh oil would overcome all dilution troubles and, in tractors, most of the cylinder wear difficulty; the question is whether the quantities could be small enough to give an economy comparable with that of the conventional system at a total cost of manufacture smaller than that involved in the installation of continuous regenerative attachments."

The Service Man's Viewpoint

The service man's viewpoint was given forcibly by Ralph C. Rognon. He said that the most difficult thing in service work was that things which would cure oil pumping in some engines would not work in others. He expressed strong approval of the type of ring which expands sideways in its groove as well as radially, but said that this had not invariably proved able to effect a cure.

Largely in reply to this speaker several points were brought out in discussion that were not mentioned at White Sulphur. H. M. Crane again described his preferred type of piston, having a parallel skirt with a scraper ring so arranged that it emerged from the bore to the extent of half its width at the bottom of the stroke. He showed that an improperly placed piston pin would inevitably cause piston cocking and said that no ring could possibly compensate for such a movement. The skirt should, he said, be practically equal in length to the bore and the piston pin be located midway of the skirt, the ring-carrying portion not being reckoned as part of the cross-head. Crane stated that, with pistons of this type and a scraper ring, high oil pressures are practical and considerable latitude on cylinder accuracy can be allowed.

There has, this year, been an unusual amount of trouble with new cars. This the speakers attributed mainly to poorly fitted piston rings and to rings themselves of poor accuracy. Oil dilution as such was not much mentioned.

Porter in his paper said that it was rightly to be considered a carburetion problem and other members supported this view. Dilution usually is found associated with oil pumping when the latter is due to piston or ring imperfections.

Points Agreed Upon

The meeting was not so well attended as it should have been, but the Section has seldom had a better discussion, adjournment not being made till well after eleven o'clock. It appeared that there was fairly general agreement on the following points:

That the forced or, to use Porter's more accurate phrase, "dry sump" system is the most logical where adequate standards of design and workmanship are to be had and where intelligent maintenance exists.

That the conventional circulating splash system is adequate for normal passenger car use, but requires, in common with all other systems, properly designed pistons, properly fitted rings and true cylinder bores.

That the "all loss" or individual feed system is worthy of consideration for some classes of service, perhaps tractor work.

Finally, and most important of all, that service stations and repair shops would benefit greatly from a better appreciation of the bearing fits, depth of splash dip and other factors affecting the performance of all the systems.

Canada Spends $50,000,000 on Highways

FIFTY MILLION DOLLARS will have been spent on improving Canada's highways, many of which are of the asphaltic or resilient types, when the five-year period terminates in the fall of 1923, according to reports received by A. W. Campbell, Dominion Commissioner of Highways. Of this total $20,000,000 will have been appropriated by the Dominion Government and the remainder by the different provinces. Of the Dominion sum there is yet $800,000 to be taken up by the provinces.

Agreements have already been entered into by the Province of Ontario calling for an expenditure of $12,500,000 by the end of 1923, of which sum $5,000,000 is the Dominion share.

The New Brunswick Government now has all of its appropriation of $3,000,000 under agreement, the Dominion Government contributing $1,200,000. A total of 1595 miles of highways are scheduled for improvement.

Alberta, the last province to take part in the Dominion highway scheme, has just filed for approval plans for road improvement under the Canada Highways Act. All of the provinces are now working under the general regulations provided by this act, and the work throughout the provinces is being carried out in accordance with uniform standard specifications.



Proposed Standards for Electric Units

Prominent Engineers Discuss Tentative Standards Under Consideration by Automotive Electric Association

Editor, AUTOMOTIVE INDUSTRIES:

I have read with great interest your report of the Old Orchard meeting of the Automotive Electric Association.

It is hoped that the publishing of the proposed standards on generator ratings will draw constructive criticism from all those interested, so that when the Association finally adopts the generator and motor ratings which are to be followed, they will be standards in every sense of the word.

Last spring, before the meeting of this committee at White Sulphur Springs in June, the entire industry was circularized by S.A.E. headquarters as to the use of generator and motor mountings which are now in the S.A.E. Handbook as standards, and it was found that the use of these standards was a surprisingly low per cent of total. It is believed that after the A.E.A. Standardization Committee has had a chance to consider and digest the report of the S.A.E. Standards Committee, that a joint conference of our Standards Committee with the S.A.E. and executives and engineers of car manufacturers will prove of great value in determining what is to be done with standard methods of mounting motors and generators.

It is of interest to remember that the very first electrical standard adopted by the S.A.E. is still in use substantially unchanged. I refer to mounting dimensions for magnetos.

So far as I can see, there is no reason why standards cannot be adopted for at least 75 per cent of total production. I sincerely hope that your journal will continue to give publicity to these matters in order that the greatest good may be derived therefrom.

A. D. T. LIBBY,
President, Automotive Electric Association, and
Patent Counsel, Splitdorf Electrical Co.

Editor, AUTOMOTIVE INDUSTRIES:

I have given careful consideration to your article on the standardization program of the Automotive Electric Association and offer the following comments regarding the proposed standardization of generators and starting motors.

In order to arrive at a set of standards on electrical units which will be of mutual advantage to the automobile manufacturer and the producer of the electrical equipment, it would appear to be necessary to formulate a set of skeleton specifications which would insure not merely a satisfactory bench performance but also good service in the hands of the user. That is to say, I would like to feel (assuming that this proposition goes through) if I was approached by different manufacturers with a view to purchasing, say, their No. 2 S. A. E. standard generator, that these generators would give something like the same result in respect to such important factors as heating and brush life. I realize, of course, that, in formulating standards, it is desirable to make them as broad as possible, but it is also highly desirable to impose such restrictions as will prevent one manufacturer obtaining an unfair advantage over another due to the absence of such a controlling specification, for example, as would cover the temperature rise of the generator. I would, therefore, suggest that the standards include some reference to temperature rise for all sizes and, if possible, some reference to minimum brush life which, to my mind, should be in the neighborhood of 25,000 miles.

As regards the proposed standards on starting motors, the chief obstacle, to my mind, is represented by differences in pinion sizes recommended by different manufacturers. In other words, a starting motor with a 10-tooth pinion and a 10 foot-pounds stall torque should be just as satisfactory as a starting motor with a 12-tooth pinion and a 12 foot-pounds stall torque. It would appear to be detrimental to progress to standardize on any minimum number of teeth in the pinion for each size of starting motor, so this leads to my conclusion that for the present it might be more desirable to merely standardize on a set number of starting motors to cover the range of engine sizes in common use. For example, some such schedule as follows:

No. 1—up to 180 cu. in.
No. 2—180 to 300 cu. in.
No. 3—300 to 500 cu. in.
No. 4—500 to 1000 cu. in.
No. 5—1000 to 1500 cu. in.

Of course, these different classes would overlap, to a certain extent, depending upon the number of cylinders and many other considerations.

I believe that all efforts toward standardization along the proposed lines are highly commendable and I will look forward with considerable interest to the further progress of this work.

J. G. VINCENT, Vice-President of Engineering,
Packard Motor Car Co.

Ninety per cent of the farmers who responded to a survey made by the United States Department of Agriculture state that the factor of time saving is the greatest advantage of trucks over horse-drawn vehicles. Even on short hauls the motor truck requires only about half the time needed to make the same trip by wagon.

Automotive Industry Can Avoid Ills of Secondary Inflation

Conservative expansion policy essential to sound progress. Limit plant expansions to demands of normal growth curve. General deflation not likely to be entirely completed within twelve years. Past deflation records worth serious study.

By Harry Tipper

BETWEEN the Civil War and the World War, industry in the United States had seen the greatest period of its development. It had become highly specialized, complicated, subdivided, so that nearly every product necessary to the individual was manufactured by a special industrial section, with its complicated process of manufacture and systems of distribution. In this matter of complication and interdependence, the industrial fabric of 1914 represented a greater development over the fabric of the Civil War, than that system represented over the beginning of the century.

The disturbance of war, therefore, profoundly affected the entire living of every family within the borders of the United States. The removal of men from the normal pursuits of industry for active warfare and the segregation of many more to the industrial necessities of war, made the normal life of the previous few years impossible. With such an interdependent system, every citizen was obliged to concentrate a part of his activity on war needs, whether consciously or otherwise. Consequently, the rise in values, owing to the scarcity of commodities, was sharper and continued for a longer period. Some check was placed on this during the war, so that the peak was not reached until the war had been over for two years.

Under these circumstances it is not likely that the deflation processes will be less difficult, or occupy less time than the twelve years required after the Civil War. The disturbance was profound; it involved the national and the important international developments of industry. It carried with it political changes far more important than the previous conflicts, and it affected the activities of a large part of the population to such a degree that the results will be many years in accumulating.

The deflation processes, therefore, are likely to occupy some years and to be separated by periods of secondary inflation. If they follow the conditions to be observed after the Civil War, they will require a much longer time for their final settlement and they will be divided into a larger number of periods, with the intermediate inflation separating these periods from each other.

The deflation which began in the latter part of 1920 has carried us only about a third of the way down the path up which we climbed so rapidly in the rush of war necessities. This period is almost over. In some lines of industry it is over. In other lines it must continue for several months at least before it can be considered as finished. It is obvious, however, that this period has not completed the process of deflation and that further struggles are before us, unless the entire lesson of previous history during the mechanical age is of no moment.

The automotive business suffered less from inflation than many other lines.

This was because it had not reached the same stage of development and was less affected by the immediate economic changes. The unit system of self-propelled transportation was so important a necessity to our business and social life that it was still in the absorption stage of growth when the war developments came along. Its activities in the war, therefore, delayed the process but did not lead to any such abnormal development of production as affected some other manufacturing industries.

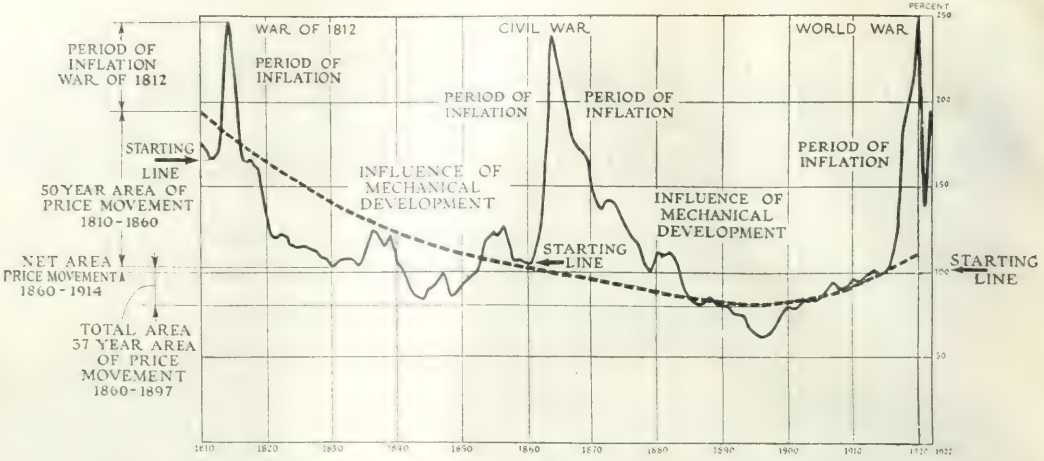
Business men have been unable to understand the vitality of the automotive business during the period of depression, when many other lines of industry were virtually at a standstill. They are similarly confused by its rapid resumption of capacity business, while they are having a difficult time to keep themselves intact during the doubtful hand-to-mouth business which still obtains with them. The reasons for this condition are plain, if the economic situation affecting the business is thoroughly understood.

This makes it all the more important for the automotive manufacturer to study the reasons and to be sufficiently familiar with the surrounding business conditions so that he will not be misled by the buoyancy of this industry into thinking that it is not subject to the same economic laws as other lines.

PRESENT business conditions bring to mind the advice given one time by a very shrewd and successful Scotch business man. Discussing expansion plans he remarked:

"It is well to figure pessimistically and then act optimistically and courageously on the basis of the calculations."

The automotive industry has an opportunity to escape from some of the worst effects of the deflation process, if it does its figuring conservatively and acts without hesitation after the figuring has been completed.



A century of price cycles

There need be no secondary inflation in the automotive business, following this period of deflation, unless the automotive manufacturer is hurried into extensions of production, which are not justified by the circumstances and are brought about by confining his examination to the comparative condition of this industry during the last two years.

The present shortage in manufacturing facilities, which makes it impossible to deliver automotive products on time to the user, may be due to a manufacturing capacity too small for the permanent normal requirement. The present situation does not, however, indicate such a condition.

Undoubtedly, the market for automotive products will be generally upward for some years as yet, and in the course of time many additions will be necessary to secure the full production requirement. The probable imminence of a period of secondary inflation generally in industry in this country would argue the wisdom of limiting extensions to such absolutely necessary developments as are well within the normal curve of requirement.

The area of most intense competition occurs when the production capacity is somewhat larger than the immediate requirements of the market. The automotive industry has escaped a large part of this competitive difficulty, and it will be possible to continue without inviting that necessity if extensions in production capacity are considered with thorough conservatism.

In the Dec. 1, 1921, issue of AUTOMOTIVE INDUSTRIES there was published a chart showing the changes in wholesale commodity prices for somewhat over a century. At the time this chart was used to suggest the increasing importance of marketing and distribution costs. The same chart is used in this article because of its significance in the examination of the factors of inflation and deflation.

Deflation After 1812

This chart includes the period of the War of 1812, the Civil War and the World War to the summit of the inflation peak. By an examination of the inflation and deflation processes, it is possible to get some idea of the conditions which will obtain in all probability in this period.

The War of 1812 shows a very rapid inflation to about 1814 and an equally rapid deflation ending about 1816. There was only one period of deflation which occupied a very short time and which brought the general price average down to the prices obtaining before the period of inflation induced by the war. From that time the action of prices was governed by the movements of industry in its economic development.

The Civil War shows an entirely different condition in the progress of the inflation and the length of time involved in the deflation process. The length of the inflation line is twice that of the previous war; it reaches its culminating point at the end of the war or somewhat thereafter, and the line of deflation is broken by secondary periods of inflation, so that it occupies a number of years. There was a sharp deflation in the period from 1865 to 1868, followed by a year and a half of almost stationary conditions, another period of deflation ending in 1872, a year and a half of secondary inflation and a further drop completing the process by about 1877.

Economic System Simple

The War of 1812 affected the industrial fabric of that time, so that the period of inflation caused by the emergencies of the war lasted about the same length as the period of deflation occasioned by the return to peace. The machinery of manufacture and distribution was simple, the average community almost self-supporting, consequently the disturbance caused by the war was eliminated with the same ease that it was accumulated. There was no long period of adjustment with its difficulties and dangers to the individual business man. When the hazards of war were removed and the population returned to peaceful pursuits the lack of product and the damage to the system were repaired within the same period and with no after effects.

After the War of 1812, the complication of the machinery of manufacture began. The steam engine in the mill, the railroad train and the steamboat made a revolution in the industrial processes which had secured a fair start before the Civil War again disturbed the machinery of commerce. The community life had begun to change in response to that development. The various communities were no longer almost self-supporting. From the older industrial country of Great Britain manufactured commodities were beginning to take the place of the home-made variety. The production of food, the development of raw materials and the transportation of commodities was taking on a more highly specialized form.

Consequently the disturbance caused by the Civil War resulted in an entirely different condition of inflation and

deflation. The war emergencies affected more deeply and more seriously the life of all communities. The removal of large areas of land and great armies of men from the ordinary work of the specialized occupations left these activities without any possibility of immediate recovery. The products for the use of the civil population became scarcer, the line of inflation rose more sharply and to a greater degree from the average previous level.

A similar situation confronted the country after the war was over. The more complicated machinery of industry could not be repaired and made effective as readily. The man power could not be distributed so as to bring back an equilibrium as quickly. When industry did settle down, whole areas had changed in their potentiality and possibilities. The period of deflation was longer, broken into three distinct parts with secondary inflations, occupying from one to two years each.

The difference could be illustrated by the effect of a strike at this time and one in any fabricating area in the early part of the nineteenth century. The grim possibilities involved in the recent strike of the coal men are sufficiently in mind to need no emphasis. The whole industrial fabric of the country was on the verge of stagnation, the whole social life near disaster when the strike was settled. If the strike had been continued much longer the hardships involved would have affected the whole country and taxed the ingenuity of the best minds to avert. In the early part of the nineteenth century, when every fabricating area secured its own fuel at its doors, no such result was possible. Each area was almost independent of the other, and any dispute or disturbance was confined within the actual area of that disturbance, without materially affecting the conditions in any other part of the country.

The chart will show that the war just over produced a longer and sharper line of inflation than either of the other conflicts included in its consideration.

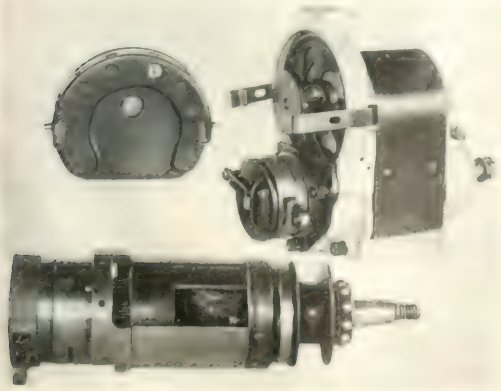
A New Magneto for Six-Cylinder Engines

A NEW high tension magneto for six-cylinder engines, which weighs only $10\frac{1}{4}$ lb., is now being marketed in this country by the Robert Bosch Magneto Co. It is known as type ZH6 and was designed originally for use on aircraft engines, but is well suited for other automotive applications, especially in the passenger field.

Aside from its compact design, the feature of particular interest which differentiates this magneto from others of the same make is the use of a magnet field sleeve which is attached to and moves with the interrupter housing. This sleeve is interposed between the field magnets and the armature, and being made of magnetic material, so diverts the magnetic field as to give approximately the same flux and consequently the same spark intensity throughout the timing range, which in this instrument is 40 deg.

In general construction the magneto follows that of other products of the same make. The breaker design is the same as that used for many years. No die-castings are employed. The base is an aluminum forging and is smaller than the S. A. E. standard base, although the magneto can be mounted on the same brackets by drilling two extra holes or using only the two bolt holes nearest the tapered shaft end, since these holes are the same distance apart and the same distance from the end of the taper and the shaft height is the same as the S. A. E. standard. The taper on shaft end is 1 to 5.

The magneto is fitted with Norma ball bearings, one of which is carried within the magnet field sleeve. It is of waterproof construction and is said to be the smallest magneto made to-day for six-cylinder engines.



New Robert Bosch magneto showing the field sleeve which surrounds the armature

Cut-Throat Competition of British Air Lines to Cease

A NEW subsidy scheme for Continental air services worked by British companies has been evolved by the Air Ministry whereby it hopes (1) to put these services on a paying basis when assisted by the subsidy allowances, (2) to encourage the extension of traffic, and (3) to cause British services to penetrate farther afield. It has decreed that unprofitable competition shall cease between the various British companies, and has decided that in future each one shall be allowed to operate only on a specified service.

Thus, instead of three British companies working the London-Paris service there will be one only, the other two being allocated respectively to the London-Brussels-Cologne route and to a new service from London to Berlin via Amsterdam and Bremen. This arrangement will come in force almost immediately and will be supplemented early next year, it is expected, by a service to be run by a new company from London to Southampton, Cherbourg and the Channel Islands.

The Air Ministry announces that the total amount of the annual subsidy will be as hitherto, viz., £200,000, but that the basis of payment will be changed. Up to the present each company has been given an amount equal to 25 per cent of its gross earnings, with additional payments for each passenger carried plus contributions toward insurance and the provision of aircraft. The new scheme provides for a limited cash payment in each case for the completion of a stipulated number of flights and contributions in cash or in kind toward the maintenance of a fleet of approved size and value.

The London-Paris service (225 miles) will in future be worked by Handley Page alone, except for the competition of French air lines; Instone will operate the London-Brussels route with an extension to Cologne (310 miles).

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The Beaten Bonus

PRESIDENT Harding's courageous veto of the soldiers' bonus bill has been given cordial approbation by the press generally and by business interests in particular. It is probable the measure would have had far fewer supporters in Congress had not the President announced months ago that he would not sign the bill unless it provided some acceptable means of raising the enormous sum needed.

By stating his determination in advance, the President made it possible for senators and representatives to give the impression that they were for the bonus, heart and soul, without committing the nation irretrievably to an expenditure which would be suicidal at this time. These members of Congress thought it was good politics to wrap the flag about them and thus win the soldier vote. The chances are, however, that Mr. Harding has won much more respect than they have.

This country is not so poor that it cannot afford to deal generously with the dependents of those who died on foreign soil and those whose earning capacity has shrunk seriously by reason of wounds or illness suffered in the service. There is no excuse for failure to be generous and the country will not tolerate a policy of penuriousness. But there is even less excuse for loading the nation at this time with a terrific burden of taxation for the benefit of those who do not actually need assistance.

It may as well be accepted as certain, however, that the bonus merely has been delayed and not defeated. Some such measure as that just defeated by the presidential veto will be passed sooner or later. But unless some new emergency arises every year of delay will make it less burdensome when it comes.

Cooling Ideals

THE ideal of internal combustion engine cooling is to do away altogether with the need for thus wasting heat. Every particle of energy that goes into cooling air is waste that can never be recovered. The use of higher compressions and, in general, the obtaining of more power from a given piston displacement usually goes hand in hand with improved efficiency of combustion which means less waste.

The ideal is probably unattainable, but progress in its direction may be made; meanwhile there will be increasing competition between the different methods of getting rid of such heat as must be dissipated.

It has never yet been decided how hot an engine cylinder should be for maximum economy, assuming equality in all other respects. The true temperatures of a few engines have been measured, data on air-cooled engines being particularly meager. One thing is clear and outstanding, that whatever temperature is ideal that temperature we should have all the time with perfect automatic regulation of the cooling in proportion to the power output.

At the moment the attainment of really constant conditions appears to be far easier with a steam or vapor system than with any other and to be especially difficult with direct air cooling. A fairly long course of experiment with steam systems under pressure ought to give conclusive data as to the effect of definite degrees of heat above 212 deg. Fahr. Of course such data is not obtainable by simply adapting steam cooling to an engine designed for water, but with it a whole engine could be laid out for a jacket temperature of 250 deg. Fahr. or 300 deg. or what you will.

In developing air-cooled engines the principal difficulty has been in the elimination of hot spots rather than in the temperature mean throughout the cylinder and considerable irregularities probably exist in the best air-cooled engines. Experiment with some gaseous or fluid medium giving even and exactly controllable temperature ought to be valuable in air-cooling design and it is sincerely to be hoped that steam-cooling experiments will give us this data.

In any case the advantages of steam cooling should not be overlooked.

An Opportunity for Truck Transport

By JAMES DALTON

AN exact counterpart of the conditions which resulted in the first real development of highway transport will prevail in the United States in the next few weeks. How long these conditions will continue cannot be determined at this time, but there is little doubt that their duration will be long enough to broaden still further the permanent use of the motor vehicle as a means of transportation.

It should be remembered that the motor truck has been an important element in transportation for only about six years. It owes its present position to the railroads which were unable to handle the enormous volume of freight offered them during the boom from 1917 to 1920.

When railroad congestion became so acute that they declared embargoes and were blockaded for weeks at a time, manufacturers saw they would have to find some new means of transportation or close their plants. They found the answer in motor trucks but expected their use to be only a temporary expedient. These vehicles met the emergency so well, however, that use of them was continued when the railroads finally cleared up the traffic jam after depression strucy the country in 1920.

Merchants and farmers found trucks as necessary as did the manufacturers. They employed them to move merchandise and foodstuffs with such good results that they have continued to use the highways for short haul, less than carload lot shipments.

A. J. Brosseau, a director of the National Automobile Chamber of Commerce, and president of Mack Trucks, Inc., made a prophetic statement in an address before the Shippers' Conference of Greater New York on Jan. 10 last, when he said:

"As you all know, business has been poor for the past year and the railroads can handle all the traffic that offers. We are asked if the railroads are now helped by the motor truck. My answer is 'yes,' for business is going to be good in the near future and, when it is, the railroads will again be unable to handle the traffic. We shall then have delayed shipments, embargoes, blockades and the truck will again save the situation for the railroads and the public. It may also save the railroads from the fate they so narrowly escaped during the last traffic jam—permanent government ownership."

The situation forecast by Brosseau more than eight months ago has arrived. The carriers are getting into a terrible tangle. With a winter chill in the air and coal pockets almost empty, miles of loaded coal cars are standing in railroad yards because there are no locomotives to move them. Rolling stock, already badly worn, is in worse condition than ever because of the shopmen's strike. When the roads are paying refunds every day to passengers on their excess fare trains which are continually running late because of engine trouble, there's no blinking the fact that their motive power is in a bad way.

Freight car loadings, even with the coal movement not yet normal, have reached record proportions. The carriers are doing the best they can under difficult circumstances, but winter is approaching and operating conditions soon will be more difficult. The time is already here when almost a third of the steam generated by locomotives must be used to heat passenger trains.

The consequence will be that manufacturing and mercantile operations must be curtailed unless some auxiliary means of transportation can be found. Resourceful American business men are not going to slow down their business when their order books are full, if they can help it. They have learned that they can rely on trucks in almost all kinds of weather and the tonnage trucked will increase steadily from this time until the railroads straighten themselves out.

Even the carriers' executives will admit, privately, that the carrying capacity of the roads is not great enough to meet the demands of American business in a period of normal prosperity. Even with increased earnings, it would take them a long time to equip themselves with the rolling stock they need.

When that time comes, the motor truck will be so firmly established in the short haul field that it cannot be injured seriously by any propaganda that may be directed against it.

After all, the public and not the motor truck owner or the railroad will determine ultimately how far highway transport is to be developed.

Factory Operations Exceeding Last Year

Various Factors, However, May Keep September from Reaching August Record

NEW YORK, Sept. 25—With a further marked awakening of interest on the part of the farmer, the demand for automobiles, while showing a slight decline in cities, is taking a perceptible swing upward in the agricultural districts. Improvement of general business conditions is equalizing the demand for motor trucks, dealers availing themselves of it as well as beginning to realize on the potential market the farmer offers.

Agricultural interest is most in evidence at the state fairs now in progress in many sections of the country and forms a good barometer of what the industry may expect during the coming months.

Output 25 Per Cent Better

Present indications that September is keeping up with the steady pace maintained since early spring may upset predictions that this month will show the seasonal falling off in sales, as a whole, and with it a consequent curtailment of factory schedules. The first week of the month, for which reports have been received, shows a surprisingly good production record with an output from 25 to 30 per cent greater than for the similar period a year ago. Final reports may show that this percentage of gain has been continued through the entire month.

Although Ford closed his factories for a brief period, all other manufacturers are maintaining production at a high level. Securing coal has not been so serious a deterrent to producers in maintaining capacity schedules as has been the difficulty in getting through steel shipments. Up to this time, however, tie-ups that have come in steel deliveries have been merely temporary and not such as to cause deep concern.

Coal Situation Easier

Several factors will combine to keep production from reaching the high mark attained in August. A short month, the cessation of work over Labor Day and the few days' closing of the Ford plants will effect a reduction in the total output for the month.

A further easing up in the coal situation through the order of the Interstate Commerce Commission abolishing priorities will place the industry in less danger of having to curtail their programs through lack of fuel.

Business in Brief

There are several contributing factors to the noticeable improvement in business generally—strike settlements, cooler weather, the passing of the tariff bill and activity in building. Retail trade and industry both are more active than they have been for some time.

Grain prices have reached the highest level of the month, while there have been several advances in many commodities. Buying at wholesale has been conservative, while some retailers doubt their ability to obtain the higher prices asked in their lines.

Car shortages have hampered coal production and lumber shipments. This is noticeable in the failure of the weekly soft coal output to top 10,000,000 tons, even after three weeks of peace in the labor world.

Buying has been stimulated in steel by the prospects of higher prices, although steel prices are steady and pig iron is higher on the whole.

Frost has not touched the corn crop, but it has been hurt by past heat and drought. Cotton estimates tend downward. Central Illinois reports a large part of the fall plowing done because of a good rain, while the seeding of wheat in the Southwest will be late. The Central West promises an increased acreage.

Car loadings for the week ended Sept. 9 totaled 832,744 cars, a decrease of 98,854. This is 83,192 ahead of the same week last year.

The war scare depressed the stock market. Bonds were irregular but money was firmer, with European exchanges recovering.

Bank clearings for the week ended Sept. 21 aggregated $7,453,174,000, a gain of 13.2 per cent over last week and of 13 per cent over this week last year.

Adding to Lincoln Plant to Increase Production

DETROIT, Sept. 25—Work has been started on a large addition to the Lincoln plant of Ford Motor Co. which is declared to be designed to meet the needs of Lincoln manufacturing. The new building will make possible a large increase in production, but details as to how large this might be were declined. The question if it would reach 100 a day was met with the statement that definite totals could not be told at this time.

In addition to providing for more production, the new plant will take care of a lot of manufacturing which is now being done by outside companies. In this will be included some of the body work, but it was not declared to what extent the company would go in building its own bodies.

Mason Tire Will Ask New Issue of Bonds

To Submit Plan to Stockholders —Refinancing Follows Increased Business

AKRON, Sept. 27—Stockholders of the Mason Tire & Rubber Co. of Kent will have submitted to them for their ratification at a special meeting on Oct. 17 a complete refinancing program which will include issuance of $2,000,000 in first mortgage bonds.

The financing measures contemplated are not for the purpose of getting the company out of hot water and of extricating it from financial difficulties, it is explained by President O. M. Mason, but the company has experienced so healthy a growth during the past few years that new funds are imperative at once to permit a substantial increase in production in order to fill orders without unnecessary delay.

Will Finance Owen Plant

The Mason company recently purchased the plant of the Owen Tire & Rubber Co. at Bedford, near Kent, and now is in production there at the rate of 500 tires daily. Funds derived from the refinancing measures which stockholders are expecting to ratify without a dissenting vote, will be used to complete the financing of the Owen plant, and to increase production there to 1500 tires a day so as to give the Mason company a total daily production of 6000 tire casings.

The capital stock of the company will be increased from 150,000 to 350,000 shares of no par value stock. Part of the funds from the refinancing program will also be used to refund $540,000 worth of outstanding seven per cent serial notes.

Need for additional capital with which to expand is seen, according to President Mason, in the fact that the company in the past three years has tripled its tire production with sales now averaging more than $1,000,000 a month.

Steady Growth of Business

The Mason company was incorporated in 1915. At the close of the second year it had done a business of $1,213,859 for the 12 month period. This was increased to $2,324,144 in 1918 and to $3,464,859 in 1919. The company's business grew rapidly in 1920, approximating $7,150,000 for the year. In 1921 the company reported sales of more than $9,000,000 and net earnings of $600,000.

The company's last annual financial statement showed cash on hand of $240,000, accounts and notes receivable of $1,071,767, inventory of $1,363,458, and plant accounts of $3,395,000. Liabilities listed included accounts and notes payable of $774,619, preferred stock amounting to $6,128,990 reserves of $115,882, serial notes amounting to $595,000, and minor liabilities of less than $100,000.

Chevrolet Will Use Plant at Janesville

Only Part to Be Occupied by Unit —Samson Manufacture to Continue

MILWAUKEE, Sept. 25—General Motors Corp. decided to employ part of the unused capacity of its mammoth Samson tractor plant in Janesville, Wis., to relieve the pressure upon the present facilities of the Chevrolet division at Flint, Mich., and elsewhere.

The Janesville plant, erected during the last four or five years, consists of vast areas for manufacturing and assembling tractors and embraces also one of the largest foundries and steam generating plants in the United States. The project, already representing an estimated investment of nearly $5,000,000, was laid out to cover several more years of construction work, which was intermitted in 1920 because of the general business depression and the sharp decline in tractor trade.

While tractor business is now reviving in a most encouraging manner, the great capacity of the Janesville plant probably would not be fully occupied for some time to come, consequently General Motors will take advantage of the idle capacity by devoting it to Chevrolet production and distribution.

Forerunner of System

It is said that the prospective Janesville Chevrolet division will serve the Northwestern territory, and will be the forerunner of a probable system of branch assembling and distributing plants similar to that maintained by Ford. Chevrolet business has experienced a remarkable increase, especially in the past six to eight months, which demands a very material enlargement of production and more ample means of distribution as well.

In addition to the big machine shops, foundry and other buildings grouped at Janesville, the Samson tractor division of General Motors also owns a large malleable foundry at Waukesha, Wis., acquired at the time the new Janesville plant was being operated at the limit of its capacity on tractors, and construction work, although pushed with every means available, was not able to cope with the production schedules demanded by orders.

Therefore a going plant in proximity to the main works was purchased to get immediate supply of malleable castings. At the time, too, the Janesville plant was intending to engage in the manufacture of tractor implements on a large scale.

Tractors to Be Continued

DETROIT, Sept. 26—Location of a unit of the Chevrolet Motor Co. in a section of the plant of the Samson Tractor Co. at Janesville, Wis., will not have the effect of decreasing the tractor capacity of the Samson company, according to a statement by General Motors Corp. Chevrolet will take over some of the buildings formerly occupied by Samson and will erect additional buildings, but in giving up these plants Samson is moving into new buildings recently completed for its use.

Equipment and stock of the company will be moved from the present assembly building into the new foundry and implement plant. General Motors has no intention of quitting the tractor business, but is taking advantage of the present lull in this business to divert some of its facilities to taking care of the pressing needs of the Chevrolet company.

Farmers Need Cars but Will Be Governed in Buying by Prices of Crops

By HENRY KROHN

Vice-President in Charge of Sales, Paige-Detroit Motor Car Co., Jewett Motors

Detroit, Sept. 25.

THE farm market this fall is not going to run higher than twenty-five per cent of what had been anticipated earlier in the year, and the industry must continue to look to the industrial centers to supply most of the demand for the remainder of the year.

With dealer organizations in the larger cities continuing their sales efforts of the earlier part of the year, the industry should enjoy a very fair and reasonable business in the fall and winter. There is no reason to expect a continuance of the capacity business of the early year. On the contrary, business will taper off gradually until the beginning of the shows.

The farmer has failed to come into the market in anything like the numbers expected because fall prices for his crops have not justified immediate turnover and he is holding until spring. The farmer who normally could afford to buy a car this fall is the farmer who can afford to hold over. We have been advised that farmers in Minnesota have been quoted a price of 60 cents a bushel for wheat on the farm. Farmers can't sell at a price like this and buy cars.

In the fruit growing and lumber sections of the Northwest the railroad situation has stagnated business. Thousands of dollars worth of fruit have rotted for lack of transportation. No freight cars are available for moving lumber and the industry has been compelled to hold up operations until its needs can be met.

Business is showing much improvement in the cotton growing States where there has been a short crop but for which there was a stiffening in price which made it profitable to market. With the resumption of work in the coal mining districts there should be an increase in buying there, but most of the business will continue to come from the city centers and from the western coast.

Automobile credits are not satisfactory in the farming districts and will not be until the farmer sells his crops. Bankers are frowning upon loans to farmers for automobile purchases and are awaiting the liquidation of existing loans before they extend further credits. This situation will be corrected in the spring when the full volume of farmer buying comes through.

There is no question but that the farmer will buy cars, because investigation has shown that he needs them. If his prices are satisfactory he will buy the best car he can afford. If prices are low he will be compelled to hold his choice of cars to low priced ones. Cars now moving into the farm districts are only in from a fourth to a third the number that dealers estimated several months ago.

Used cars are not influencing the market for new cars. There are cases everywhere of dealers who are burdened with used cars but this is an individual matter. There is one aspect of the used car situation which aggravates it at this time of year, this being the tendency on the part of some part payment purchasers to lapse in their payments so that the dealer has to repossess the car and reimburse the finance company. To overcome this the dealer and the finance company should be more careful in extending credits to buyers.

ADDS ELEVEN RAIL CARS

CHICAGO, Sept. 25—The Chicago Great Western Railroad, already operating four gasoline motor driven trains, announces its intention of adding 11 more for daily runs of from 100 to 150 miles in Iowa.

Dunlop Plans Approved by Debenture Holders

LONDON, Sept. 14 (By Mail)—Plans for financing the American business of the Dunlop Rubber Co. are progressing most favorably and it is expected that within a few weeks enough money will be assured to enable the Dunlop Tire & Rubber Corp. of America to go ahead. A representative of the American banking interests is on his way to London to conclude the negotiations.

To accomplish this financing it was necessary to secure the consent of holders of £3,000,000 of debentures to the waiving of the stipulation that the unissued £3,000,000 of similar debentures should "only be used by the company as collateral for securing advances from, or liabilities, whether absolute or contingent, to its bankers." It was necessary to get 75 per cent of these stockholders. This has been done, holders of £2,500,000 having given their consent.

N.A.C.C. Would Halt Stolen Car Exports

Bauer to Appear Before Treasury Department for Bill of Lading Reform

NEW YORK, Sept. 25—Concerted action will be taken by the National Automobile Chamber of Commerce and the insurance companies to break up the practice of shipping stolen cars to foreign ports for resale. With this object in view G. F. Bauer, secretary of the foreign trade committee of the N. A. C. C., will appear before the customs officials of the Department of the Treasury at Washington next week in an effort to get government co-operation.

It is desired that the Treasury Department shall devise some method that will compel the identification of every car, new or old, that may be exported from this country. This can be brought about if the bill of lading contains engine numbers and other identifying characteristics of the car being shipped, such information being sent out to insurance companies, police departments and other interested parties. With this data the exportation of stolen cars could be practically stopped, it is believed. It also would enable the police to run down the shippers of such cars and aid in breaking up gangs.

At the present time it is claimed that many stolen cars are shipped abroad, mostly to Cuba and Mexico. When shipped out in boxes and crates, it is almost impossible to discover make, model or identifying numbers without opening the crate, which is not done now.

The National Automobile Chamber of Commerce is anxious to bring about this reform because it feels that these illegitimate sales in foreign countries give American cars a bad name, for in most cases the stolen cars are in poor mechanical shape. Such practices, it is felt, also hurt American export business. The N. A. C. C. also desires to protect the legitimate dealer as far as possible.

Miller Rubber Declares New Preferred Dividend

AKRON, Sept. 25—The Miller Rubber Co., after having paid its quarterly preferred dividend of two per cent on Sept. 15, has declared a similar preferred dividend payable Dec. 1 to stock of record Nov. 10.

In addition directors of the company have duplicated their action of September in declaring another 1 per cent dividend applicable to the deferred dividends on preferred stock. Miller, prior to resumption of preferred dividends, had deferred payment of six quarterly dividends, making 12 per cent in arrears. With the payment of 1 per cent in September and declaration of another 1 per cent payable in December on these deferred dividends, the company will only owe its preferred shareholders $10 a share.

Miller production is heavier than ever before in the company's history according to Jacob Pfeiffer, president, tire output exceeding 6500 casings a day.

William Pfeiffer, treasurer and general manager, sailed Sept. 22 for an extended survey of economic conditions in European countries.

LATVIA HAS $70,000 FOR TRACTOR BUYING

WASHINGTON, Sept. 26 — Trials of tractors, among them being four of American make, has convinced the Latvian Government that they are of special value in plowing the devastated districts and fields in many instances overgrown by underbrush. It is estimated that there are more than 1,000,000 acres of such fields on which tractors might be used to great advantage. The shortage of horses also makes the use of tractors particularly advantageous.

The Government, according to Consul John P. Hurley, Riga, Latvia, in a report to the Department of Commerce, announces that it proposes to spend 17,000,000 rubles or the equivalent of $70,000 in the purchase of tractors. A demonstration of four machines from America, four from Germany, and one each from England, Finland, Sweden and Italy has been held. All of the machines, except the "Kosts," were kerosene burners.

Maker of "Accuratime" to Enter Piston Field

MUSKEGON, MICH., Sept. 25—The Muskegon Motor Specialties Co., which for some time has been exclusive manufacturer of camshafts under the trademark "Accuratime," is about to enter the piston field. This company will specialize on lightweight, cast-iron pistons.

According to F. C. Whitney, general manager, an investigation of the field has been made showing that several manufacturers are buying piston castings at one point and shipping to another point for machining and then reshipping the finished products for assembly in the engine.

The pistons will be both cast and machined in Muskegon, and this centralization, it is claimed, will result in a considerable saving in freight and, consequently, handling costs to the engine manufacturer.

The Muskegon company has about completed its tooling operations for production and will be turning out pistons by Oct. 1. The sales will be directed by A. W. Lines, who, for the past three years has been sales manager of the Spencer-Smith Machine Co., Howell, Mich. Carl Kopanka will have charge of manufacturing.

Material for Cars Ordered Far Ahead

Manufacturers Seek to Escape Effects of Expected Transportation Shortage

NEW YORK, Sept. 25—Manufacturing activities among the makers of parts and accessories continue at a pace that surprises even the optimists. In many cases September business is better even than August and there seems to be no immediate lull in sight.

Business is, in fact, much better than had been expected for this time of the year and the parts makers are gratified with the volume. Few complain of a let-up in orders and most of them say that passenger car makers are ordering for longer periods, whereas formerly they contented themselves with buying as they needed the materials for immediate manufacturing. In several instances these orders which are now coming in extend well into next year.

There are some who say that this exceptional fall activity is caused by car manufacturers expecting a transportation shortage later on and so are loading their shelves with materials in order to get by this period of inactivity. There seems to be a well grounded fear that the country is in for a bad spell with the railroads.

Immediately ahead there promises to be such a shortage of freight cars that the automobile industry is taking every precaution possible to offset its ill effects. Crop movements require the use of so many freight cars that industry as a whole will feel the effects of it and when the weather turns it is feared the railroads will be greatly handicapped.

New Company to Build Ogren Car, Commander

NEW YORK, Sept. 25—The Commander Motors Corp., with headquarters at 49 Wall Street and a factory in Chicago, is the successor to the H. W. O. Motors Corp. of Chicago. It will build the Commander, a $5,000 car designed by Hugo W. Ogren, at one time head of the Ogren Motors Co. of Milwaukee.

The officers of the new company are: Charles H. Wilcox, president; Nicholas Schmidt, vice-president; Hugo W. Ogren, vice-president and general manager, and Sidney R. Flett, secretary-treasurer. K. W. Zoeller is sales director.

The company is capitalized at $2,000,000, all common stock, of which $1,500,000 has been placed on the market. C. F. Buman & Co., who are financing the proposition, claim to have placed $250,000 of this with which manufacturing operations will start.

The Milwaukee plant will be used until the factory at Chicago, occupying 40,000 sq. ft., is completed. It is expected that the Chicago works will be in operation by the middle of November.

Milwaukee Reports Much New Business

Will Keep Factories Busy for Month or Two—Plants Keep at Capacity

MILWAUKEE, Sept. 25—Production of passenger cars in Milwaukee and neighboring centers is going forward practically at the capacity of factories reached at the height of the season, the high rate being required to fill orders already on the books and current requisitions from distributors and dealers. Most factories have not yet caught up with dealers' orders, although this refers mainly to closed types. New business is coming at a rate to keep factories busy from 30 to 60 days forward, and with another good month for retail selling in the foreground, it is believed that this condition will obtain until the holiday vacations.

Peak Not Previously Reached

In the case of several factories not the maximum capacity was employed at the peak of the early summer rush, due to a number of reasons. One is that competent labor was not available up to capacity, and another is that some were satisfied to keep inventories well balanced to avoid a possible contingency of a sharp let-up, which has occurred in the past, but fortunately was not the case this year. Such factories, however, have been able not only to maintain their peak forces of this year, but many of them have been adding men as competent help was available.

Manufacturers of parts and equipment as a rule are sustaining production at the recent high point. Makers of equipment for the jobbing trade are busy filling current orders and are not able to make much headway on reserves for winter and spring deliveries, booked or in prospect.

Tractor Trade Improves

Tractor business is steadily coming back to a more nearly normal basis. The John Lauson Manufacturing Co. at New Holstein, Wis., for instance, is now employing over 200 men on tractors and farm gas engines to fill orders actually on the books. Lauson distributors in various parts of the country report business improving rapidly and the outlook good.

Tire factories during the past month increased operations about 10 per cent on the basis of an increase of 15 per cent in volume of sales within the same period.

The virtual end of the railroad shop crafts strike, with which reference to Milwaukee has resulted in manning the large shops to normal, together with the previous cessation of labor hostilities in the coal mines, is slowly showing a beneficial effect, although it will take some time for railroads to get back into their accustomed swing, and for the coal movement to grow to reasonable proportions. In any event Milwaukee, the principal distribution point for coal to the Northwest, will be far short of requirements, for it is a physical impossibility to bring the movement, in the time available for Great Lakes shipping, to a point where the sharp falling-off during the strike period is compensated for.

Milwaukee industries, however, do not believe they are going to suffer radically during the coming winter. The anthracite shortage will be by far the worst evil. Hydroelectric power, supplementing steam generation, is available in fairly liberal quantities; in fact, a great many of the shops making automotive parts and equipment are and have been buying current, although some of the larger plants, of course, maintain their own plants for power and heating.

Although the matter of retail passenger car trade some time ago underwent a conversion from filling a demand to that of selling merchandise, the sales volume so far in September has been relatively excellent.

CLEVELAND EXPECTS COAL TO BE CHEAPER

CLEVELAND, Sept. 25—Automobile manufacturers in this city have taken a prominent part in bringing down the price of coal at the mines in Ohio from $6 and $7 a ton, when the strike of miners ended, to $4 and $4.25 per ton. A lower price is expected.

Cleveland's largest automobile factories are not dependent on coal for fuel. They purchase electric power. All of them require coal for heating plants, but they are so situated they can wait for a lower market.

Steady Demand Will Keep C. G. Spring at Capacity

KALAMAZOO, MICH., Sept. 25—With several hundreds of thousands of dollars in orders booked and a large number of inquiries daily, the C. G. Spring Co. expects the satisfactory rounding out of a busy and prosperous year. The Kalamazoo plant will be required to operate steadily at full capacity to keep up with the demand for bumpers.

This condition was disclosed at a conference of branch managers, in charge of Christian Girl and Fred A. Cornell, new sales manager of the company, who resigned as branch manager of the Studebaker Corp. at Omaha, to accept the local position.

Girl reported that the largest individual contract held during 1921 to 1922, and amounting to over $350,000, has been renewed for another two years, with the announcement that it will likely run to over $500,000 annually. In addition the C. G. Spring Co. also has several contracts with some of the largest producing companies in America.

Indianapolis Plants Moving on Up Grade

All Manufacturers Increase Production—Scarcity of Labor Still Experienced

INDIANAPOLIS, Sept. 23—September promises to be the best production month in the motor car field that Indianapolis has had this year. Practically every local plant is increasing production, adding to its force of laborers and making larger shipments than has been the rule up to this time.

Marmon is about at the best production and shipment records of the year. Stutz is increasing rapidly and hopes to be at maximum production within thirty days. Cole's August record which was far ahead of anything the plant had done during 1922 is being hard pushed.

Increases Personnel

National is increasing the personnel of the plant, and production is ahead of earlier records established during the summer. H. C. S. is also gaining, while Lafayette, which is to be moved from this city, has been increasing its employment rolls.

Earlier in the season one factory or two or three at a time made good records, but this is the first time when all the plants seem to be on the upgrade and shipping vehicles at a good pace. Difficulty in obtaining workmen in certain lines is being experienced in some plants, which adds its eloquent confirmation to better production all around. The labor shortage does not seem to be confined to this city, for several car and accessory plants in other parts of the State are advertising in local papers for additional men. Studebaker and Maxwell are prominent in this connection.

Oakland Motors Output Has Reached 150 Daily

PONTIAC, MICH., Sept. 23—In spite of some difficulties with transportation and securing supplies of materials, the Oakland Motor Car Co. has been increasing its schedule this month and reached the 150 daily output point within the past week. The output of both open and closed jobs is being raised to meet orders on hand. A comfortable margin of orders ahead is reported, although no effort has been made to get business beyond a 30 day delivery period.

Coal supplies have not bothered the plant particularly and no danger of a shutdown on that score has threatened since the settlement of the strikes. There is no likelihood of any tie-up unless there should be unexpected difficulty in transportation. Restoration of full passenger service on the Grand Trunk lines entering Pontiac is taken as a hopeful sign with regard to freight transportation also.

Profit on Each Ford Sold Placed at $100

Daily Earnings Estimated at $500,000—Cash in Bank Totals $180,000,000

NEW YORK, Sept. 25—An analysis of the Ford Motor Co., made by Dow, Jones & Co., has been circulated in the financial district, showing that Henry Ford earns $500,000 daily. With $180,000,000 in cash, Ford's fortune is the greatest in the world, it is pointed out, and he is the largest individual banker in America. The statement claims that the Ford company could be capitalized at $2,000,000,000 and pay 5 per cent. For 1922 it is predicted Ford's profits will be $125,000,000, and it is said a profit of $100 is realized on each car sold.

Continuing, the statement says in part:

In his newspaper interviews Ford says Wall Street and the gold standard have outlived their usefulness, but his millions flow through Wall Street at 4 per cent to bring his company a possible $7,200,000 gold standard money annually in interest. This is more than $6 for every car he produces.

His replacement parts business is so profitable that he could chop off his manufacturing profit of probably $80 a car and make more than $15,000,000 annually or more than $14 on each car produced from the sale of parts necessary to keep the millions of Fords now on the roads in running condition.

D. T. & I. Operates at Loss

DETROIT, Sept. 26—The Detroit, Toledo & Ironton, Ford's railroad, showed a net operating loss of $16,367 for July. This is the second deficit incurred within eight months. Gross operating revenues fell ten per cent from June.

This slump cannot be laid to the shopmen's strike because the management had an individual agreement with the employees. It appears rather that when maintenance expenses should have been high they were reduced and consequently equipment and way required repairs. Equipment expenses increased nearly 200 per cent over 1921 in May, more than 150 per cent in June and 175 per cent in July.

Gill Battery Co. Handles Sales on Pacific Coast

SAN FRANCISCO, Sept. 25—The Gill Storage Battery Co. with factory and general office at San Bernardino, Cal., has awarded the rights to manufacture and distribute the battery in the Pacific Coast territory to a newly formed corporation, the Gill Battery Co. of California.

The new company, which is capitalized at $1,000,000, will erect a modern factory at Oakland, the plant to be in operation probably in the early part of 1923. The original company will continue to operate from San Bernardino and handle its business in states outside of the limits outlined for the coast corporation, which include California, Oregon, Washington, Nevada, Utah, Idaho, Arizona, Hawaiian Islands and Mexico.

The Gill Battery Co. is formed for the purpose of pushing the product on the Pacific Coast where its efforts will be concentrated. A development of the future will be the placing of plants in the East and in Canada, where the original company also has patent rights.

J. & B. Injunction Suit Against Rico Settled

PITTSFIELD, MASS., Sept. 25—A bill of stipulations has been filed in Superior Court here in the case of the J. & B. Manufacturing Co., against the Rico Ignition Co., both of this city. Suit was brought to restrain the Rico company from advertising and selling a spark coil alleged to be so similar to a J. & B. product in appearance as to constitute unfair competition.

In the bill of stipulations it is agreed that Rico shall place distinctive markings on its product and paint it a different color. It is also stipulated that a bill dismissing the case without costs be entered and that charges made by plaintiff and respondent involving bad faith, unfair competition, and so forth, are withdrawn. It is understood that the final decree embodying the terms of this agreement will be entered shortly.

Rail Head Urges Roads Give Detroit Car Supply

DETROIT, Sept. 26—An appeal to "save the automobile industry and its workers" has been made to John C. Roth, director of the Interstate Commerce Commission, by Frank H. Alfred, president of the Pere Marquette Railway.

Alfred suggests that the railroads use automobile cars as far as possible for shipments to Michigan and thus make cars available for the automobile industry. He desires all carriers to use box cars, so that any surplus may be used by the industry which at present is suffering a shortage and may have to curtail production on that account.

The industry is entitled to every consideration possible without injustice to shipment of priorities, Alfred says, because that section of the country depends on the automobile business for its prosperity and will suffer greatly this winter if unemployment results.

COX BRASS GAINS

ALBANY, N. Y., Sept. 25—The Cox Brass Manufacturing Co. reports a 60 per cent increase in business during the year ended Aug. 1 in the sale of bumpers, mostly through dealers and distributors of passenger cars. Ground has recently been broken for an addition to the Albany plant, to be finished Jan. 1, which will double the capacity of that factory.

Additions also are being made to the Cleveland plant, largely increasing its production facilities. The Chicago service station has been enlarged and equipped to function as an assembling and finishing plant.

Attacked Industry, Now Seeks Its Help

Southern Pacific Railroad Petitions for Aid, Fearing Divorcement of Lines

LOS ANGELES, Sept. 21—A somewhat unusual situation has developed in this state due to an appeal being made by the Southern Pacific Railroad Co. to the various motor car dealers' associations asking that the latter, by resolution, go on record and support the petition of the Southern Pacific that action on the divorcement of the Southern Pacific and Central Pacific Lines ordered by the Supreme Court be held in abeyance until after the Interstate Commerce Commission shall have opportunity to hold another hearing.

Employees of the Southern Pacific Lines recently went on record as petitioning merchants of the state to refuse to patronize motor truck freight lines and to use their influence with the public as against patronizing motor stages. On protest of the motor car dealers, the Southern Pacific instructed its organized employees to withhold further agitation of their proposals.

Personal Appeal Made

The Southern Pacific Railroad is now, in its time of trouble, appealing to the motoring interest for help, when only a few weeks ago railroad employees were attacking the business of the motor industry.

D. W. Pontius, general manager of the Pacific Electric Railway, subsidiary of the Southern Pacific Railroad, appeared before the Motor Car Dealers Association of Los Angeles a few days ago and asked that body to lend its support to the railroad's plea. It is probable that in view of the changed conditions and the attitude of the railroad interests the dealers' association will accede to the request, but action was deferred until after such a time as opponents of the Southern Pacific's proposal can present their argument.

Hydro-United Resumes Following Court Action

PHILADELPHIA, Sept. 25—The Hydro United Tire Co. resumed operations to-day at Pottstown, according to Receivers John P. Hill and Ephraim Lederer. The resumption means a minimum production of 600 tires daily and employment of 300 men.

The United States District Court of the Eastern District of Pennsylvania previously granted a petition of the receivers, approving an agreement and stipulation between them and the National Iron Bank of Pottstown and its associates, whereby the bank will extend payment of $57,457 for a period of sixty days and likewise will grant an extension of the indebtedness of $140,000 for a period of ninety days.

Nobile to Supervise Goodyear Dirigible

Italy Grants Him Leave of Absence—Work on Ship Already Started at Akron

AKRON, Sept. 25—Umberto Nobile, Italy's leading aeronautical authority and the co-inventor of the semi-rigid type of lighter than air ship, will come to Akron, Oct. 1, to assist personally in supervising construction of America's largest semi-rigid dirigible, which will be built by the Goodyear Tire & Rubber Co. Nobile is managing director of the Italian government's aircraft factory near Rome and has been granted a three months' leave of absence to permit his work on the new American dirigible.

Will Be Mother Ship

Work on the new semi-rigid ship already has started at the Goodyear aeronautical factories. The ship will be the first "Mother" dirigible to be constructed in the world. It is given that name by reason of the fact that it is designed to carry airplanes which can take-off for flight from the mother ship while the big dirigible is in full flight itself.

The ship will be 300 feet long with a metal keel running the entire length of the gas bag. The envelope will have a capacity of 750,000 cubic feet of gas. The power cars containing the engines and propellers, and the navigator's car, will be suspended from the metal keel, with the huge bag attached to the keel at intervals of ten feet. Designers of the ship say it will be able to pick up or release airplanes while flying at full speed of seventy miles an hour. The ship will have a cruising radius of 4000 miles and will be the world's largest semi-rigid dirigible when completed.

Dirigible at Lakehurst

The only other larger American ship will be the rigid dirigible, the ZR-1, now being assembled at Lakehurst, N. J., for the U. S. Army. This ship will be 630 feet long and will contain twenty individual compartments for gas ballonets or containers. The containers will have a total capacity of 2,250,000 cubic feet of gas. They now are being made at the Goodyear factories here out of rubberized fabric and "goldbeater" skin linings. The largest of these ballonets will be larger than the entire envelope or gas bag of the Government dirigible the C-2 which is now flying to the Pacific coast on the first trans-continental trip ever undertaken on this continent by a lighter than air ship.

REGRINDERS MEET

OMAHA, Sept. 25—The Midwest Regrinders' Association at its second meeting held here outlined a basis for permanent, constructive work on behalf of the regrinders of this section. Regrinders from Nebraska, Iowa and Illinois were present at the convention, and others from Minnesota, Missouri, Kansas and Colorado have signified their intention of joining.

Different departments were organized including membership, selling, production, accounting and adjustments. These departments plan to ask replacement parts manufacturers to co-operate with them in their work. J. J. Fuchs of Omaha is the president of the association.

Aeromarine Ends Season Of Flying to Lake Ports

NEW YORK, Sept. 26—Aeromarine Airways, Inc., announces the closing of the 90 minute flying boat service between Cleveland and Detroit on Sept. 17 after continued operation since July 17.

Two 11-passenger cabin cruisers, making two flights daily between the lake cities, carried 1839 passengers, made 222 crossings of Lake Erie, took 28 charter parties to points on the Lakes and 24 sightseeing flights over Cleveland and Detroit. In addition 2574 pounds of freight were carried, including a Ford roadster, newspapers, magazines, bags and suitcases.

A larger number of passengers were carried in the second month of operation, and the proportion of women fell off due to the fact that business men found the service of increasing value. No forced landings were made; no mishaps occurred and schedules were maintained. This performance compares very favorably to the European subsidized services.

Air transportation will be furnished until after the Pulitzer Race in Detroit, but ships will fly only when demand warrants.

German Points Lesson In "Facts and Figures"

NEW YORK, Sept. 28—Dr. R. Allmers of the Hansa-Lloyd Werke, Bremen, Germany, who has translated the N. A. C. C. statistical review, "Facts and Figures of the Automobile Industry—1921," points out in his preface that the development of motor transportation has played a significant part in America's development and suggests that a stimulation of the industry there would help his country to economic recovery.

He says further:

If one had been more concerned about the United States and known more about its gigantic power, it is possible that things would have been different from what they are now.

Now that the Fatherland is poverty stricken the task for us men of deeds is to build it up again. In this connection it can be of usefulness to know by a closer survey of conditions in the automobile industry that a large field for development is still open to us Germans.

But the statesman also can learn out of this book. He can learn of the great economical significance which this medium of transportation has, despite the fact that such significance is not generally realized; and what he must do in order not to obstruct it, but rather to encourage its development.

Milan Race Winners Identical in Design

Fiat of 122 Cu. In. Displacement, However, Has Six Cylinders; 91 Cu. in., Four

MILAN, ITALY, Sept. 10 (*By Mail*)—American interest in the two long distance races run recently on the new Monza speedway should be keen because of the fact that the major event was for cars of 122 cu. in. piston displacement, the same size scheduled for the next Indianapolis sweepstakes, thus affording a chance to anticipate possible speed results on the Hoosier track next Decoration Day.

Bordino in a six-cylinder Fiat won the 122 in. race at 497 mi. at the rate of 86.89 m.p.h., while the same driver in a Fiat four captured the 373 mi. race for 91 cu. in. cars a week previously at 83¼ m.p.h. While it is doubtful if the Fiats on the Indianapolis speedway could beat Murphy's record of 94.48 m.p.h., it is felt they certainly could equal, if not better, the time made in 1921 on the course in that city.

Engine Difference

In design the 122 and 91 cu. in. Fiats which won are identical, the only structural differences being that the 122 in. engines have six cylinders of 2.5 by 3.9 in. bore and stroke, while the 91 in. engines have four cylinders of 2.5 by 4.4 in. bore and stroke. With two cylinders fewer the hood can be shortened and in consequence the wheelbase is reduced. Many of the parts in the transmission are identical in the two sets of cars; the difference in weight between the 122 in. and the 91 in. cars is only slight.

These cars are the result of three years' uninterrupted work by the technical department of the Fiat company, the men most directly responsible for the success being Chief Engineer Forcana and Avoccato Cavalli, head of the technical service. Signor Cavalli attributes the success not to any one outstanding feature of design, but to a harmonious whole. It is worth noting, however, that Fiat has succeeded in making a successful use of roller bearings for crankshaft and connecting rods where others have met with failure.

Speedway Like Indianapolis

Monza Speedway is a very successful attempt to imitate American automobile track racing methods. Built in a former royal park with the Alps as a background, the Monza Speedway has a unique setting. It really consists of a duplicate of Indianapolis.

The full circuit was used for the opening races, but there is no reason why the small circuit, duplicating Indianapolis, should not be used alone. Over the 6½ mi. track Monza is slower than Indianapolis, but the 2½ mi. track alone is faster than the Hoosier Speedway.

W. F. BRADLEY.

California Unites to Make Good Laws

Conference Will Have Definite Plans to Submit to Prospective Legislators

LOS ANGELES, Sept. 25—In order to bring about a plan for concentrated effort in legislative matters there has been organized in this state what is known as the California Automotive Conference. This conference is composed of the following seven units: Passenger car dealers, truck dealers, franchised freight haulers, franchised passenger haulers, individual truck owners, fleet owners and motor draymen. Each unit has its committee with a chairman, who is alone empowered to vote.

The conference has been organized for the sole purpose of uniting the interests concerned upon proposed changes in the state motor vehicle laws. In the past, when changes have been advocated or opposed, the legislature has had to listen to claims from so many different sources that nothing but confusion resulted.

When candidates for legislative office this year were approached, they stated their willingness to help the industry if it were united on a definite plan. Numerous problems are involved and to date the conference has held five meetings in the effort to smooth out the difficulties. It was agreed among the various units that whatever decision was reached as advisable for the majority, all would support. This will result in a very much simplified procedure before the legislature, which convenes in January.

New York Association

NEW YORK, Sept. 25—Dealers and dealer association representatives of seven New York State cities met here as guests of the Automobile Merchants Association of New York and discussed a proposal for a state dealers' association. It was decided to call a convention of dealers in Albany Nov. 9 and 10, when a decision will be reached as to whether such an association should be formed.

It was brought out at the meeting that it would be to the advantage of the trade throughout the State to be able to present a united front before legislative and administrative officers of the State on legislative and other questions affecting the sale and use of motor vehicles. It was felt that if dealers throughout the State in sufficient numbers want a central organization, and are willing to finance it, this fact will become apparent at the Albany meeting and plans can then be made to go ahead with the project.

The conference here was attended by representatives from New York, Brooklyn, Buffalo, Syracuse, Poughkeepsie, Utica and Binghamton. C. W. Bull, of Syracuse, acted as chairman of the meeting which was called by Thomas F. Moore, New York secretary.

SAN DIEGO BOY WINS HIGHWAY ESSAY TEST

WASHINGTON, D. C., Sept. 26—The first prize for the best essay on "How I Can Make the Highways More Safe," offered by the National Automobile Chamber of Commerce to the school children of the Nation, was won by 13-year-old Stanley Newcomb of San Diego, Cal. Newcomb won from 400,000 competitors.

The prize winner is entitled to a gold watch and a trip to Washington, all expenses paid, where he will be the guest of the Highway Education Board and the N. A. C. C.

Second prize went to Miss Merlene Beck of Draper, Utah, and third honors to James Gillenwaters of Knoxville, Tenn. Many other prizes were distributed through the different States.

The contest has been beneficial in reducing the number of accidents among children, and a similar contest is being announced again by the Highway Education Board as part of its "Safety Season" for 1922.

Wilson Foundry Expands to Meet Willys Demand

PONTIAC, MICH., Sept. 23—Development of production capacity at the Wilson Foundry & Machine Co.'s plant here to keep up with demands of the Toledo plant of the Willys-Overland Co. is progressing favorably, and the force of men has been increased to nearly 2500. Production is as high as is possible with present machinery and no cessation of orders from Toledo is in prospect.

The expansion began some weeks ago when, after a tour of the plant, John N. Willys gave instructions that arrangements should be made to turn out 300 Knight engines daily for the coming year. At that time the plant was making around 150 Knights daily. Rearrangement of equipment with a view to greater output is practically complete.

New Tariff Law Allows Vehicle to Be Searched

NEW YORK, Sept. 25—Right to search without warrant and confiscate the vehicle if liquor is found is given in Part 5, Section 581 of the new tariff law, it is contended by those who have read the paragraph in question. This is in direct conflict with other laws which do not permit search and seizure of automobiles without warrant, and it is declared that this portion of the tariff law is unconstitutional; that a custom law cannot be enforced when it thus conflicts with the Volstead act.

The tariff clause is intended to give officers of the customs or the coast guard the right to board vessels in search of liquor.

Truck Users Widen Association Scope

Organization in Indiana Is Reorganized and Bars Are Let Down on Membership

INDIANAPOLIS, Sept. 25—Allied Motor Commerce of Indiana, which was organized last fall as a federation of organized trade associations of the state whose members used motor transport, has been reorganized and the scope of its work broadened.

While the federated idea is still a part of the organization plan the new constitution and by-laws make room for the thousands of individuals and firms of the state who employ trucks but who are not members of other organized trade bodies. There is also provision for the membership of those who though not commercially interested in motor transport or highway development are in sympathy with further expansion of the highway building and of greater use of motor transport.

Plan of Organization

The three main features of the policies and plan of the organization are "Public Highway Development," "Fair (Motor Vehicle) Legislative Regulation," and "Reciprocal Highway Courtesy." The body will stand for the idea that the state ought to be vested with the regulation of rates of motor transport to the end that fair treatment will be accorded the transport people, the shippers and the geneal public. Educational campaigns are planned that will make motor transport and its public benefits better understood by the general public.

The advisory board which now controls the organization pending the first annual convention has appointed S. C. Hadden, editor of Municipal Engineering, secretary, and plans a state wide membership campaign in the endeavor to obtain a strong contingent of the body in every congressional district.

LEACH-BILTWELL ELECTION

LOS ANGELES, Sept. 26—New officers and four new directors were elected at the annual meeting of the stockholders of the Leach-Biltwell Motor Car Co. of Los Angeles. M. A. Leach was re-elected president and general manager; S. J. Ulrey of Ontario is first vice-president; Truman Berry of Whittier, second vice-president; and Alfred Ashby, secretary-treasurer. New directors are L. B. Ulrey of Oakland, C. S. Chapman of Fullerton, C. N. Hollingshead of Anaheim, and William Dibble of Puente.

LIGHT MAKER ENJOINED

NEW YORK, Sept. 26—An injunction has been granted the American Lamp Co., manufacturer of the "Yankee" signal, in a suit brought against the D. & L. Manufacturing Co., charging infringement of patent.

Men of the Industry and What They Are Doing

Fuller Back from Europe

Henry J. Fuller of Aldred & Co., also chairman of the Rolls-Royce Co. of America and the Noiseless Typewriter Co., has returned from Europe after a stay of several weeks. He reports that the English Rolls-Royce Co. is operating at capacity and is employing 5500 men.

A. A. A. Promotes Eldridge

M. O. Eldridge, for three years connected with the American Automobile Association, has been named executive secretary of that organization and will have complete charge of the association's work in the United States. Outstanding in the program which Eldridge will endeavor to accomplish will be the development of good roads, with which he has been identified most recently as director of the roads of the three A's. Prior to that he was associated for 25 years with the United States Bureau of Public Roads.

Geisler Manages Gillette Sales

Max Geisler has been appointed secretary and general manager of the Gillette Rubber Sales Co., which has opened offices in Chicago. Geisler has been identified with the tire industry for a number of years and during that time has handled Firestone, Fisk, Columbia and other tire makes. The sales company acts as wholesale distributor for the products of the Gillette Rubber Co. of Eau Claire, Wis. The ultimate aim of Geisler and his associates is to establish a national organization of dealers, taking in the entire country.

Scott Heads Atlas Forge

R. H. Scott, vice-president and general manager of the Reo Motor Car Co., has been elected president of the Atlas Drop Forge Co. succeeding S. H. Carpenter, who died recently. O. C. Hartig has been named a director.

Kennedy in Sales Business

Arthur M. Kennedy, who has been sales manager of the Franklin Motor Car Co. of Philadelphia, has resigned and has established an independent business in sales, research and promotion which is intended to serve manufacturing and sales organizations.

V. C. Kloepper Resigns

V. C. Kloepper has resigned his position as designing engineer with the Dorris Motor Car Co., effective Oct. 1.

Couzens Succeeds Warner

St. Claire Couzens, formerly with the Olympian and Friend Motors, has taken charge of Durant investment sales in Michigan, succeeding Fred W. Warner, former president of Oakland Motor Car Co., who is connected with the New York office of Durant.

Fetterman with Jennings

I. P. Fetterman is now acting as factory representative for the Jennings Corp., Pittsburgh, manufacturers of carbureters.

Ford Returning to Mark Reached Before Closing

DETROIT, Sept. 27—The Ford Motor Co. is working back to a production point which will carry it along at the record capacity mark reached just previous to the closing on Sept. 16. Retail sales of both cars and tractors are reported to be as brisk as at any time during the year, and running slightly in excess of production capacity.

With the exception of one or two bad spots, the demand is general from all parts of the country. Farmer buying is reported to be good, the company not experiencing any falling off because of low farm prices. The bad spots, the company declares, are spots that have been bad all year, but are limited in area and have no important effect on general business in any locality.

Diamond Taxicab Starts Operations in New York

NEW YORK, Sept. 27—The Diamond Taxicab Co., the formation of which was announced in AUTOMOTIVE INDUSTRIES three months ago, has started operations in New York City, its first cab appearing on the streets of the city this week. It has attracted attention by announcing it will operate at 20 cents a mile.

This, it is declared, is the start of operations that will become nation-wide, with a separate operating unit in each of the large cities. The holding or manufacturing unit will have headquarters in New York City, with Mat D. Jacoby, vice-president of the Black and White Cab Co., at the head as general operating manager of the Diamond Taxicab Co.

This manufacturing unit will establish two plants, one at New Haven, Conn., and the other at Jackson, Mich., and expects to make 2000 taxicabs in the next year. There also will be a finance company which will aid in financing each of the local units as well as be of assistance to chauffeurs or owners buying the taxicabs.

The plan of local operation is to sell the taxicab direct to the operator, who will be serviced by the local company in the way of selling him supplies at wholesale rates and furnish suitable garaging accommodations.

Great Britain Field Best, Chrysler Says

Long Time Before Southern and Central Europe Will Be Large Importers

NEW YORK, Sept. 25—Walter P. Chrysler, chairman of the board of directors of the Maxwell Motor Corp. back from a three months trip through Europe, believes Great Britain is the export field which is most promising to the American manufacturer. It will be a long time, he thinks, before central and southern Europe will buy much, although Holland, Belgium and the Scandinavian countries offer some opportunities.

"We are exporting from 2000 to 2400 Maxwells to England and the continent annually," said Chrysler, "and it looks now as if next year we will be able to send over from 4000 to 5000."

Chrysler has not been back long enough to get in direct touch with affairs at the Detroit factory, but he expects to go to the plant the end of this week to look over conditions there.

Willys Manager Here

Sir William M. Letts, managing director of Willys-Overland Crossley, Ltd., came over at about the same time Chrysler did, this being one of his semi-annual visits to the factory at Toledo. Sir William says:

American manufacturers who ship higher priced cars expecting to find a considerable demand are likely to be disappointed. The British public is buying cars like the Overland, Ford and Chevrolet. Trade depression in England, aggravated by the strikes of the engineering trades, interfered severely with the sale of automobiles. There are now unmistakable signs of improvement, especially for the cheaper cars.

Gear Driven Car Added to Kelsey Production

NEWARK, N. J., Sept. 25—The Kelsey car may now be purchased either with the Kelsey friction drive or with the conventional gear transmission. The friction and gear driven chassis are identical except that the latter, instead of the Kelsey propellor shaft, friction clutch, transmission and rear axle, has a 10 in. Borg & Beck clutch, Detroit three-speed gearset, Standard Parts semi-floating rear axle and Snead propellor shaft. Torque and drive are taken through the springs. The tires are 32 x 4 in. and the gear ratio is 4.75 to 1.

Prices on the gear driven car are the same as for the friction drive models: Five-passenger phaeton, $985; five-passenger sport, $1,185; suburban sedan, $1,450.

SEEKING TO REPEAL WAR TAX LAWS

N. A. C. C. Campaign Is Opened by Hanch

Points Out Inequalities in Letters to Present and Prospective Congressmen

WASHINGTON, Sept. 29—The repeal of the discriminatory war excise tax laws of 1918 and 1921 will be sought by the National Automobile Chamber of Commerce in a campaign, launched here to-day, placing facts and figures before Congress, setting forth the Chamber's argument as to why the laws should be repealed and citing the present inequalities of the existing law.

The opening "guns" of the Chamber are being trained on the members of the House, Senate and more than 1000 nominees for seats in these two bodies.

In a letter, carefully planned by the Taxation Committee of the N. A. C. C., of which C. C. Hanch is chairman, aspirants for Congress and those already in office are asked one question:

Letter Asks Question

"Are you in favor of the repeal of all discriminatory war excise taxes?"

Continuing the letter states:

The desire of Congress to repeal discriminatory war excise taxes was definitely indicated in amending the 1918 Federal tax law by removing such taxes on some articles and reducing them on others. In no case did Congress increase such taxes or add new ones.

The discriminatory war excise taxes in the Federal tax laws of 1918 and 1921, and the changes made in the 1918 law by the 1921 law, are graphically shown in the attached memorandum.

Apparently Congress believed it of greater importance to relieve musical instruments, sporting goods, chewing gum, thermos bottles, fur articles, picture frames, perfumes, toilet waters and hair dyes, than individual transportation. In this belief we do not concur, and we feel that the only equitable thing in the interests of fair play and the welfare of all industry as a whole, is to repeal all discriminatory war excise taxes.

No Special Privileges Sought

The Chamber's letter closes with the request that the addressee favor the Chamber with his opinion in the premises.

The opening "shot" makes it clear that the automobile industry is not seeking any special privileges for itself as an industry, but is merely asking fair taxation on all industry and not the elimination of taxation on certain classes while others must continue to pay the excise taxes.

Under the existing law, section 900 levies a tax of three per cent on all motor trucks, tires, parts and accessories, and five per cent on all other automobiles, tires, parts and accessories.

The law of 1921, repealing in part the law of 1918, relieves manufacturers of musical instruments, sporting goods, chewing gum, thermos bottles, toilet soaps, toilet powders, picture frames, motion picture films, perfumes, toilet water, hair dyes, patent medicines and ice cream from payment of the excise taxes. This the Chamber points out is unfair discrimination against the manufacturers of other, and in the majority of cases, more useful commodities.

Revenue to Government Big

Just what the excise tax means to the automobile industry is seen in the light of Government reports showing that owners of motor vehicles paid into the public federal treasury in 1921 a total of $117,322,000 in excise tax alone, in addition to $212,978,000 in the way of State taxes and $11,000,000 in municipal taxes, or a total of $341,300,000 taxes for the year.

Accompanying the letter and extract of the war excise tax laws of 1918 and 1921 is a vest pocket story of the motor vehicle, showing the census of automobiles by States, the amount of raw materials consumed in manufacturing automobiles and the number of workers employed in the automobile industry.

Success for the campaign against the existing law it is believed by the Taxation Committee of the N. A. C. C. can best be courted by making the broad general appeal for the removal of all excise taxes, and it was decided at the concluding meeting of the committee in New York on Sept. 6 to 7 that the policy would be pursued that was adopted, thus leaving the way open for the support of other industries which feel that they are entitled to a measure of relief from war and post-war legislation.

August Big Month for Makers of Parts

NEW YORK, Sept. 28—In keeping with the production records makers of automobiles are establishing are the reports from members of the Motor and Accessory Manufacturers Association that August is the second best in the last 19 months. It ranks next to May, 1922, and only $646,300 behind in sales. It is the best of any of the summer and fall months by a large margin; in fact it is almost twice as good as August, 1921.

August, 1922, produced sales amounting to $43,053,700, an increase of 5 per cent over July. This month a year ago reported $23,397,640. Collections in August, 1922, are lower than July by 8.21 per cent, $3.705,000 being reported. Outstanding notes amounted to $2,398,350, or 8.15 per cent increase over July.

Will Urge President to Use Tariff Power

N. A. C. C. Wants Executive to Take Action in Cases of Discrimination

WASHINGTON, Sept. 27—Representatives of the National Automobile Chamber of Commerce, acting as the official body for the automobile manufacturers, will go before the Tariff Board next week and urge that steps be taken to secure a lower tariff rate on automotive products from those countries which discriminate against the United States.

The new tariff bill contains a provision whereby the President is given administrative power to increase or decrease the tariff rates to a maximum of 50 per cent in the case of countries discriminating against the United States. It is the bringing into play of this power that the N. A. C. C. seeks.

When negotiations with foreign nations fail to bring about a reduction in their automotive tariff rates or fail to break embargoes, the N. A. C. C. will urge that our tariff rates be raised or similar embargoes be used as a retaliatory measure. In case non-automobile producing countries fail to take favorable action the chamber will ask that the American tariff be raised on certain items of manufacture or agricultural produce.

The N. A. C. C. has always favored lower tariffs on automotive products and the success of its effort to secure them is made evident by the retention of its suggestions in the new tariff bill.

Dividends Declared by G.M.C. Directors

NEW YORK, Sept. 28—Directors of the General Motors Corp., at their meeting to-day, declared the regular quarterly dividends as follows: 6 per cent preferred, $1.50 a share; 6 per cent debenture, $1.50 a share; 7 per cent debenture, $1.75 a share.

These dividends are all payable Nov. 1, 1922, to stockholders of record at the close of business Oct. 9, 1922.

Predicts Good Year

DETROIT, Sept. 26—"The corporation is going to have a very satisfactory year," said C. S. Mott, vice-president of General Motors Corp. "Our units are all doing more than might be expected at this time of the year. The effects of the strikes still are with us, but the fundamentals have been corrected and healthy recuperation is under way. In fact, I might say that never in the history of the corporation have immediate prospects been so promising."

PACKARD RE-ENTERS RACING FIELD

Will Test Out New Theories of Design

Engineering Principles Figure in Decision to Compete at Indianapolis

INDIANAPOLIS, Sept. 27 — The Packard Motor Car Co. will return to automobile racing in 1923 with a factory team, the first of the big factories to engage in the speed sport after once having retired. Incidentally the Packard is the first of internationally famous American factories with big production to engage in racing in the last decade.

This was announced by T. E. Myers, secretary and general manager of the Indianapolis motor speedway, who has been advised by Colonel J. G. Vincent that the Packard team would participate in the eleventh annual 500-mile international sweepstakes race next Memorial Day.

Two Reasons Prompt Move

Colonel Vincent is vice-president in charge of engineering of Packard. He is the co-designer of the Liberty motor and recently won the gold cup at Detroit in the national power boat championship.

The Packard company has two reasons for entering the coming race. The 1923 event will be for cars powered with engines not to exceed 122 cu. in. piston displacement, being smaller than any engine manufactured for production automobiles in this country. European engineers have made rapid strides in the perfection of engines of this size and smaller. The other reason is the national pride of the company.

Colonel Vincent has not given out the details of the construction of the cars but they are now being built by the Packard organization. Three types of engines will compete for the $50,000 purse, four, six and eight. Packard has selected the six for its team because it believes the six will be most efficient in competition in this class. The cars will be one man, with the driver seated in the center. No drivers have been announced.

De Palma Engaged

The return of Packard to racing will revive memories of the Packard Gray-Wolf, which was a sensation 15 years ago and one of the most successfully campaigned cars in the days when the acme of speed competition was achieved on the dirt tracks and beaches. It also will call to mind the work of Ralph De Palma four and five years ago when he successfully campaigned a Packard 12 on the speedways and smashed many straightaway records at Daytona, Fla.

De Palma has been engaged by Packard as a consultant in the building of its team of racing cars for the Indianapolis event of 1923. He is working with Colonel Vincent and the Packard engineering staff in perfecting the design of the cars.

To Test Out New Principles

DETROIT, Sept. 27—The Packard Motor Car Co. is re-entering automobile racing as a means of testing out new engineering principles and theories of design under the extreme conditions which racing presents. The team entered in the 1923 race will drive under the personal direction of Col. J. G. Vincent, vice-president in charge of engineering, who will be in the pits throughout the running of the race. Under his direction tabulation of the data afforded will be accumulated.

According to Colonel Vincent, the changes in piston displacement defined by the race authorities mean a complete revision in designing the engine. The race will be largely a contest of engineering skill, he declared, and companies like Packard should engage their best efforts against those of European countries, that there might be no question of the ability of America to compete with Europe's best.

The qualities of the six cylinder motor will be most strikingly demonstrated in a test confining the engine to a minimum piston displacement, he said. A wealth of engineering data should be afforded by the running of the race under the conditions set, he said, and progress made as a direct result of this which might otherwise not be made without the lapse of considerable time.

OVERLAND DEFICIT GREATER

TOLEDO, Sept. 26—The Willys Overland Co. for the six months ended June 30, reports a net loss from operation of $163,305, but at the same time $6,989,586 was written off for adjustment of investments, commitments and inventories, while the directors also wrote of questionable values and provided for expected losses by suitable charges and reserves in addition to any earlier similar provisions. The result was that with the deficit of $7,924,015 reported as of Dec. 31, 1921, the deficit on June 30, this year, was increased to $15,676,906.

ANDERSON DOUBLES PROGRAM

ROCK HILL, S. C., Sept. 26—The production schedule for the Anderson Light Aluminum Six, originally set at 5000 for the year beginning Oct. 1, has been doubled. The reason for the increase is said to be due to the fact that parts will be more available than was first thought possible, coupled with requests from dealers for increased allotments for this model.

Vote of Motorists Defeats Governor

Show Disapproval of Announced Plan to Increase Tax Burden in California

LOS ANGELES, Sept. 21—The political power and influence of motorists were demonstrated as probably never before in connection with the recent California primary election. Faced by the announced plan of the present administration to increase the tax burden on motorists enormously, the defeat of William D. Stephens, present governor and candidate for the nomination, was accomplished.

Friend W. Richardson, the successful candidate, based his campaign on the policy of an economical administration. He appealed directly to the 800,000 owners of motor vehicles, telling them that if Stephens continued in office they would be called upon to meet heavily increased license burdens and a gasoline tax.

Had to Fight Machine

Stephens had all the influence of a powerful political machine behind him, and his nomination was looked upon as a certainty until the votes were counted. Then it was learned Richardson had defeated him by approximately 25,000 votes, and there is no question of doubt but that it was largely the motoring vote that brought this about. The State's Highway Commission had announced its needs as $12,000,000 annually for the next five years.

Under the law, if the highway commission received that sum, the same amount would have had to be raised for distribution among the counties, with a ten per cent allowance for the conduct of the motor vehicle department. This would have meant that if the commission received $12,000,000 a year as its share, the total amount motorists would be called upon to contribute would be $27,000,000, and in addition the Stephens lineup had advocated a gasoline tax.

New Lancia to Feature Paris Show in October

PARIS, Sept 12 (*By Mail*)—It is expected that the outstanding technical feature of the coming Paris show, which opens Oct. 4, will be the 122 in. frameless Lancia, weighing 1650 lb. complete, with four passenger body and capable of a speed of 70 m.p.h. It is a reasonably priced production job, and in the opinion of many it is the most important recent departure from standard practice. Lancia is negotiating for the sale of license in the United States.

Woodhouse's Effort Fails to Stop Races

Court Allows Aero Club Trophies to Leave New York State for Detroit

NEW YORK, Sept. 27—An effort made by Henry Woodhouse, formerly a governor of the Aero Club of America, to prevent the holding of the national airplane races in Detroit Oct. 7, 12, 13 and 14 by attempting to enjoin the removal from the state of the Pulitzer and Curtiss trophies was stopped by Justice McCook in the Supreme Court here to-day.

Woodhouse, in the last two or three years, has started half a dozen court actions to prevent the control of the Aero Club of America passing out of his hands. In the present suit he sought an injunction to prevent the two trophies, the Pulitzer and Curtiss, to be raced for at Detroit, from being taken out of New York State.

Request Refused

Justice McCook after a lengthy hearing refused this request. The trophies were in the custody of three trustees appointed to look after the assets of the Aero Club of America and these trustees were permitted to ship the trophies to Detroit, which means that the contests for them will be carried out.

To-day's hearing on the injunction served to bring into court many facts concerning the controversy over the Aero Club of America. In August, 1920, the club, being in financial difficulties, an effort was made by those interested in aircraft not only to redeem the debts of the club but make it a truly representative organization of the industry. Howard E. Coffin was one of the leaders in this movement and was supported by members of the Manufacturers Aircraft Association and others interested in the work.

Was Dominating Factor

Woodhouse previous to this time had been a dominating factor in the club's activities and it was considered necessary to get rid of him. Steps were taken that accomplished the reorganization of the club. Woodhouse declared in court that he represented 404 members and still contends that he is chairman of an administrative committee of the club. It is in this alleged capacity that he has been bringing court actions against those who are trying to build up some form of national aeronautical federation.

Last spring the affairs of the club were partly wound up. The clubhouse was discontinued and headquarters established in a room in the Automobile Club of America, where the trophies were placed. The other assets of the club were placed in storage warehouses.

It developed in court proceedings today that Woodhouse, who has been carrying on a very aggressive publicity propaganda against the aircraft manufacturers, as well as many individuals such as Howard E. Coffin, S. D. Waldon, and others, killed a man in 1905 and served a term of over three years in a New York prison. At the time he was a cook and killed a fellow workman in a kitchen. After serving his jail term he took out his final citizenship papers in 1917, it was brought out in court, but he made no reference to his criminal record, not even to those who vouched for his character. His name previously was Henry Casalegno, which he had changed to Henry Woodhouse.

Not only is Woodhouse charged with carrying on a campaign of publicity against the aircraft manufacturers and in general against those who worked for the good of aircraft during the war, but he has been feeding this propaganda to members of Congress, it is claimed.

Plan Aeronautical Body

It is planned to organize a national aeronautical association in Detroit, Mich., Oct. 12, 13 and 14. The formation of such an association is favored not only by the aircraft manufacturers but by such government groups as the United States Navy, the Army, Postoffice department, Bureau of Standards, National Advisory Committee for Aeronautics, the Aeronautical Chamber of Commerce, and the Society of Automotive Engineers. A program for its formation has been drafted and suggested by-laws prepared. In order to make such an association truly national the country has been divided into nine districts, based geographically on the military corps areas. Each area will send its instructed delegates to the convention.

ENGINEERS FAVORING OIL INSPECTION LAW

CLEVELAND, Sept. 25—Automotive construction engineers in this city have come forth in support of the state-wide demand in Ohio that an oil inspection law be enacted to protect users of automobiles from low grade gasoline.

The grade of gasoline in this city has declined since 1910, according to H. R. Matheny, chief engineer of the Winton Co. He said the decline has been shown by actual experience in the Winton plant. Tests made at the plant show that carbon must be removed from engines every 1000 miles. Some dealers advocate that it be done every 500 miles. Not long ago when gasoline tested around 56, an engine would go in good shape for 10,000 miles without having carbon removed.. Gasoline now tests 15 to 20 points lower than it did some years ago.

B. H. Anibal, chief engineer for the Peerless Motor Car Co., says the amount of kerosene in gasoline is increasing each year and favors weekly tests to determine the quality of gasoline used.

Detroit Air Cooled Buys Plant at Wayne

Has Capacity of 50 Cars Daily—Production of Line to Start in December

DETROIT, Sept. 27—Detroit Air Cooled Car Co. has purchased an assembly building in Wayne, near Detroit, in which it will begin production of its air-cooled line in December. The building will be used exclusively for car assembly and will have capacity for about 50 cars daily.

The financial plans of the company are about complete, according to President W. J. Doughty, and have advanced to such a point that arrangements for manufacturing are now being closed.

All of the parts for the car will be made by specialized unit makers, in almost every case being specially designed for the air-cooled line. Throughout, the engineering effort has been directed to the elimination of moving parts. The general accessibility of each unit has been the important consideration. Contracts for parts will be complete next week, many of the important units having already been closed.

The car will sell in the phaeton model for $1,250, the coupe for $1,700 and the sedan for $1,750. Bodies for the line have been specially designed. Contracts with distributors and dealers have been made in 40 important cities, and Doughty declares these will cover production for the first year.

Foreign Trade Contact Committee Meets Oct. 2

WASHINGTON, Sept. 27—Gordon Lee, chief of the Automotive Division of the Bureau of Foreign and Domestic Commerce, has called a meeting of the foreign trade contact committee of the various automotive associations to meet here on Oct. 2, for the first meeting of the 1922-23 winter season. This committee, formed last spring, has for its purpose the co-ordination of export activities in the various associations representing car, truck, motorcycle, equipment, airplane and marine engine fields.

"The markets abroad are picking up rapidly, and in every group of the automotive industry the possibilities are getting better every day," Lee declared. "Now that the division has been established for practically a year, I believe that the division will be in a position to accomplish some good things for the industry during the next twelve months."

NEW BUICK RECORD

FLINT, MICH., Sept. 27—During the week of Sept. 23 a new high point of production was reached by the Buick Motor Co., when the plants in this city and Detroit turned out a total of 4058 cars, which is an average for the five and one-half working days of 737 cars a day.

Olds Prices Reduced On All But One Line

Cut Made in Four-Cylinder and Light Eight Models—Large Eight Unchanged

LANSING, MICH., Sept. 26—The Olds Motor Works has announced a price reduction on the four cylinder and light eight models. Prices of the large eight models remain the same. The new prices are as follows:

	Old Price	New Price
Four Cylinder		
Roadster	$1,095	$955
Phaeton	1,095	975
Semi-Sport	1,225	1,075
Cal. Top Phaeton	1,395	1,350
Brougham	1,425	1,375
Coupe	1,595	1,475
Sedan	1,745	1,595
Light Eight		
Phaeton	1,495	1,375
Super-Sport	1,725	1,675
Sport Roadster	1,695	1,625
Coupe	1,995	1,875
Sedan	2,145	2,025

Ford of Canada Lowers Prices from $30 to $60

DETROIT, Sept. 27—The Ford Motor Co. of Canada, Ltd., has made reductions ranging from $30 to $60. The chassis now is $395; runabout, $455; phaeton, $495; truck chassis, $545; coupe, $780, and sedan, $870. Starting and electric lighting are standard on closed models. On all others $85 extra.

The Ford Motor Co. of Canada is independent of the American company though Henry Ford controls both plants. No price change on the American side is announced.

Production capacity of the Canadian plant is about 500 daily as compared with 5500 in United States. The Canadian car, because of structural differences and lower production rate, always has been higher in price than the United States car.

LOWER HAWKEYE LISTS

SIOUX CITY, IOWA, Sept. 26—New prices have been announced by the Hawkeye Truck Co., effective immediately. The schedule is as follows:

	Old Price	New Price
1 ton	$1,500	$1,375
1½ ton	1,850	1,645
2 ton	2,650	2,145

The 3½ ton and 5 ton models will be built on special order only.

APPLETON TRUCK FORMED

APPLETON, WIS., Sept. 25—The Appleton Motor Truck Co. has been incorporated with an initial capital of $25,000 by A. G. Brusewitz, M. Rossmeissl and W. G. Jamison for the purpose of manufacturing and dealing in motor vehicles, parts and equipment.

Brusewitz was one of the principal officers and stockholders in the Reliance Motor Truck Co. of Appleton, which a little more than a year ago was forced into bankruptcy through lack of adequate working capital for manufacturing the Reliance motor truck and axles for heavy duty vehicles. However, nothing definite concerning the plans of the new corporatioon has been made public.

EIGHT MONTHS OUTPUT PLACED AT 1,507,495

WASHINGTON, Sept. 26—During the month of August there were produced 246,941 automobiles and 24,064 motor trucks, according to figures compiled by the Census Bureau from reports of approximately 90 passenger car and 80 truck manufacturers. These figures are subject to slight revision when all reports are received.

The following table shows production for the first eight months of the year, the reports each month, with few exceptions, being from identical firms:

	Passenger Cars	Trucks	Total
Jan.	81,693	9,416	91,109
Feb.	109,171	13,195	122,366
March	152,959	19,761	172,720
April	197,216	22,342	219,558
May	232,431	23,788	256,219
June	263,027	25,984	289,011
July	224,057	21,357	245,414
Aug.	246,941	24,064	271,005
Grand total	1,507,495	159,907	1,667,402

Dealers Protest Early Announcement of Models

CHICAGO, Sept. 27—Acting upon the complaints received from a number of individual members, the Board of Directors of the Chicago Automobile Trade Association has adopted a resolution protesting against the announcement of manufacturers of their new models and new prices as much as six months in advance of the season for which they are intended.

It was stated that the association opposes the policy of mid-season announcement of new models and new prices because it has a tendency to slow up buying not only of the cars in question but of other cars as well.

Lansing's First Star Shipped to Utah Fair

DETROIT, Sept. 22—The first Star car to be turned out at the Lansing plant of the Durant Motor Co. has been shipped to the Intermountain Motor Sales Co., which will exhibit it at the Utah State Fair at Salt Lake City. The assembly lines for the Star are reported almost ready for production at the Lansing factory.

Sales of the Durant four are reported to be brisk, a trainload being shipped to Chicago this week, with other trainloads to be shipped to other points in the next few weeks.

Jordan Cuts Prices: Makes Some Changes

Closed Models Drop from $2,785 to $2,485—No Change Made in Open Cars

CLEVELAND, Sept. 25—Jordan Motor Car Co. announces a reduction of $300 in the prices of its brougham and sedan, the drop being from $2,785 to $2,485. No change has been made in the lists on the open models.

Several slight changes have been made in both these closed models. The sharp corner lines have been changed to a broomstick radius, roof lines have been lowered two inches and the seats dropped a corresponding amount. The rear seats are wider and the pitch changed slightly. Both bodies are now trimmed in Windsor weave cloth. In the brougham this cloth is worked in plain trim without pleats, but in the sedan pleats are used.

A worm type regulator replaces chains in the doors, while removable panels make it easy to get at the regulators. Platinum finish hardware is used in dome lights, door pulls and regulator handles. A new steering wheel with walnut spider and rim, similar to that used on the new Play Boy, is standard on both closed jobs, with small polished aluminum control levers mounted in the center.

The sedan body has been lengthened to allow more room in the front compartment and a little more in the tonneau. A large trunk has been mounted on the rear of the brougham, carrying two large suit cases and having an extra compartment for packages.

Hudson Prices Drop $120; Cut of $50 Made on Essex

DETROIT, Sept. 25—Another price reduction, effective Sept. 22, is announced by Hudson and Essex, which is the second within three months. The cuts do not affect the sedan and coupe in the Hudson line. The drops are $50 in Essex and $120 in Hudson. The new list:

	Old Price	New Price
Hudson		
4-pass. phaeton	$1,645	$1,525
7-pass. phaeton	1,695	1,575
Coupe	2,570	2,570
Sedan	2,295	2,295
Coach	1,745	1,625
Essex		
5-pass. phaeton	1,095	1,045
Cabriolet	1,195	1,145
Coach	1,295	1,245

It is announced that the Essex sedan has been discontinued.

GARY LISTS INCREASED

GARY IND., Sept. 26—The Gary Motor Corp. announces an increase in the prices of its trucks as follows:

	Old Price	New Price
Model F 1-1½ ton	$1,675	$1,775
Model I 2 ton	2,250	2,450
Model J 2½ ton	2,650	2,850
Model K 3½ ton	3,650	3,790
Model M 5 ton	4,100	4,450

FINANCIAL NOTES

Dayton Rubber Manufacturing Co.'s balance sheet as of Aug. 31 shows current assets, consisting of cash, receivables and merchandise, of $1,635,079 as against $1,778,962 as of June 30; miscellaneous assets of $3,033,950 compared with $3,058,833 and total debt, including accounts payable, notes payable, etc., of $716,176 contrasted with $933,441. The company reports that August sales showed a volume approximating $400,000 which places it the largest month in the company's history. Sales for the first eight months aggregated $2,500,000, more than for the entire year of 1921. September business is reported to be as good as August, with many orders booked. The plant has been working on a basis of twenty-four hours a day since Dec 2, 1921.

Timken Roller Bearing Co. stock has made its first appearance on the New York exchange, selling around 30. Earnings in the current quarter will approximate $2,500,000 after charges and taxes, and added to earnings for the first half will approximate $6,600,000 for the nine months, or $5.50 a share on the 1,200,000 shares of par capital stock. Full year profits are expected to equal nearly $7 per share, more than twice current annual dividend requirements. Both company plants are working at capacity with no indications of a let-up.

Studebaker Corp. of America may declare an extra dividend when the directors meet Oct. 31. Financial quarters predict that it will be $1.50, as was given in July. Studebaker earnings, which will approximate $8.50 per common share in the current quarter, will bring the total to about $26.50 a share for the nine months. An October dividend equal to the July would mean a total distribution of $11.50 a share for the year, an amount earned twice over in the first nine months.

McCord Manufacturing Co. reports its plant is operating at 70 per cent capacity and gaining steadily. Body department is proceeding at 60 per cent while axle works are running low. Radiator, gasket and lubricating departments are normal. Net earnings for the first eight months were $500,000 and now are at the rate of $1,000,000 annually. Preferred dividends, discontinued fifteen months ago, have not been resumed.

Hayes Wheel Co. directors are expected to increase the dividend rate on the stock of the corporation to $3 per annum at the forthcoming meeting. Net earnings from Jan. 1 to Aug. 31 amounted to $763,499. It is said that the portion paid out has been $150,000 in dividends. Net working assets have increased $505,006 between Jan. 1 and Sept. 1.

Farm Equipment Makers Prepare for Convention

CHICAGO, Sept. 27—The complete program for the annual convention of the National Association of Farm Equipment Manufacturers which will be held in Chicago Oct. 18 to 20, has been announced. Among the speakers will be the following:

J. B. Bartholomew, president of the association; C. H. Markham, president of the Illinois Central Railroad; R. L. Lathrop, president of the National Federation of Implement Dealers Association; Guy H. Hall, director of The National Institute of Progressive Farming, and F. R. Todd, vice-president of Deere & Co.; T. F. Wharton, secretary of Deere & Co.; L. C. Pryor, editor Farm Implements and Tractors; Donald D. Conn, formerly chief of the transportation division, Joint Commission of Agricultural Inquiry; H. H. Stackhouse, general manager, French & Hecht; W. A. Durgin, chief of the division of simplified practice, Department of Commerce; Grant Wright, general secretary-treasurer, Eastern Federation of Implement Dealers Association, and James R. Howard, president, American Farm Bureau Federation.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Last week, for the first time in a long period of low money rates, the trend was toward greater firmness. On Sept. 21, call money was quoted at 6 per cent, the highest rate since Feb. 23. The range for the week was 3½ per cent to 6 per cent, as compared with 4 per cent to 5 per cent in the preceding week. The firmer tendency was also noticeable in time money.

The rates for sixty and ninety days' maturities were 4½ per cent to 4¾ per cent, as compared with 4¼ per cent to 4½ per cent in the preceding week, while the rate for four, five and six months' maturities ranged from 4¾ per cent to 5 per cent, as compared with 4½ per cent to 4¾ per cent. The prime commercial rate was 4¼ per cent to 4½ per cent, as compared with 4 per cent to 4¼ per cent. The stiffening of money rates was ascribed chiefly to the rush of importers to get materials out of bond before Sept. 22, when the new high tariff went into effect.

In anticipation, apparently, of the new tariff schedule, the value of merchandise imports for August, amounting to $271,000,000, was the largest total for any month since November, 1919; 7.5 per cent larger than in July and 38 per cent above August a year ago. The excess of exports over imports for the month was $31,000,000, the smallest amount since September, 1915.

For the week of Sept. 16, the third week since the adjustment of the labor controversy in the industry, soft coal production was estimated at 9,500,000 tons against 8,756,000 tons in the preceding week and 9,359,000 tons for the week of Sept. 2. The failure to reach the 10,000,000 ton mark was attributed chiefly to car shortage and delayed transportation. The anthracite production for the week of Sept. 16 was estimated at 900,000 tons, as compared with 53,000 tons in the previous week.

White Co. Dividend

CLEVELAND, Sept. 28.—The White Co. on Sept. 30 will mail to stockholders a dividend at the rate of $1 a share. Quarterly earnings from Jan. 1 to Aug. 31 have exceeded dividend requirements for the entire year and a continued improvement in business is indicated by the volume of orders on hand and in prospect.

Middle Priced Cars Fall Off in Output

Smaller Companies Will Show Decline for September—Light Trucks Moving

DETROIT, Sept. 27—The automobile industry is tapering off in production, this being especially true in the middle priced field. In the high priced and low priced cars there continues to be a large volume of buying, and in at least two cases in the middle priced, the buying still is around the capacity of earlier peak months. The dropping off in production figures which will be visualized in the September reports will represent losses which have been sustained by the smaller companies in the medium priced field, the leaders continuing to hold a large share of early business. In every factory, however, there has been a lessening of production and a laying off of employees.

Some Schedules Drop

Companies in the high priced fields which have declared themselves sold to the first of the year are laying off men in small numbers and schedules in medium priced cars generally have dropped from 20 to 50 per cent. Factory sales managers are turning their efforts toward the cities on both seaboards, and the middle west and the southeastern section of the country to sustain operations on a sizable scale during the fall and winter.

Most of the buying in farm districts, aside from the southeast, is in low priced cars, due to the low yield to the farmer. Substantial farmers are expected to come into the market in the spring.

Truck factories are finding the largest volume of business in light trucks. The coal situation has created a market for light trucks, which manufacturers are urging their dealers to follow up. Much of the domestic coal during the winter will be sold in small quantities, making a definite market for small, speedy delivery vehicles. With practically all business on a smaller scale than usual, light trucks are meeting requirements for the present.

Standard Parts Pays Creditors 5 Per Cent

CLEVELAND, Sept. 28.—Creditors of the Standard Parts Co., a $20,000,000 automobile accessory manufacturing plant which went into the hands of a receiver on Sept. 1, 1920, will receive shortly a payment of 5 per cent of their claims. Federal Judge D. C. Westenhaver today directed that the payment, which will total $500,000, be made. The sum will come from earnings of the company which has shared with other similar plants in the prosperity which the automobile industry has enjoyed in the last 12 months.

Receiver Frank A. Scott has paid a total of 25 per cent of claims to creditors.

S. A. E. Will Discuss Production Methods

Papers Being Prepared for October Meeting—Paper on Oil for Detroit

DETROIT, Sept. 23—Papers on production methods will be presented by Studebaker, Packard, Ford and the General Motors Corp. at the first annual production meeting of the Society of Automotive Engineers, scheduled for Oct. 26 and 27 in this city. Two other companies at least, will have papers for this session.

The papers will represent a symposium of practical ideas on production from the chief production men of each company rather than from an individual. This feature is new to S. A. E. papers and adds considerable interest to the coming meeting.

The morning sessions will be devoted to the technical sessions. Factories that will be visited in the afternoons include Cadillac, Packard, Dodge Brothers and the Ford River Rouge plant. The dinner will be held on Thursday evening at the Hotel Statler.

Detroit Section Meeting

The Detroit Section of the Society will open the fall season, Sept. 29, with a paper by A. A. Bull of the Northway Motor & Manufacturing Co. on "Oil Consumption." This paper was originally presented at the summer meeting of the Society at White Sulphur Springs. There was not sufficient time then for a thorough discussion, and the Detroit section is having the paper presented again in order to afford the opportunity of having subject of common interest very thoroughly argued.

The object of the paper is to consider some of the fundamental factors that affect oil consumption, according to the summary given by the author. It does not dwell upon the differences between lubricating systems. Beyond the fact that different oils apparently affect the oil consumption, and that there is a definite relation between viscosity and oil consumption, the effect of the physical characteristic, or the quality of oil, does not receive particular attention.

Dayton Meeting

The members of the Dayton section will meet at the Dayton Engineers Club on Oct. 3 to hear C. F. Kettering, president of the General Motors Research Corp., speak on "Some Problems Confronting the Automotive Engineer."

Washington Opens Year

The Washington section will start its year with a meeting on Oct. 5 at the Cosmos Club. R. E. Carlson of the Bureau of Standards staff will read a paper on "A Road Test Method for Comparing Motor Fuels." Carlson is engaged in the conduct of the road tests now being run at the bureau in connection with the Society's fuel volatility research project. He will describe the methods and apparatus employed in this work and give some idea of the conclusions that may be deduced from the data recorded.

Minneapolis Section

The Minneapolis section will open the season with a technical meeting on Oct. 4, at the Manufacturers Club. N. S. Kingsley, who is connected with the Standard Oil Co. of Indiana, will present a paper on "The Manufacture of Petroleum Products for Automotive Uses." H. S. Morton will also present a paper on "Front Wheel and Four Wheel Braking."

INDUSTRIAL NOTES

Wheary-Burge Truck Co. has been incorporated for $500,000 at Racine, Wis., to make special trunks and baggage merchandise for the motor car trade in addition to its main line of patented wardrobe trunks. George W. Wheary, for 19 years associated with the Hartmann Trunk Co., Racine, resigned recently as vice-president and general manager to form the new corporation. Harry L. Burge, until now general western sales manager of the Hartmann company, is associated with Wheary. A plant is now being equipped on three floors of the Racine Industrial Community building at Racine Junction, near the Mitchell Motors Co. and Racine Rubber Co. (Ajax) factories.

Star Rubber Co., Akron, is ahead of all previous records in production and sales. July and August formed the largest 60-day period to date. September totals, while known to be gratifyingly large, are not available at present. Star reports a particularly heavy demand during the past 60 days for straight side Meteor cords. This tire is made in all sizes up to 38 x 7. No additions to the Star line are contemplated at present by company officials.

Angle Steel Stool Co. which was established about 11 years ago at Otsego, Mich. has moved to its new day light factory at Plainwell, Mich., the removal being due to the need of an opportunity for expansion. The new location will permit the company to make its shipments over two steam and an electric road. C. E. Pipp is president and general manager.

Austin Manufacturing Co., Chicago, has contracted to handle sales of tractor and road maintaining machinery of the Wilson Tractor Co., Ottawa, Iowa. Many individuals of the Wilson organization will be transferred to the Austin force through the arrangement.

The Davis Boring Tool Co. has purchased a factory site in St. Louis, fronting on Forest Park Boulevard, on the corner of Spring Avenue. Preliminary work is now under way for the erection of a modern three-story daylight factory.

GRAY JOINS N. A. C. C.

NEW YORK, Sept. 26—Gray Motor Corp. has been elected to membership in the National Automobile Chamber of Commerce and will exhibit its various styles of Gray cars at the New York and Chicago automobile shows.

METAL MARKETS

The motley condition which of late has prevailed in the iron and steel markets is beginning to give way to a somewhat more orderly state of affairs. Fresh buying is at a tonnage rate that does not make up for the shipments leaving mills. The latter in spite of all transportation difficulties arising partly out of car shortage and partly out of embargoes exceed new bookings. Consumers are even more insistent than they were while the railroad shopmen's and coal miners' strikes were in full swing that mills make heavier deliveries on account of standing contracts. It seems almost as though they wanted to have all steel bought at what now seem like low prices in their own hands. At the same time there is impressively little, if any, disposition on the part of buyers to replace filled orders with new ones.

What light amount of business is forthcoming is of the "hand-to-mouth," "expect prices-to-be-lower" sort. For all that, neither producers nor consumers look for any spectacular price changes over the year's three remaining months. If the aggregate of business should suffice for a continuing operation of steel mills at 60 to 75 per cent of their capacity, gradual elimination of delivery premiums will ensue without basic prices being affected. The keenest market observers consider further liquidation of steel prices as having been deferred until 1923, when they hold that the process of deflation which set in two years ago and which lately has been interrupted as the result of the strikes will be resumed.

If deflation of steel prices is to be a genuine affair and not merely an ephemeral weakness of the market, it must be preceded by a sufficient buying movement to allow of a rate of mill operations that will make possible economies in production that are out of the question unless mills operate at more nearly their capacity. While the general expectation is for a gradual shading off in prices, it must be borne in mind in judging the market's future course that production costs have undergone a sharp advance as the result of wage increases which it will be very difficult to readjust on a lower basis in the near future. Steel producers recognize more so than any other class of manufacturers that one of the principal reasons why their products are selling at abnormally high prices is the scarcity of labor.

Pig Iron. Many automotive foundries have been showing a tendency of late to let their pig iron reserve run so low that when they must enter the market they lack the requisite time to make certain of lowest prices and are thus frequently compelled to pay the penalties that attach to distress tonnage. The general feeling in the trade is that the market is topheavy and that from now on it will gradually give way to more reasonable levels.

Aluminum. The chief question before the aluminum market now is how long a time will elapse before the domestic producer revises prices upwards so as to take advantage of the protection afforded to the American industry by the Fordney-McCumber tariff law. The heavy stocks of imported ingot metal are expected to serve for some time to come as a brake on too sharp advances for that description. The situation with reference to sheets, however, is different and the domestic producer is now really in a position to dictate the price for rolled metal.

Copper.—Quiet and easy.

Calendar

SHOWS

Sept. 23-30—New York, Closed Car Show, Grand Central Palace.

Oct. 7-14—New York, Electrical and Industrial Exposition, Grand Central Palace.

Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8-13 — New York Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Sept. 1922 — Rio de Janeiro, Brazil, Automobile Exhibits in Connection with the Brazilian Centenary Associação Automobilista Brazileria.

Oct. 4-15 — Paris, Automobile Show, Grand Palais.

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 9 - 19 — Buenos Aires, Argentina, Annual Exhibition. Automovil Club Argentino.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

CONVENTIONS

Oct. 2-7—Detroit, Fourth International Steel Exposition and Convention of the American Society for Steel Treating and the American Drop Forging Institute, General Motors Building.

Oct. 7-14—Detroit, Second National Aero Congress and National Airplane Races.

Oct. 9-11—Chicago, Annual Convention of the American Gear Manufacturers Association.

Oct. 18-20—Chicago, National Association of Farm Equipment Manufacturers, Congress Hotel.

Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

S. A. E. MEETINGS

Sept. 29—Detroit Section, Lubrication, A. A. Bull.

Oct. 3—Dayton Section—Dayton Engineers Club.

Oct. 3—Dayton Section, Dayton Engineers Club, "Some Problems Confronting the Automotive Engineer," C. F. Kettering.

Oct. 4—Minneapolis Section, Manufacturers Club, "Manufacture of Petroleum Products for Automotive Uses," N. S. Kingsley; "Front Wheel and Four Wheel Braking," H. S. Morton.

Oct. 5—Washington Section, Cosmos Club, "A Road Test Method for Comparing Motor-Fuels," R. E. Carlson.

Oct. 6 — Aberdeen Proving Ground, Md.

Oct. 26-27 — Detroit, General Motors Building.

Jan. 9-12—New York, Annual Meeting.

New York Hears Lens Makers on State Law

ALBANY, N. Y., Sept. 26—Hearings on the orders to show cause why State approval, granted in the past to more than 70 anti-glare automobile headlight devices, should not be revoked was begun to-day before Judge Walter H. Knapp, of the State tax commission. Six manufacturers of headlight devices upon which notice had been served appeared, and more are expected to-morrow when the hearing will be continued.

Several methods of enforcing anti-glare headlight regulations, under the new State law, were discussed. Suggestions made included a greatly increased State police force, especially trained, establishment of State testing stations and licensing of reputable garages passing required tests to aid car owners in testing and adjusting their headlight lenses and devices.

Old Types Removed

Dr. Max Poser, representing the Bausch & Lomb Optical Co. of Rochester, offered no objection to the withdrawal of the old type of Bausch & Lomb lens, stating that only a few of them were made, for test purposes. The later type is approved by the State. The same situation was found with the Shaler roadlighter and the Benzer lens. The new types of both lenses are approved, and there was no objection to the withdrawal of approval from the old type. Frederick H. Ford and R. E. Malone represented the C. A. Shaler Co. of Wampun, Wis., and J. A. Berkman, represented the Benzer Corp. of Brooklyn.

Edward Lyndon appeared for the C. and A. Mattise Corp. of New York City, manufacturer of non-glare lenses. It was found that this lens, under the name of Mattise, has been approved in Massachusetts, whose standards are the same as the New York standard. This lens, therefore, will be approved upon the filing of a statement from the testing laboratory that the lenses are the same.

Minna Vatter of New York City, manufacturer of the Deflecto device, and N. A. Siraco of the Siraco-Hammond Co. of Whitehall, manufacturer of the Eureka-Lunette device, were told that their devices could not be approved unless they complied with the provisions of the new tests as applied by the electrical testing laboratory of the United States Bureau of Standards.

Judge Knapp put forward as a possibility in enforcing the law the licensing by the State of reputable garages to examine car owners' lenses and devices and issue certificates for a small fee, to the effect that they comply with the State regulations, which certificates would be attached to the application for motor vehicle license.

One of the important features of the question which has been approached by the commission, Judge Knapp said, is the candlepower of bulbs. The commission has established the rule that all bulbs must be 21 candlepower.

NEW CANADIAN RULING

NEW YORK, Sept. 26—A Canadian ruling, effective Oct. 1, requires that the shipper's invoice indicate the country of manufacture or production, as to all imports and that the shipper certify that each article covered by his invoice is the product of the country specified. Under the new form of invoice the former ruling of the Canadian Customs that the American exporter must certify that the fair market value shown on his invoice was not lower than the wholesale price, or lower than the actual cost of production at the time or place of shipment, plus a reasonable profit, has been removed.

Rail Representative Blames Motor Buses

WASHINGTON, Sept. 27—The most direct cause for the falling off in passenger traffic on railroads has been due to the new and growing competition of hundreds of motor bus lines which have been built up in every State in the Union, and the millions of privately owned automobiles, declared C. A. Fox, chairman of the Central Passenger Association, representing 166 railroads, in the course of cross examination before the Interstate Commerce Commission to-day. This testimony was given in the hearing on the proposed interchangeable mileage plan which is vigorously opposed by the railroads and as strongly supported by the travelers' organizations. Fox says:

Private Cars Affect Roads

The fares of the bus lines are in some cases lower and in other cases they are the same or higher than the rail fares, but, regardless thereof, they are a controlling factor in handling this short haul traffic for the reason they pick up and deliver passengers, taking them from the main streets of the originating points to the main streets at destinations, and the service is so frequent that it diverts traffic from the rail carriers.

Millions of individually owned motor cars also make inroads on the local and through traffic of the carriers, which has been lost for some time.

Instead of any prospective alleviation of these difficulties, the losses from these causes undoubtedly will continue to grow because of the vast amount of money being expended in every state in the union in the improvement of the public roads.

Fare Reduction Not Wanted

For these reasons it is not believed a reduction in fares by means of reduced rate mileage or scrip tickets would have the effect of restoring to the rail carriers any considerable volume of this traffic now handled either by bus lines or in privately owned automobiles.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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Motor Car Development Just Begun, W. C. Durant Declares

Talk of saturation point silly. Automobile business still in infancy. Predicts new type of production and distribution. Highways of future will make possible radical structural changes. Lighter motors will serve needs. Foreign markets not scratched.

By James Dalton

PROFOUND faith in the future is the cornerstone upon which the automotive industry must build if it is to rise to the heights which destiny evidently intended for it. There can be no profound faith where there is not vision. The stupendous success of the motor vehicle up to this time has been due to the fact that it was sponsored in the early days by men with vision. Having vision does not mean being a visionary, although the public hailed as visionaries fifteen years ago the men who were able to sense something of what the automobile would mean in the life of the nation to-day.

W. C. Durant says—

THERE are not enough cars running today even to equip properly the farms of the country.

The motor car business is still in its infancy and automobile development is not yet out of the experimental stage.

The next 20 years will witness an expansion more marvelous than the past two decades.

Future production and distribution methods will be based entirely upon competency, experience and sound judgment.

Most of us will live to see the country covered with a network of motor highways.

Highways of the future will make possible radical changes in automobile construction with lighter motors and lighter cars.

One of the greatest "visionaries" of a decade and a half ago was William Crapo Durant. A good many people regarded him not only as a dreamer but mad when he planned and built the great Buick plant in 1907. But his vision has long since been justified. He was again hailed as a visionary when he organized the General Motors Corp. a couple of years later.

Then Durant had another "dream" and formed the Chevrolet Motor Co. with a capital of $80,000,000 and plants in eleven cities. Later, when he merged that big enterprise with General Motors, people began to concede that he might be a dreamer, but that he had an exceedingly hard business head.

Then, two years ago, a combination of circumstances arose which forced Durant out of the great combination he had built and for the second time in

his career the skeptics remarked "Durant is through."

But Durant hadn't lost his vision and he wasn't through. In the two years which have intervened he has again demonstrated his genius and his profound faith in the future of the automobile. His vision and his faith have enabled him to accomplish what seemed impossible in a period of great business depression and his development of a second great automotive combination is well under way.

HERE are some of the reasons why Durant had enough confidence in the future of the industry to stake his own future on a new automotive enterprise at a time when most people outside the industry and a good many of those within it, were convinced the bottom had fallen out:

"There are not enough automobiles running today even to equip properly the 6,350,000 farms in the United States alone," he says with all the emphasis at his command.

"Every mile of new highway that is built creates a market for many new automobiles. Most countries haven't started to build roads yet.

"This constant talk about a 'saturation point' is silly. There isn't any such point. The more automobiles built and successfully marketed, the more it will be necessary to build. Every day that passes adds at least one more practical use to which automobiles may be put.

"Nearly everybody carries a watch but the watchmakers are still making watches in increased quantities.

"The motor car business is still in its infancy. The development of the automobile is still at the experimental stage.



W. C. Durant

"The next twenty years will witness an expansion of the business of automobile making more marvelous by far than that of the two decades through which we have just passed.

"Relatively speaking, the automobile business to-day is in the same position that railroad development was thirty years ago."

Durant draws a remarkable parallel between the development of the railroads and the motor vehicle, apparently basing his predictions on the experiences of the steam carriers. He presents a graphic picture of the highways of the future and predicts that the character of these highways will make possible the development of a light, simple and economically operated motor car that will completely revolutionize transportation methods.

The automobile business of the future, he says, will be built upon a firm commercial basis with keen competition eliminating the incompetent and wasteful. This era of sound thinking he believes is already at hand.

Durant believes that out of the present strife for sales and dealers will come a completely new type of motor production and distribution with old methods ruthlessly cast aside and replaced by a system based entirely upon competency, experience and sound judgment. While he does not express the thought in so many words, it is evident he expects a survival of the fittest.

"Most of us can look back thirty years," says Durant, "and recall the early development of this country's railroads. It will be remembered that the ties and rails were laid on the surface, the one track lines following the contour of the land and avoiding the obstacles in the way by circling around them. The ballast for the tracks was made from the cinders from the ash pits of the locomotives traveling over them. Time saving was not the factor that it has since become. Up to that period we had been accustomed to water traffic with mule power, and days instead of hours had been required to reach a given point. Even the crude railroad facilities were so great an improvement that we thought we were approaching the millennium.

"The building of the railroads quickly became the ambition of the capitalists so called, in every community, visions of extraordinary profit attracting most of the available money in the country.

"Wealth created opulency and when opulency grew bold adverse legislation gave the railroad business its first jolt. But out of this jolt came a railroad development which made possible the luxurious traveling facilities which we later enjoyed. To avoid the payment of taxes over and above a stipulated figure fixed by law, the railroads turned their earnings back into their properties, improving road beds, straightening lines and buying more substantial equipment.

"From the single track they developed the double track line and then additional tracks were provided for slow freight traffic.

"The short lines were extended and connections were made from point to point until finally we had our transcontinental systems with mile-a-minute trains, dining and Pullman car service, and luxuries previously undreamed.

"WHEN the first automobiles appeared they were designed merely to supplant the horse, just as the railroads supplanted the canal boats. It was necessary to build the motor car to contend with highway conditions as they existed.

"The dirt roads of those days were for the most part the early trails of the pioneers, following the line of least resistance, avoiding the obstacles in their path

by circling around them and following their winding courses in and out, up and down, with little regard to the distance to be covered from point to point.

"To encourage motor travel and to meet the demands of the early motorists, these old trails were given new surfaces. As the popularity of the automobile grew, cities and towns vied with one another in the building of so-called motor highways until the states took over the main roads and began experimentation in surfacing.

"To-day the states are connecting up the short lines and creating systems of highways, but this development is still experimental.

"Gradually we are approaching the time when our highway systems will compare with the road-beds of the railroads. Gradually we are seeing the need for parallel lines to compare with the double-tracked railways. Eventually we will see the four-track lines duplicated in highway construction to provide for rapid passenger traffic and the slower freight truck transportation.

"Most of us will live to see this whole country covered with a network of motor highways built from point to point as the bird flies, the hills cut down, the dales bridged over, the obstacles in the path removed.

"Highway intersections will be built over or under the through lines and the present dangers of motor travel, one after another, will be eliminated.

"Even now we see indications of this development, but, with the Federal Government realizing the need of National control, our 'Riverside Drives' and 'Ocean Parkways' will be extended from coast to coast and from the Great Lakes to the Gulf.

Predicts Lighter Motors

"These highways of the future will make possible radical changes in automobile construction, less power-ful and, therefore, much lighter motors will be necessary and with the weight taken from the motor the car will be lighter built, for it is the strain created by the powerful power plants required to meet present needs that makes necessary the heavily constructed car of to-day.

"The point of absorption? We will not approach it for twenty years and, by that time, the motor car will be so extensively used that replacements will require capacity production constantly.

"We read of 50,000 motor cars passing Columbus Circle in a ten-hour period, or of the thousands of cars constantly traveling on some exceptionally prominent and well-built highway and we think the limit has been reached, but there are hundreds of thousands of miles of highways in this country over which the passing of a dozen cars a day is rare indeed. The character of the highways alone is responsible. Millions more automobiles would be in constant daily use in America to-day if highway conditions permitted their economic or even comfortable operation.

"Hundreds of thousands of people in this country would find the automobile practicable to their needs if the highways made rapid transportation in their neighborhoods permissible.

"And yet I have confined my observations to this country alone. South America, with its wonderful undeveloped resources and its area vastly greater than that of North America, has practically no highways at all outside a twenty-mile radius of a few of its larger cities. Asia, Siberia, Africa and large areas in Europe, to say nothing of western Canada and Mexico, have comparatively few highways that even will permit of motor travel.

"But motor highways will be built to reach the inaccessible points of the world, and America will build the automobiles that will travel over these highways, for America alone of all the countries of the globe is capable of the quantity production that will be required to meet the world's motor needs of the future."

Durant's visions of the future are not playing him false. He's not guessing at what's going to happen. He knows what the years to come hold for the motor vehicle.

When Durant retired from General Motors for the second and last time, he had only to announce his intention of re-entering the automotive field to bring flocking to him many of the men who had grown up with him and profited by his business sagacity. He found no difficulty in obtaining all the millions he needed as capital without going into Wall Street to get it.

$32,500,000 Business

There were a good many people who proclaimed that Durant was merely an organizer and a speculator and that he never again would build motor cars in large quantities. To-day his company ranks eighth in point of production and these critics have been put to flight. Durant cars did not go into production until August, 1921, and in the thirteen months which intervened up to Aug. 31, last, the plants operated by the divisional companies of Durant Motors had built and marketed 34,845 Durant four and six-cylinder cars. The total value of this product, at wholesale, was $32,500,000.

In addition to this achievement, Durant has purchased the second biggest automobile plant in the country in which to manufacture the Star, which has been designed to compete with the Ford; has perfected the Mason truck, has purchased the Locomobile and is building plants for the production of the Flint, which will be based on the designs for the Chrysler six for the development of which the Willys Corp. spent many millions of dollars at Elizabeth, N. J.

The Star is now going into production, although it was shown for the first time only last March. Since then 10,000 dealers and distributors have applied for sales franchises and 1000 dealers have been appointed. Orders for approximately 500,000 Stars have been received and orders for 120,000 have been accepted. Star Motors, Inc., has 20,000 stockholders.

This is only a sketchily drawn picture of what has been accomplished in two years by a man who started anew at the age of 60. It shows what vision and faith in the automobile have done for W. C. Durant.

STATISTICAL data gathered by the Danish government reveals that the demand of the automobile industry in that country is for a light car. The figures show there to be 15,635 automobiles in Denmark at the close of 1921 and of this number 6800, or nearly one-half of the total number, are 10 to 12 hp.

Even smaller horsepower automobiles are in demand, the figures indicate, showing that out of the total registration 2878 had engines rated from 6 to 8 hp. Only 270 machines had over 20 hp.

Taxis and buses, numbering a total of 1946, were for the greater part rated at from 6 to 12 hp. There were at the close of last year 4679 trucks having a total of 66,552 hp. Of this number 1651 had from 10 to 12 hp. each; 1255 had from 12 to 20 hp. each; 901 over 20 hp.; 510 from 6 to 10 hp., and 26 less than 6 hp.

One of the weaknesses in the case of American cars is the comparatively poor parts service which is rendered by the local dealers. So serious is this, according to cable advices, that a syndicate is being formed which involves the centralization of parts service for all American cars, headquarters to be in Scandinavia.

How Car Makers Can Assist Dealers in Handling Time Sales

Expert in operations of finance company could give valuable assistance to entire sales organization as well as manufacturer. Would scrutinize credit risks and thus keep interest rates down. Such a service would be profitable.

MOTOR vehicle manufacturers are giving greater attention than ever before to the problems of their dealers. One of the most important of these is the financing of time sales. Few factories are in a position to assume the burden of dealer financing, even if they deemed it wise to do so. As a consequence, broadly speaking, there are only two sources from which the dealer can obtain the funds he needs to finance installment paper. They are:

From automobile finance companies.
From his bank by pledging his own credit.

There are few dealers so fortunately situated that they can supply their needs through their banks. In most cases their line of credit is not long and banks are not eager to accept long term paper in a series of comparatively small notes. Most of them, therefore, have to rely on finance companies. Finance companies are not philanthropic institutions and they have their faults, but they are the best means developed thus far for financing time sales when the dealer's bank won't handle the paper.

To most dealers, and to many manufacturers, the operations and the internal workings of a finance company are a profound mystery. Dealers kick on what they consider the extortionate rates charged for the service given. Unfortunately, the finance companies have done little to enlighten their patrons. Such attempts at enlightenment as they have made have been couched in language absolutely unintelligible to the average dealer. He will try to look wise and nod his head at the right time but it is all so much Greek to him. When the attempt at explanation is finished the chances are that he will be more convinced than ever that some one is trying to put something over on him.

Most factories do not have in their organizations a man thoroughly versed in the operations and requirements of finance companies. If they had some one entirely familiar with finance company methods, he would be in a position to obtain much closer co-operation because of his understanding of both sides of the case. Such a man would be able to give dealers and distributors invaluable assistance.

Such a man would understand clearly the legal safeguards and the credit requirements with which finance companies must surround themselves if they are to stay in business. He would be able to insure prompt return of the money invested by the company which may have a contract with his factory to finance the dealer organization. This would make the finance company more eager to assist in the distribution of cars.

For several years finance companies dealt exclusively with individual dealers. They have enabled the dealer to sell cars on time and thus materially increase his turn-over. Naturally the factories have benefited. Much has been written of the exorbitant rates charged for this service but it is significant that few finance companies have returned abnormal profits.

As a matter of fact some of those which operate on a national basis have abandoned motor vehicle paper and have taken up other lines as a substitute. They have lost heavily in some cases through the sharp practices of dealers.

It has been only within the past two or three years that motor vehicle manufacturers, with a very few exceptions, entered into contracts with these concerns to finance their dealers.

Factory Contracts

These factory contracts vary somewhat but in most cases the manufacturer insists upon the financing of the dealer's sales, either upon receipt by mail of the notes given by the purchaser of the vehicle or by the more up-to-date method of having the dealer draw on the finance company with a sight draft with documents attached. The amount of these drafts is credited to the dealer's account when presented to his bank.

A few manufacturers have gone so far as to guarantee the paper presented by their dealers and thus they become jointly interested in it with the finance company. This makes it possible for them, rather than the finance company, to control the credit operations of their dealers.

Installment paper handled in this way makes it possible for the factory to know thoroughly the class of business its dealer is doing.

It enables the factory to check the value of the notes resulting from the time sale of cars as well as the terms and time of payments, thus giving a definite line on the business methods of the dealer.

A good many dealers are operating on a "shoe string" and a good many others are none too solidly financed. As a consequence they are not able to finance themselves over periods in which sales are slow or help entirely sound prospects by carrying notes for them. They are unable to remedy the evil effects of sales made on an unsound basis. They fall down on their collections and some of them don't know how to keep their books

straight. As a result the finance company is forced to become not only a banker but a collection agency and auditor as well.

Finance companies present many plausible arguments to refute the assertion that they charge too high rates for their services. They claim that the layman does not seem to realize that they are themselves heavy borrowers at the banks or that as distributors of what is termed "prime financial paper" they must lend their name to this paper in addition to pledging the commodity actually back of it. It is asserted that some of these companies doing business on a national basis would be unable to exist were it not for other business such as the purchasing of accounts receivable.

There seems to be some sound basis for the contention that finance companies should function as subsidiaries of the manufacturers and act as specialists for the banks in the handling of the commercial paper issued when notes are given in the purchase of motor vehicles on time.

The special factory-finance company plan is steadily coming into greater favor because it enables the dealer more readily to maintain an adequate stock of cars on his floor throughout the year. With an advantageous time payment rate, offered under the factory-finance company plan, they frequently would be able to take a sale away from a competitor handling a car in the same price class who might not be favored with as good a financial backing.

Factory Plan Permits Lower Rates

IT IS because of the volume of business which normally would accrue to the finance company under the factory plan that it is able to offer a lower rate than would be possible in dealing direct with the individual dealer. From the standpoint of the manufacturer, theoretically at least, it should help him to maintain his production at a more stable level because the dealer always has a medium through which to handle his customer's paper. Then, too, proper financing of the dealer obviates shifting about in the sales organization to find men who can finance themselves.

Having in the factory organization a man who knows enough about the work to keep a check on the finance company and the dealers should result in proper lubrication of the machinery so that the system will work smoothly and satisfactorily to all three of the parties concerned. In many cases the factories have not derived the full benefit from their arrangements with the finance companies because they have lacked a man thoroughly familiar with the machinery which has been set up.

In the long run it is the dealer's credit strength which fortifies the manufacturer because it enables him to absorb his full share of the factory output. It would be helpful to the manufacturer if such a special representative could devote his entire time to this special work. Additional sales would be possible through the judicious use of credit instead of merely obtaining credit for orders already on the books. There would be fewer complaints in reference to such blanket contracts covering all dealers.

Finance Problem Neglected

FOR the last six months most dealers have had "full order books." A good many of those handling the more popular lines have been able to sell for cash all the cars they could get and they have paid little or no attention to time sales. When the market tightens at some time in the future, as it undoubtedly will, there will be more or less of a scramble for financial accommodation. Some dealers will find, when that time comes, that they have been devoting all their attention to the selling end and that their finances have been left to drift so long as they did not hit shore.

Whenever this situation arises these negligent dealers will condemn the home town banker or the out-of-town finance company if they refuse the accommodation asked because the dealer is unable to supply a lot of the information which will be demanded before he can be given a line of credit.

Tax Collection Methods

THE bookkeeper of average intelligence can make up a statement, handle the books and be useful in many capacities but he cannot handle the installment paper which will be produced by an active selling campaign. Much of this paper may be past due because of lax collection methods.

If collections do not come in promptly and it becomes necessary to replevin a considerable number of the vehicles which have been sold on time, it is evident that the installment paper covering these commodities, upon which the bank or the finance company has loaned money, becomes undesirable and must be repurchased by the dealer. This leaves him without sufficient working capital and makes him a poor credit risk, not only from the viewpoint of the banker but also from that of the factory and the trade.

Banks, as a rule, do not desire and therefore do not solicit long time paper and it was because of this fact that the discount companies came into being. Comparisons have been made time and again between the charges made by the banks and the finance companies for the same service and the finance companies contend that there is only a slight difference when all factors are taken into consideration.

Finance companies also assert that they frequently are disheartened by the practices of some dealers in the financing of cars for stock. This short time paper is sold to finance companies which purchase it in the expectation that the more desirable retail paper accruing from the sale of the stocked cars will find its way back to them, but it often happens that the retail paper goes to another finance company whose rate may be one-eighth of 1 per cent less than that of the one which carried the storage paper.

Must Strengthen Financial State

SOME finance companies are looking into this question carefully and it is probable they will refuse further accommodation to the dealers they do not believe have played fairly with them.

It would be a wise precaution for the dealer to take time by the forelock and strengthen his financial fences with the bank or company from which he has borrowed in the past and to which he probably will go again when he needs accommodation. If he is fortunate enough to be the representative of a company which has a sales-credit specialist he will be given wise guidance and steered over dangerous financial rocks. He will be doubly fortunate if he can afford to have such a man in his own organization. Even though he may not think he can afford it, he may find the expense a real economy in the end.

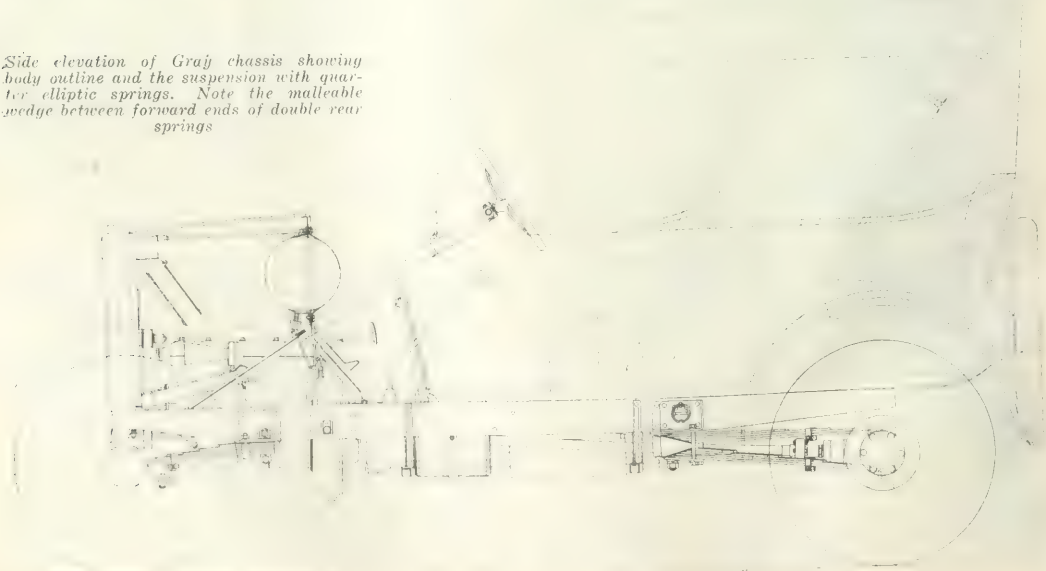
The Gray Chassis—An Interesting Design for Quantity Production

Has shortest powerplant used in any American chassis. Separate front plate in engine simplifies foundry work. Cost of assembling chassis said to be less than $10. Flywheel circulates oil through engine, gearset and over single-plate cotton faced clutch.

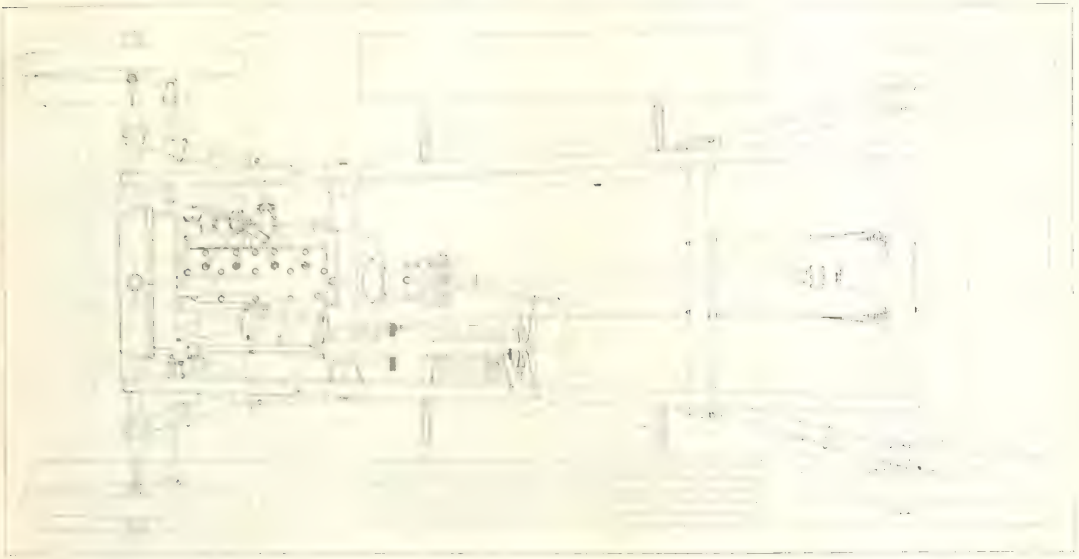
By J. Edward Schipper

THE Gray car presents an interesting study, for it was designed as a low-priced production job, which would, at the same time, give a maximum of service and life. The chassis possesses marked individuality, the design being original from stem to stern. It has 100 in. wheelbase, weighs 1100 lb. and with the five-passenger phaeton body, 1585 lb. With this body, it sells at a little over 30 cents a lb. The chassis incorporates the shortest four-cylinder unit powerplant on any American chassis, what is probably the smallest three-speed, selective gearset manufactured, an extraordinarily rigid frame and a unique type of spring suspension of interesting characteristics. The chassis weight distribution favors the front end of the car to some extent, but with the body in place and fully loaded, the weight is about evenly distributed over the front and rear axles since the three-passenger load in the rear seat is directly over the rear axle.

The manufacture of a car of this price class selling under $500 presents an interesting problem, not only in design, but in service and in economics of manufacture. For instance, it costs at the present time well under $10 per car to assemble. This cost will decrease as the production rate increases. It is generally true, moreover, that a car which is easy to assemble is also easy to service because the same features of construction which make the parts go together readily make disassembly easy. It must be remembered that, in a car selling at this figure, the same spirit of economy which prompts a purchaser to secure a low-priced car is also a strong factor when it comes to maintenance. The price factor dominates, however, and every unit which enters the car must combine low cost with durability. A car designed solely from the performance standpoint with price a secondary consideration is approached from a directly opposite angle. In going over the features of design herewith described, it is essential to bear in mind that, although reliability and satisfactory performance have



Side elevation of Gray chassis showing body outline and the suspension with quarter elliptic springs. Note the malleable wedge between forward ends of double rear springs



Plan view of Gray chassis. Note long bolts used to secure rear arms of engine, also the flare of front and rear springs

been insisted upon, the prime essential has been to accomplish these results at the lowest cost in materials, arrangement and workmanship.

The car is designed for those who have not the time or inclination to keep up a vehicle which requires delicate adjustment. The engine, in contrast with that in most of the light-weight cars recently developed, is distinctly a low-speed, low compression unit. It peaks at 1700 r.p.m., at which speed the vehicle is operating at about 40 miles per hr. The average gasoline consumption, all over the country, is said to be about 25 miles per gal. The maximum speed of the car is about 43 m. p. h. on the standard gear ratio of 3.9 to 1.

The engine is designed as a heavy-duty type with high factors of safety and relatively low compression. The compression space is 28 per cent of the total volume. As a result of the relatively low maximum pressures and temperatures the close limits used in high compression engines are said to be unnecessary and it is possible to use liberal clearances, and to employ cast iron valves. Light valve springs which conserve the valve seats and a small intake manifold giving high gas velocities are also employed—the latter to assist in carburetion. The relatively light stresses on the engine bearings make possible the use of a simple oiling system.

Innovation in Cylinder Block Casting

The cylinder block is a gray iron casting with the head separate and the upper half of the crankcase integral. The head is also a gray iron casting, but the bottom half of the crankcase is a steel stamping. A feature which is noteworthy in the cylinder block casting is that the front plate is separate, thereby simplifying the foundry work. A 5/16 in. pressed steel plate to which the front cover is bolted is used and the bottom pan is so arranged that it can be taken off without disturbing this front plate and front cover. When the pan is dropped, all of the bearings in the engine are accessible from below. Another point which may be noted in the cylinder block casting is that it has not been found necessary to carry the water jacket spaces as far down the cylinder as is customary in higher compression engines. The reason for this is that, with the lower initial pressure, the temperatures are materially less at the bottom of the stroke.

The cylinder head casting affords a noteworthy study in the arrangement of the water jackets for a thermo-syphon cooled engine. The large water space over the combustion chamber may be noted and also the manner in which the water is brought closely around the spark plugs. One of the hottest points in the chamber wall is the metal in and about the plug. With an engine of this size, it is sometimes a problem to bring the water closely around a plug. A box-like projection at the front end of the cylinder head casting gives a rigid support for the fan and carries means for adjusting the fan.

The pistons are gray iron and have three rings, two above the wrist pin and one below. An unusual feature for a low-priced engine is that all of the piston rings are lapped into the cylinder in assembly. The piston is a flat-head type and measures 3⅜ in. both in diameter and length. The head is ribbed transversely and longitudinally to assist in carrying the heat away from the center of the head, as well as in distributing the load to the wrist pin. These pistons are as light as is consistent with the material and low priced manufacture. They weigh 26 oz. and in assembly are selectively chosen.

The wrist pins are clamped in the upper end of the rod, the bearings being on bronze bushings in the piston bosses. The connecting rods are drop-forged, I-beam section of 0.35 carbon steel, heat treated. Holes are drilled both in the upper and lower halves of the connecting rod bearings for easy entrance of oil. Scoops are placed on the bottom of the connecting rods to assist in the splash lubrication. The connecting rod lower bearing caps are held in place by two nickel steel bolts. The connecting rods are 7 in. long center to center.

Three main bearings with drop-forged main bearing caps each held in place by four alloy steel bolts are used to support the 1¼ in. high carbon steel crankshaft. An interesting fact in connection with the choice of a carbon

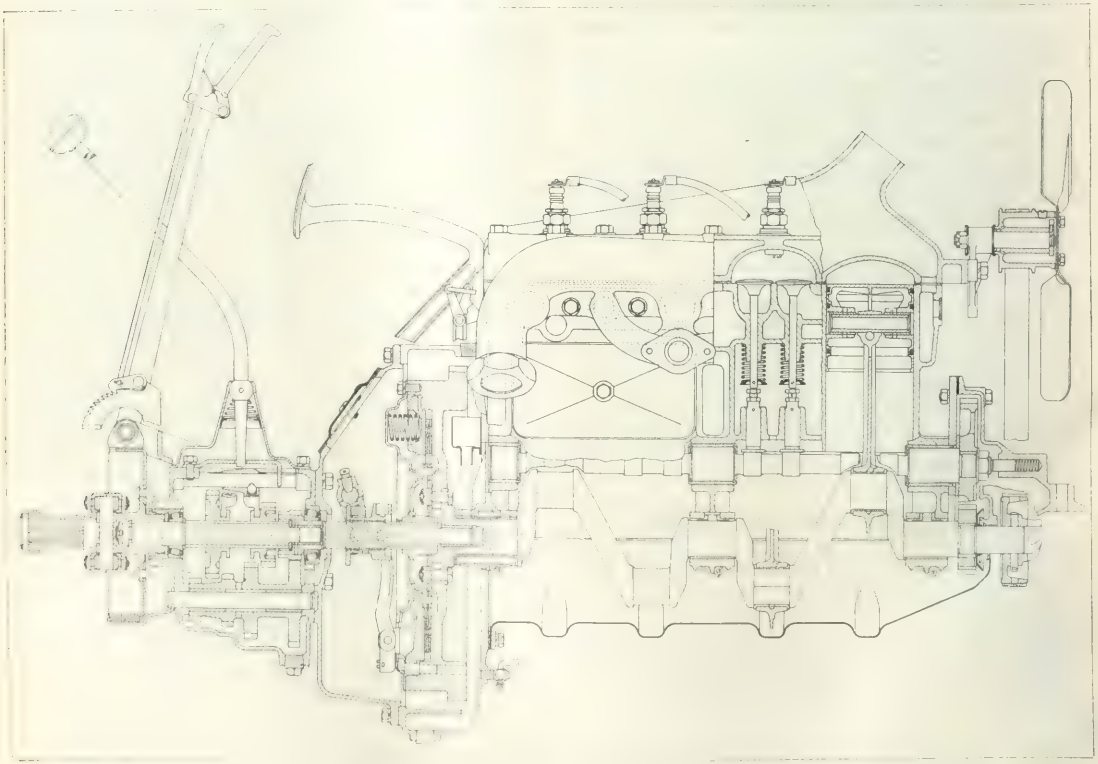
steel shaft for this engine is that it would have been possible to use, as is the practice in some of the other low priced cars, an alloy steel shaft of smaller diameter. The cost, however, is said to be exactly the same, the rigidity factor is greater in the larger diameter carbon steel shaft than it is in the smaller alloy steel. With the support given by the large main bearings, which measure in length, respectively, from front to rear, $1^3/_4$, $1^5/_8$ and $2^1/_2$ in., ample stiffness is secured.

Helical gears are employed to drive the camshaft and the generator units. The thrust of the helical gears is taken on a button in the timing gear cover. This cover is a very interesting casting, performing not only the function of a housing for the timing gears, but also supporting the oil filler and breather and carrying, by means of three studs, the entire generator unit which includes the generator, coil and breaker box. This camshaft is supported on three bearings which step down in size from 1 7-16 in. diameter so that the entire camshaft can be withdrawn through the front end of the engine. The camshaft bearings are bronze bushed, although this is slightly more expensive in initial cost than cast iron bearings directly in the block casting. The bushings are used to make a simpler and cheaper replacement. This is one of the instances which show that although it has been laid out with low cost primarily in mind, it is still built with the idea that ease of maintenance and accessibility must not be sacrificed to secure low manufacturing cost.

An original feature in connection with the valve layout is the use of cast iron push rods with chilled faces. This has proven to be very successful and since no bushing is employed in the push rod guide, a cast iron against cast iron bearing surface is provided, which, with ample lubrication, should insure long life. A valve adjustment of the usual type is provided. The exhaust and inlet valves are interchangeable, being $1^3/_8$ in. diameter in the clear, with a lift of 7-32 in. In place of the usual 45 to 60 lb. spring, a 35 lb. spring is employed and with the low lift, the inertia forces are kept down, consequently giving reduced wear on the valve seat. The low pressure valve springs act somewhat in the nature of a governor and have a great deal to do with the fact that the engine peaks at 1700 r. p. m. With the 35 lb. spring, the followers leave the cams at about 1500 r. p. m., giving a lag in the valve action, which, of course, is responsible for the drop in the power curve.

Low Pressure Oiling System

The oiling system is circulating splash, the clutch and flywheel housing acting as the oil reservoir. Oil is picked up by the teeth in the flywheel, carried to the top of the casing and dropped into a funnel shaped opening or mouth at the end of a $^1/_2$ in. tube which runs the entire length of the crankcase, with sufficient inclination to give a positive supply of oil even when the car is ascending a steep grade. A low-pressure oiling system has been chosen because it is fool-proof, will give a positive feed and is not apt to clog. At the top of the flywheel housing there is a plug through which a wire can be inserted and run through the entire length of the oil tube. The curve at the rear end of the oil tube below the funnel mouth is very easy so that it is



Part sectional view of the Gray powerplant, showing single plate clutch which is cotton faced and runs in oil

easy to pass a wire into the tube. The diameter of the tube is so large that oil will start to flow through readily even in winter weather.

At the bottom of the flywheel housing there is a trap cast integrally with the housing which acts as a sediment collector. A drain plug is placed at the bottom of this sediment pocket. In the assembly of the engine, the oil is changed four times during the running-in and final assembly processes. This results in a clean engine at the time it reaches final inspection. The oil from the ½ in. tube is fed directly to the three main bearings and from the end of the tube passes onto the timing gears. The pistons, camshaft and other working parts of the engine are all taken care of by splash thrown up from the scoops on the end of the connecting rods from the trough formed in the bottom oil pan.

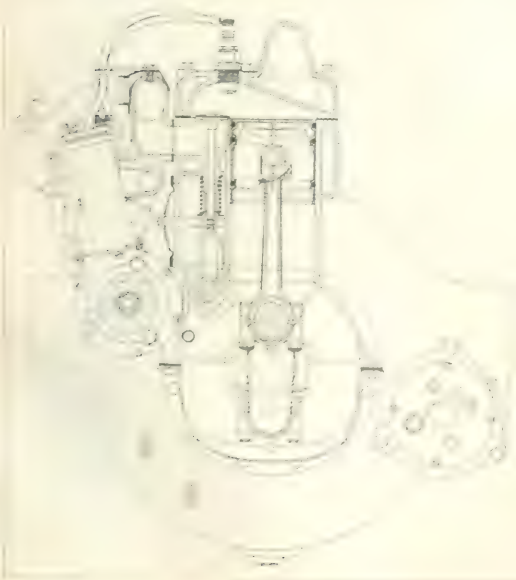
10 In. Water Head for Cooling

The thermo-syphon system is so arranged as to have a 10 in. water head which has been found to promote rapid circulation of water in the radiator. The free flowing type of tubular radiator is employed through which it is possible to circulate from 20 to 22 gal. per min. The water outlet is 1¾ in. inside diameter and the system carries 5 gal. and 1 pt. Because of the fact that this is a rather short stroke engine, the head is considerably below the hood, which permits of the large head of water mentioned.

The fan is a four-blade stamping driven by a belt from a pulley on the end of the crankshaft and has an ingenious die-cast aluminum hub which is made hollow to provide an oil reservoir in which oil is circulated by centrifugal force due to the action of an eccentric oil slinger. The periphery of the die-casting forms the fan pulley.

The fuel system is fed from an 8 gal. gasoline tank mounted in straps beneath the cowl. A hot-spot form of manifold is employed in connection with a Scoe carbureter.

The exhaust manifold is 1⅝ in. in diameter. The carbureter is offset from the center of the engine so as to provide space for the generator and ignition units. The manifold has been designed with sharper bends in one direction than the other to counteract any bad effect which the non-central location might have entailed. The wires to the spark plugs are short and the overhead location of the spark plugs makes for accessibility. It has been found that a long shank spark-plug gives the best result from the standpoint of acceleration, probably due to the fact that it brings the spark close to the center of the combustion chamber, thereby reducing the time of combustion.



Transverse section of engine. Note arrangement of water jacket

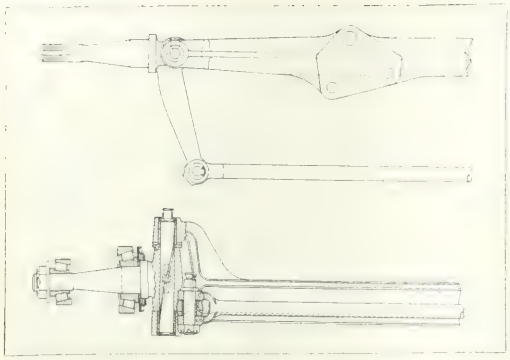
Clutch and Gearset Unit with Engine

The clutch and gearset are assembled with the engine to form a unit powerplant which measures only 38½ in. long over-all. The clutch operates in the flywheel housing which acts also as a lubricating reservoir and therefore runs in oil. It is a single plate type 9¾ in. in diameter and the plate is faced with compressed cotton which has been selected, according to the Gray engineers, because the heat generated is not sufficient to require the use of asbestos and a gain of 25 to 35 per cent is claimed to have been made in coefficient of friction. The total pressure of the six clutch springs is between 1100 and 1300 lb. These springs are spaced about the circumference of the clutch disk and are held in place by a pressed steel plate in which are formed the cupped spring retainers. This plate is corrugated for stiffness. The pressure plate is made quite heavy and really forms part of the flywheel weight. Owing to the mass of this part, it also is of considerable value in carrying away heat and the Gray company claims it is possible to slip this clutch indefinitely without burning the surface. Because of the large area of the clutch surface, the unit pressure is only 28 lb. per sq. in. The bronze throwout bearing on the clutch shaft can be replaced when worn through the hand hole in the clutch housing. It is necessary to remove only one set screw to reach this bearing. Another feature of the clutch is the fact that there is a spring on the pedal which separates the collar from the thrust bearing so that normally there is no engagement and consequently no wear between the collar and the throwout yoke. There is no adjustment provided on this clutch and it is claimed that none is necessary because any wear which takes place is compensated for by the springs. The clutch can be assembled with a wrench and without the aid of special tools. Gearshifting is facilitated due to the fact that the rotating masses are light. The assembly gives a narrow rotating mass which, it is claimed, when put in static balance, is also in rotative balance.

Gearset Design Helps Secure Silence

The gearset is probably the smallest three-speed selective unit on any American car. The span between the bearings on the lower shaft is only 4⅝ in. and on the upper shaft only 5 in. Because of this and also because there is no flat surfaces on the housing the problem of silence is considerably simplified. The main shaft is mounted on Timken tapered roller bearings, both the shaft and gears being alloy steel. The gears have a face width of 9-16 and ½ in. They are lubricated by oil which circulates through the oiling system of the engine from the clutch housing. There is a dam which permits the oil level to mount to the proper height in the gearset. The gearset cover plate contains the shift lever and interlock. There is an anti-rattle and oil-proof spring mounted underneath the ball holding this unit tightly against the cover plate.

The emergency brake is also mounted at the rear end of the gearset and acts on a drum riveted to a brake hub which is secured to the transmission shaft by an S. A. E. standard taper joint. The brake actuating mechanism



Timken front axle used in Gray chassis

consists of a double cam with a single spring for spreading the band on release. The spring is mounted freely on the shaft between the two cam followers and the cams themselves are keyed to the brake actuating shaft. When the shaft is rotated by the movement of the emergency brake lever, the two followers are squeezed together, carrying the brake band with them. On release, the spring brings the follower back with the cams.

At the rear end of the gearset is mounted the front universal joint which is a Mechanics' Machine, slip joint type. This drives the tubular propeller shaft and a second universal joint of the same make carries the drive to the rear axle. The latter unit is a Timken design made especially for this car. The axle complete weighs 95 lb., which is only $4\frac{1}{2}$ per cent of the loaded weight of the car, thus providing an unusual weight ratio factor. The axle is a semi-floating type, one feature of which is the large diameter axle tube which is said to provide a safety factor of 10 against road impact stresses.

Real Axle Follows Timken Practice

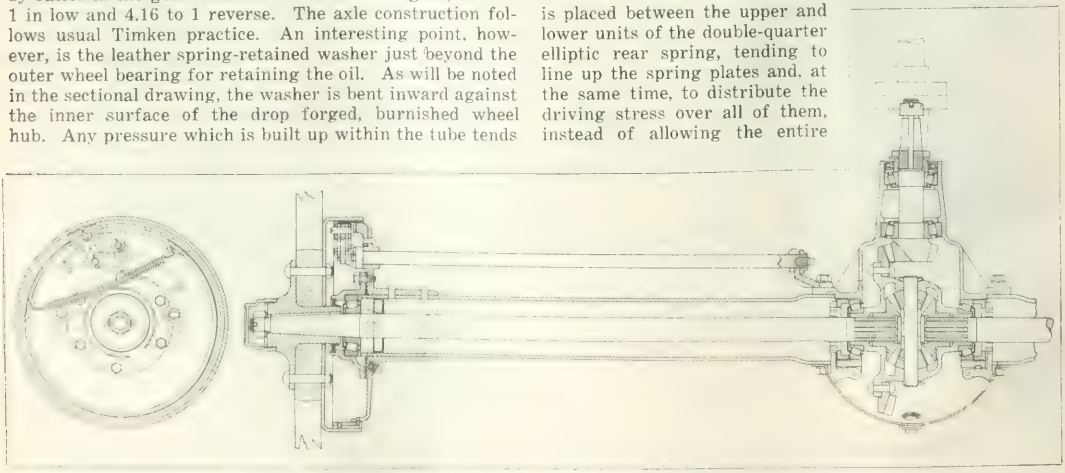
The pinion shaft is mounted on two Timken bearings of the new short series type and drives through spiral bevel gears having a ratio of 3.9 to 1. This ratio is multiplied by ratios in the gearbox of 1.6 to 1 in second gear, 3.38 to 1 in low and 4.16 to 1 reverse. The axle construction follows usual Timken practice. An interesting point, however, is the leather spring-retained washer just beyond the outer wheel bearing for retaining the oil. As will be noted in the sectional drawing, the washer is bent inward against the inner surface of the drop forged, burnished wheel hub. Any pressure which is built up within the tube tends to force the washer more tightly against the hub and consequently prevent leakage. The drawing herewith does not show the small spring which is now mounted against the leather washer to force it against the wheel hub.

The rear wheel service brakes are internal, wrapping band type and are fully enclosed. They are 10 in. in diameter with a $1\frac{1}{4}$ in. face. Owing to the fact that the brake bands are supported solely at the top, considerable wrapping action is claimed in both directions for this brake. The wheels are of wood, artillery type, and the hubs are drop forgings.

One of the most interesting features of the chassis is the frame layout. The frame has no malleables in its entire structure and weighs but 82 lb. The main side members are $4\frac{1}{2}$ in. deep with a $1\frac{3}{4}$ in. upper flange and $2\frac{1}{8}$ in. lower flange. The stock is $\frac{1}{8}$ in. thick. The engine mounting is of the three-point type. Nickel steel cap screws 8 in. long are used to attach the two rear arms to the frame and the front point of support is slightly to the left of the center line of the engine, but about on a line with the center of gravity. This permits of simplification of the front end, as it gets the motor support away from the end of the crankshaft. Because of the unique spring suspension, some side twist is put in the frame as the springs are deflected. In the case of the front end, the spring in the frame is spread through a great part of the length and the twist on the crankcase is absorbed through elongation of the nickel steel cap screws used in the mounting of the engine. The use of the $\frac{7}{8}$ in. nickel steel bolt at this point has been found to compensate fully for the frame distortion and no trouble has developed at this point, although a mounting of this kind is a new departure.

Tubular Cross Member Key to Frame

From a structural standpoint, the tubular cross-member is the key to the entire frame. This tubular member is placed at the point in the frame where the torsion from the rear spring is greatest. A drop-forged, heat treated plate is riveted to both the tubular cross-member and to the frame and also takes the driving thrust and twist, due to the fact that the front ends of the rear springs are supported at this point. The angularity in the rear springs has been found to be instrumental in decreasing side sway. An unusual feature in the suspension and mounting is the use of a malleable wedge which is placed between the upper and lower units of the double-quarter elliptic rear spring, tending to line up the spring plates and, at the same time, to distribute the driving stress over all of them, instead of allowing the entire



Gray-Timken rear axle. Note large tubing employed, also the expanding brake which is a self-wrapping type

driving stress to be transmitted from the main leaves of the springs to the spring bolt. In suspensions of this kind, one of the troubles which has developed is the shearing of the spring bolts, due to localization of the driving stresses. By means of this wedge shaped piece and the bolts which tie together the entire spring assembly, together with the wedge, the stress is so distributed that it is claimed that this trouble is eliminated. Due to the rigidity of the tubular cross-member with the forged supporting gussets, no rear cross-member has been found necessary. The steel tube is 2½ in. in diameter and is of the brazed type.

The front axle is the Timken type with plain bearings at the king pins, these being fitted with spiral grooves for oil lubrication. The king pin diameter is 11-16 in. The front wheels are mounted on Timken short series roller bearings. The steering gear is the worm gear type with full adjustment providing four locations of the gear in case of wear. The gear provides a 6⅜ to 1 reduction. The turning angle is 40 deg., giving a 28 ft. turning diameter. The steering wheel is 16 in. in diameter and the column carries the spark and throttle control units in a very simple manner. The throttle mechanism is carried around the cylinder block by a simple linkage, while the spark control is connected from the end of the column directly through a hole in the cylinder block to the distributor on the opposite side.

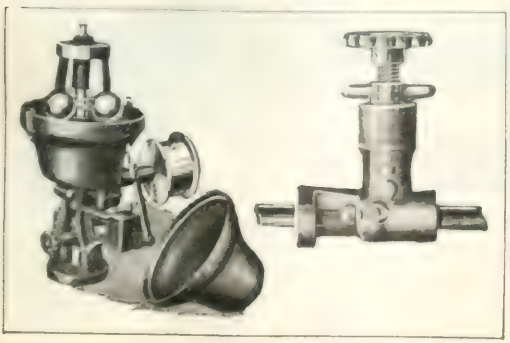
On the chassis is mounted a light weight body which has unusual foot room for the wheelbase. The shortness of the powerplant is instrumental in helping secure the large passenger space. The doors are 21 in. wide. A recent development in the car has been the elimination of the wood running board and its replacement with a steep stamping which provides additional strength with greater economy. A further improvement has been the replacement of the plain windshield glass by plate glass. Deliveries are now going forward at the rate of about 80 per day. Production for the month of September exceeded 1500 cars.



Worm and wheel steering gear in Gray chassis

Governor for Tractor Engines

A GOVERNOR of the fly-ball type, the essential parts of which have been used on governors for steam engines for many years, is now being marketed, for tractor, portable engine and similar installations, by the Pickering Governor Co. This governor is arranged, as a rule, for belt drive to a pulley on a horizontal shaft. Thence the drive is through bevel gears to a vertical shaft about which the fly-balls rotate. The working parts are fully inclosed by a metal casing designed to exclude dust and water and provided with a removable cover giving ready access for lubrication and inspection.



Pickering governor showing detail of range adjusting device

The governor is fitted with an adjusting device, termed a "ball ranger." This consists of a screw with hand wheel and lock nut, and three balls fitted into the lower part of the casting which supports the vertical shaft. Turning the handle raises or lowers the vertical shaft through the motion imparted to the balls and thus changes the speed range through which the governor is effective. By this means the operator can vary the maximum speed to suit the condition of service. The adjusting screw can be connected, if desired, to an extension shaft with universal joints, thus providing means for speed adjustment at the hand of an operator some distance from the engine.

Motorcycles Popular in Palermo

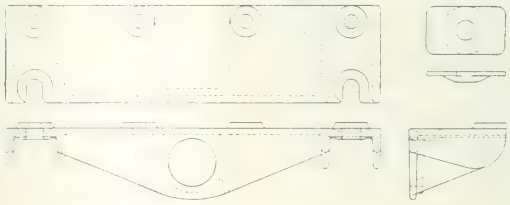
THE use of motorcycles is steadily increasing around Palermo, Italy, and machines are finding a ready sale. The present time is opportune, says Consul Nathan in a report received by the Department of Commerce, for American motorcycle manufacturers to enter the market and develop their business in this district. The Italian "Bianchi" retails for 3,000 lire as compared to American motorcycles which sell for about 14,000 lire on account of heavy duties varying from 3,000 to 3,500 lire according to the premium on gold.

New Low Priced Six Assembled from Well Known Parts

New Barley car is characterized by frame of unusually stiff construction. Radiator has novel mounting on two ball-pads. Designed to prevent distortion. Continental engine and Columbia axles among units employed.

THE new car announced by the Roamer Motor Car Co., manufacturer of the Roamer, is to be a low priced six cylinder model bearing the name of the Barley six. It includes a set of units well known in the automobile field, notably the Continental 6-Y engine, Borg & Beck 10 in. clutch, Fuller gearset, Merchant & Evans fabric universals, Columbia axles, Jacox steering gear and Delco electrical equipment.

These units are brought together in a chassis of 118 in. wheelbase and will be supplied with a complete line of bodies shortly to be put into production. The bodies are made at the Roamer plant and are similar in appearance and characteristics to the low straight line types which have characterized the Roamer car.

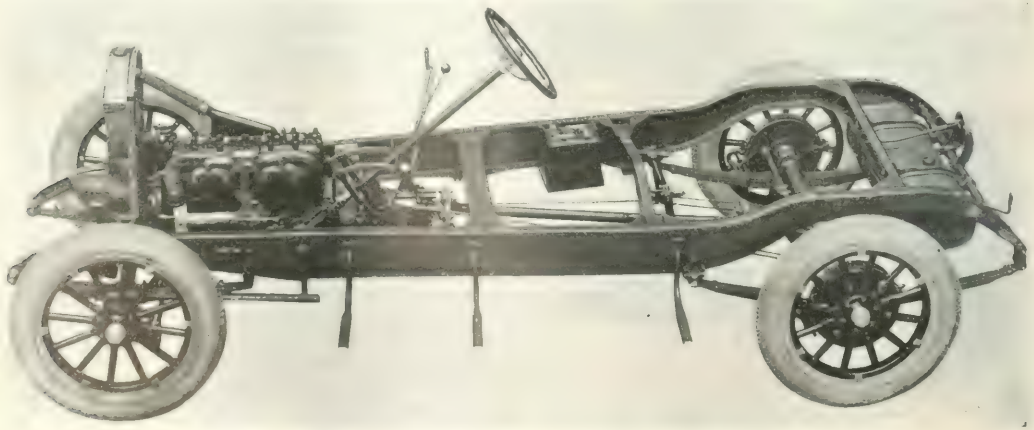


Malleable iron radiator support, showing the ball-pads used to prevent distortion

Although this is a car made up of units purchased outside the plant it nevertheless has a number of distinctive points of design. The frame has been made exceptionally stiff, the side rails are of channel with an 8 in. web and 2 in. flanges. The stock is ⅛ in. Integral gussets are employed for anchoring the cross members and there is a box section cross member at the center which contributes largely to the rigidity of the frame. In addition there is a heavy tubular cross member against which the side rails are drawn up by a through bolt.

To prevent distortion of the radiator when mounting it to the frame this unit rests on two ball plates which find their own seat. The radiator is a Modine with a Spirex core.

Both brakes are located on the rear wheels and are without equalizers. The brakedrums are 14 in. in diameter by a 2 in. face. The spring suspension is semi-elliptic and the Hotchkiss drive is taken through double leaves both of these being wrapped about the front eye thus distributing the load. The rear springs are 56 in. in length and on the phaetons one dead leaf is inserted to reduce rebound. In the sedan there are two of these dead leaves. The front springs are 38 in. in length and are fitted with rebound plates. A ¾ in. caster is given the front wheels. The car has a 30 ft. outside turn-



New Barley chassis, showing the stiff frame which is a distinguishing feature.

ing diameter. Thirty-two x four in. wood wheels are standard. These have twelve spokes each and on the rear wheels the spokes are embossed and carry six extra bolts for increased strength.

The bodies, like the frame, are unusually rigid and substantially braced with structural forgings. The upholstery is genuine leather an option being given of tan Spanish, gray Spanish or black long grain. Three color combinations are also afforded in the bodies, these being liberty blue, coach painters green deep or moleskin deep, all with black fenders and chassis. The fenders are 10 in. wide, have a deep crown and are braced and bolted to frame and body.

The equipment includes one man top with bevel plate rear window, Stewart-Warner speedometer, adjustable drum type head lamps, Empress lubricator system, complete set of tools.

The price of the phaeton car is $1395 f. o. b. factory. There are three other types of bodies including a five-passenger sedan at $1850, a touring sedan and a five-passenger sport model, on which the price has not been set, but will be announced in the near future.

Two New Closed Bodies in 1923 Oakland Line

TWO new closed cars have been added to the Oakland line for 1923, a five-passenger coupe and a five-passenger sedan. The bodies for these cars are now being built by the Fisher Body Corp. The bodies are distinguished from their predecessors by a lower body belt line and slightly lowered roof. The interior appointments and fittings are likewise new to conform with the new exterior design. In this series, full crown fenders have been adopted as in the other cars of the 1923 Oakland line. These are heavier and wider than formerly.

To conform with the changed lines, the windows of the closed models are deeper and wider, which results not only in an improved appearance, but also in better visibility. All the pillars are metal covered. Included in the equipment are an adjustable metal visor covered with water-proof fabric; rear view mirror and double windshield wiper; rear and rear quarter curtains; dome light and snubbers. Door windows are regulated by crank control.

Some of the refinements which are new for this year on both these models are cross-bar type door handles; pull-to handles on the door; a lock with two keys on the right door and an inside lock on the others. The interior trimming on the cushions and seat backs is plush mohair velour. The wall and head linings are of gray plush mohair velour with carpet to match.

The five-passenger coupe takes the place of the former four-passenger coupe. It is built on the same chassis as the sedan and is provided with a platform in the rear for carrying a trunk, the back body panel being protected by metal bars. There are two wide doors opening to the front seat, allowing easy entrance to the rear seat when the front seats are tilted forward. The two front seats are separate and are of Pullman type. The rear seat accommodates three persons. The position of the rear seat on this car is ahead of the rear axle, thus carrying most of the weight between the axles and improving the riding qualities.

In addition to the refinements common to both closed cars, the five-passenger sedan has been increased in the front seat width to give added room for the two occupants. The sedan has four doors. These two closed bodies, together with the two-passenger coupe, which has recently been described, make up the closed body line for the Oakland company for 1923. There are three types of open cars. The prices on the two new closed cars are $1,445 for the five-passenger coupe and $1,545 for the five-passenger sedan, f. o. b. Pontiac, Mich.

New Corbitt Delivery Truck

A NEW model, known as the Corbitt Speed Truck, with a capacity of ¾ to 1 ton, has been brought out by the Corbitt Motor Truck Co. This new delivery type truck has a chassis weight of 3250 lb., with a body allowance of 800 lb. It is mounted on a 130-in. wheelbase chassis with 56-in. track and has 112 in. loading space.

The engine is a Herschell-Spillman, 3½-in. bore and 5-in. stroke, with removable cylinder heads, developing 37 hp. at 2200 r.p.m.

Although of small capacity, the truck is worm driven, employing the Sheldon rear axle. Other specialized units include Eisemann magneto, Stromberg carbureter, Brown-Lipe gearset and clutch, Hartford universal joints, Ross steering gear, Stewart-Warner vacuum tank, Dyneto starting and lighting system, Exide heavy truck battery, pneumatic cord tires, Alemite chassis lubrication and chrome vanadium steel springs.

The clutch is a multiple disk type. The gearset is a sliding selective type in unit with the engine.

The reduction in the rear axle is 6 to 1 and in low speed is 20 to 1.



Corbitt 1-ton speed truck

The Corbitt Co. will furnish any style body, but is featuring a specially designed "Carry-all" body suitable for the farmers' need, which is furnished for $125. The price of the chassis is $1,250 f.o.b. Henderson, N. C.

German Railcar Departs from Conventional Truck Practice

Tramcar body, frame and running gear with automotive type engine, gearset and driving mechanism is favored. Six-cylinder 75 hp. engine selected on account of relative freedom from vibration. Air-operated gearset and brakes are controlled from either end.

By Benno R. Dierfeld

ALTHOUGH American truck manufacturers who build railcars are inclined to favor a more or less conventional truck type of construction for this class of vehicle, German designers contend that it is better to follow light railway or tramcar practice, so far as body, frame and running gear are concerned, applying to this as a starting point an engine, gearset and driving mechanism similar to that used in automotive vehicles.

A good example of the type of railcar favored in Germany is built by the National Automobil Gesellschaft (N. A. G.) of Berlin, a firm which is favorably known for its production of passenger cars and trucks. This car has some original and interesting features which are described below.

The drawings in Fig. 1 show a plan and elevations of the railcar chassis. It will be noted that the frame is fitted with buffers and is provided with two solid railway axles. These run in plain bearings which are self-adjusting when the car is operated on curves. These parts of the chassis and the body are similar to those employed in German railway carriages. It will be noted that the engine, which is designed to operate on benzol fuel, is arranged behind a honeycomb radiator at one end of the chassis. It drives through a four-speed gearset and a horizontal shaft fitted with two universal joints of the disk type to a reverse gear situated in the center of the chassis frame. From the reverse gear another inclined universal shaft having two universal joints drives to the enclosed bevel gear mounted on the front car axle. Provision has been made in the design for driving by a second inclined shaft the rear as well as the front axle thus securing better traction. For average purposes, however, the drive to the front axle only has proved sufficient.

On the rear end of the frame is mounted the fuel tank and the storage battery used for starting and lighting.

THE engine, a photograph of which is reproduced in Fig. 2, is of the six-cylinder type and is designed to develop 75 hp. at 950 r.p.m. It will be noted that the cylinders are cast in pairs and are provided with overhead valves operated by push rods and rocker arms from the camshaft situated on the left side of the engine. The four valves of each pair of cylinders are enclosed by an aluminum cover. Inlet and exhaust manifolds are arranged on the same side. The carbureter is a standard Pallas type with the air inlet connected to an exhaust heated stove. The ignition is by high tension Bosch magneto situated on the left side of the engine. There is provision for automatic spark advance and a centrifugal ball-type governor is fitted to limit the maximum engine speed.

The lower crankcase serves as an oil reservoir and carries at its lowest point an oil pump of gear type which is driven off the camshaft. Oil is delivered under pressure to the main and big end bearings. Lubrication of the pistons and wristpins is cared for by oil thrown off by the camshaft, the excess oil returning to the sump after passing through a strainer in the usual manner. The centrifugal water pump is used for circulating water through the jackets and the honeycomb radiator, and, if necessary, through additional cooling tubes carried above the top of the car body. The usual belt driven fan is provided.

The location of the lighting generator and starting motor can be readily seen by reference to the photograph



A good example of German railcar, operated near Berlin. Frame, body and running gear are similar to those employed on German railways, but the car is propelled by a six-cylinder, 75-hp. automotive type of engine

of the engine, Fig. 2. In addition to the electric starter there is provided a mechanical starting device and a Bosch hand starter. An engine driven air compressor furnishes compressed air for applying brakes and for gear changing.

The six-cylinder type of engine is used because of its excellent balance. On account of its relative freedom from vibration no springs or other type of resilient mounting have been found necessary.

The design of the gearset differs materially from that used in conventional practice, due to the fact that the designers considered the usual hand-operated type too cumbersome, or too difficult to operate satisfactorily. It will be seen from the diagram in Fig. 3 that all the gears for the four-speed gearset employed are in constant mesh, but each pair has a separate cone clutch arranged for operation by compressed air. All gears on the main shaft are fastened positively to the shaft, but power is transmitted to them only when the clutches which are splined to the shaft are engaged by admitting air to the cylinders controlling the respective clutches. In fourth speed the drive is direct. Engagement of the clutches, which is equivalent to the operation of a gearshift, is effected by admitting air to the respective cylinders through one or the other of two control valves located on the control panel at each end of the car. Fig. 3 shows the air pipe connections and the air valve which is operated by turning a lever to the desired position. With this arrangement there is no clashing of gears, and a rapid change can be effected. The usual pedal operated clutch is omitted as is also the conventional gearshift lever. A photograph of the gearset is given in Fig. 4. With an engine speed of 950 r.p.m. the four speeds of the car are as follows: 5.0, 6.8, 12.4 and 22.4 m.p.h.

This gearset is believed to be adaptable for motor truck use providing a suitable air compressor, such as is needed anyway when large pneumatic tires are fitted, is provided.

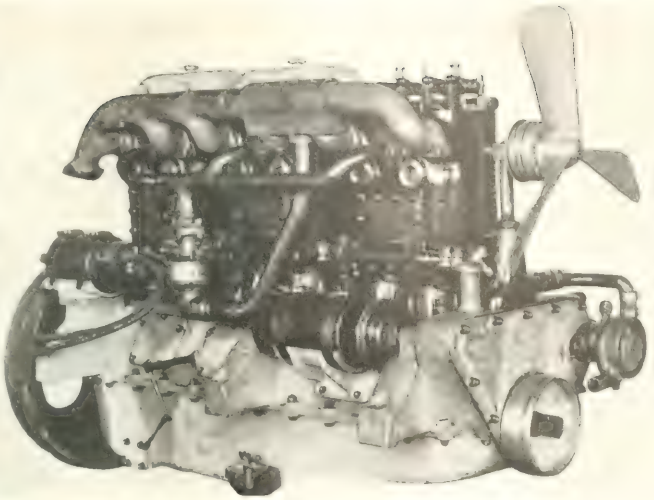


Fig. 2—Six-cylinder, 75-hp. engine used to propel the N. A. G. railcar. It is governed to run at 950 r.p.m. and is said to be relatively free from vibration

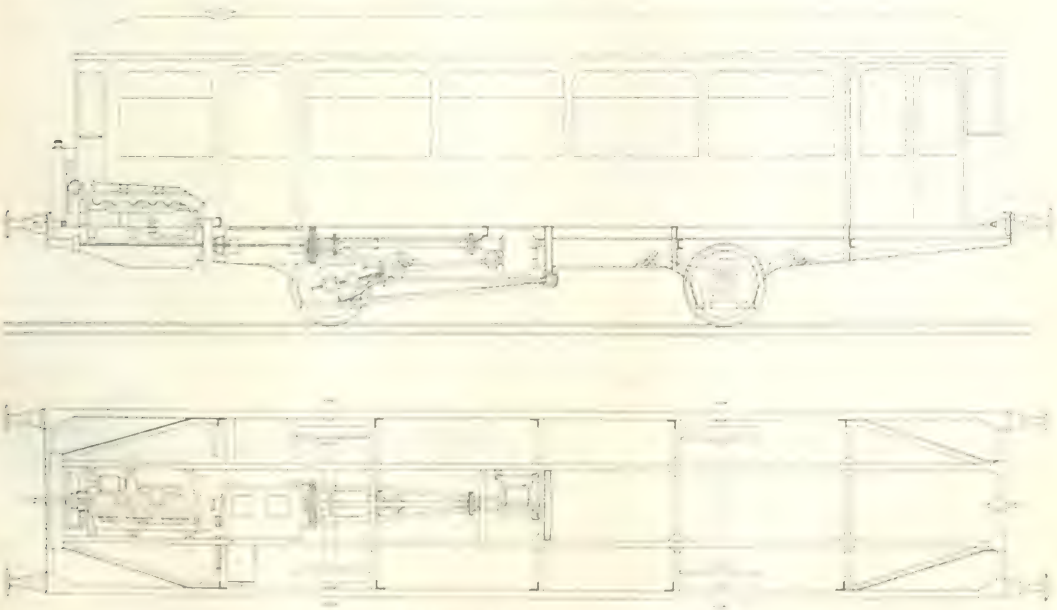


Fig. 1—Drawing showing the chassis and body of the N. A. G. railcar. It is fitted with solid axles, specially designed gearset and reverse gear and air brakes

The gearset is connected by a horizontal shaft with two flexible disk universal joints to a reverse gear which enables the car to travel in either direction. The mesh of the desired reverse gear is controlled by a compressed air cylinder similar to that used in the four-speed gearset. From the reverse gear an inclined propeller shaft with two metal universal drives to an enclosed bevel gear on the front axle of the car.

A hand brake operated by a screw mechanism similar to that used in railway design is provided in addition to the air operated brake. Neither of the brakes act upon the wheels as is usual in railcar practice, but upon a split drum carried on the axle. This drum is so mounted that it can be removed without disturbing the wheels of the car.

From the photograph and drawing it will be noted that the railcar is fitted with a crowned roof without the ventilating windows, which are commonly employed in tramcars and railcars. Sufficient ventilation is provided, however, by opening the upper portion of the hinged windows at the sides of the car and lowering the windows of the driver's compartment at each end.

The interior of the car is provided with cross seats for thirty-two passengers, and there are three emergency seats in the driver's compartment at the rear end, where space for luggage is also provided. There is in addition, sufficient standing room in the wide aisle and driver's compartments to make it possible to carry a total of fifty passengers. The driver's compartments are separated from the passenger compartment by sliding doors,

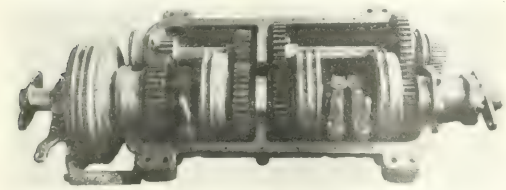


Fig. 4—Photograph of the four-speed gearset, showing constant mesh gears and the individual cone clutches. The drive is direct on fourth speed

and double doors opening outward from the baggage compartments permit loading of large pieces of baggage which would not go through a narrower doorway.

The floor of the body is covered with linoleum and is provided with trap doors to facilitate access to the gearset and other parts of the mechanism.

The heating of the car in winter is effected by utilizing the exhaust gas of the engine.

The car is designed to haul one trailer, and there is fitted at both ends air brake connections for operating the brakes on the trailer.

The equipment of the car includes a 250 watt Bosch lighting generator connected in parallel with the battery, five dome lights, and a headlight at each end of the car. The headlamps are situated on the left side of the car about 12 in. above the bumper. The car is provided with air-operated whistle and ringing apparatus

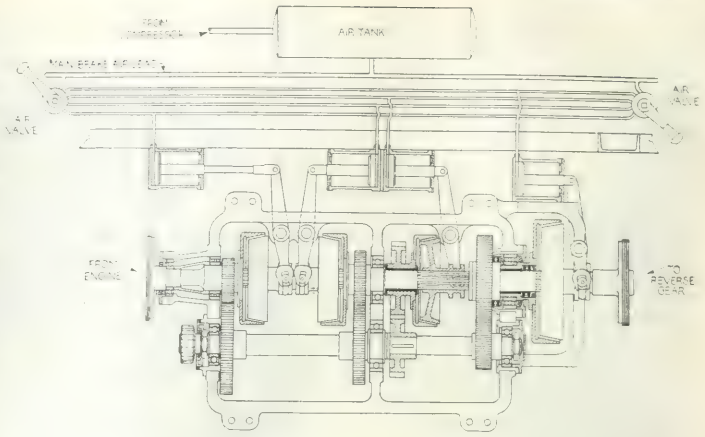


Fig. 3—Diagrammatic view of the gearset used in the N. A. G. railcar. The gears are in constant mesh and are controlled by separate cone clutches operated by compressed air

and air valves which operate the sanders. All controls are arranged on a panel in the driver's compartment at each end.

The car is in use on a line near Berlin and covers about 81 miles each week day, and nearly 100 miles on Sunday, part of which time a trailer is handled. Some dimensions and weights of this railcar and its parts are given below:

Length of railcar overall	35 ft. 3 in.
Length of railcar chassis	35 ft. 4 in.
Wheelbase	165 ft. 5 in.
Width of car body	103 ft. in.
Gage (Standard German Railway)	56 ft. 5 in.
Wheel diameter	31 ft. 5 in.
Springs length	59 ft. 2 in.
Weight of car without engine, etc	9.5 tons
Weight of engine with transmission, air pump fuel tank and radiator	2 tons
Total weight of car ready for service	11.5 tons
Weight on driving axle	7 tons

An Adjustable Yoke End

THE adjustment of the conventional yoke end used on brake rods can be accomplished only after removing the cotter and clevis pins, an operation which is not always easily performed, especially if the parts are rusted and inaccessible. A yoke designed to overcome this disadvantage is illustrated in the accompanying cut. It is similar to the conventional type except that the shank is not threaded, but is recessed to receive a hex nut which is threaded over the rod. A jam nut on the rod locks the

The Holmes adjustable yoke end



shank of the yoke between the two nuts. Adjustment is made by loosening the jam nut and turning the second nut up the desired amount after which the jam nut is again set up.

The device is known as the Holmes Adjustable Yoke End and is said to conform to S.A.E. standard dimensions. It is used as standard equipment on several passenger cars.

Wheel Wobble and Other Faults in the Steering System

An explanation of several puzzling phenomena concerning which there is much misunderstanding, even in engineering circles. Wobble is held to be impossible with vertical steering pivots or pivots in central plane of wheel.

By A. Ludlow Clayden

THE subject of wheel wobble has been productive of much correspondence recently, and the present writer, having had considerable experience with it in a consulting capacity, is led to comment on some aspects of it.

The difficulty of the subject is that wobble of much the same sort may be due to various causes. Some are obvious, such as a wheel badly out of balance; others are quite obscure, and the writer is unconvinced that there may not be still other causes than those he has been able to observe and track down.

Just one statement may be made as almost always true and this is that wobble (except from unbalanced wheels) will never occur if the axis of the steering swivel pin is truly vertical. If it be raked either fore and aft or transversely in any direction wobble is possible, and if it be raked much wobble is almost certain.

To this may be added another fact: If the steering swivels have plain thrust bearings or for other reasons are rather stiff, wobble will never occur.

Wobble, in the writer's understanding, means the rapid oscillation of both front wheels upon the steering swivel pins, over a small arc of rotation. Factors of importance are the momentum of the car, the weight of the car, the weight and moment of inertia of the wheels, the nature of obstructions encountered by the wheels, the degree of inflation of the tires, the precise proportions of all members of the steering gear, the nature of the swivel bearings, the stiffness of the front axle, the period of the front springs and the distribution of load on front and rear axles. There are other factors but this is a sufficient list to show why the subject is hardly one to be treated comprehensively within a short space of time.

Of course graphic analysis is helpful, but mathematical treatment alone is very confusing, and is not necessary to a proper understanding of the principles. Firstly, there are some popular fallacies to be slain. It is commonly supposed that, with vertical steering pivots, steering will have no sense of direction, that the wheels once set at any angle will stay there until forcibly moved by the hand gear. A glance at Fig. 1 should dispose of this erroneous notion. To obtain true rolling, or rather, as nearly as possible true rolling, the two front wheels when cut should roll along arcs of concentric circles. Suppose they do so, then the outer wheel is traveling on a larger circle than the inner one. In Fig. 1 it is seen that the center of the circle lies on a projection of the rear axle axis, and that the front axle is thus not radial. Thus to be tangent with the two circles the outer front wheel does not make the same angle with the front axle as the inner one, in other words the outer front wheel in being cut for steering is turned through a smaller angle than the inner. Now all forces applied to the wheel from the road must be applied to its centre and so must act on the stub axle at a point lying in the mid plane of the wheel.

Look at it another way. A wheel is kept rolling by force applied to its axle. To roll the wheel at a given speed a given force will be required. Whether the wheel is vertical or tilted makes no difference, the force necessary to be applied *at its center* remains unaltered.

Whatever the wheel does it does it *because* it is being propelled by a force applied to its hub through its axle and bearings. All resistance the wheel overcomes is so

This Is Why They Shimmy

OUR editorial entitled "What Makes 'Em Shimmy?" which appeared in AUTOMOTIVE INDUSTRIES for Sept. 14, 1922, has created much interest in a subject which has long been a puzzling one for engineers as well as for service organizations.

Mr. Clayden has given the matter much study and has been moved to "return to the stage" by our editorial. In so doing he has prepared the most lucid and instructive explanation as to the basic cause of wheel wobble, popularly called "shimmying," which has come to our notice. Knowing the cause of this disturbing phenomenon it is easy to remedy the trouble or prevent its occurrence.

Incidentally the author of this article has "slain" certain popular fallacies regarding the steering system which are far better dead and buried.

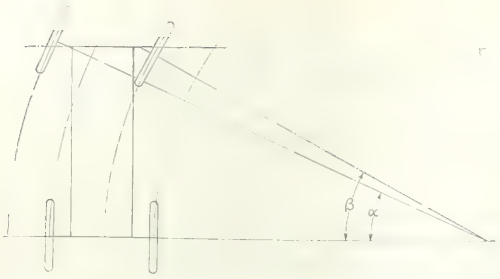


Fig. 1—Showing that in steering the front wheels are not moved through the same angle

overcome because of force applied to the *very center of the wheel.*

Suppose for argument sake that this is two inches from the swivel pin center. Suppose that to obtain a desired turning circle the proportions of the chassis are such that when the inner wheel has been moved through 40 deg. the outer wheel has turned only 30 deg.

Now turn to Fig. 2. A rolling resistance force of F lb. is applied to each stub axle at two in. from the swivel pin center. If the swivel pins are vertical and the rolling resistances are equal there will be no tendency to further rotation or to recovery, but the momentum of the car is trying to carry it straight ahead along its median center line. This momentum we may represent by a force applied to the center of the front axle P in Fig. 2. It is obvious that the force P is the real driving force that rolls the wheels along their paths. Split P into p and p and apply it to the swivel centers. The rolling resistance is carried to the point X on the stub axle so, with respect to the outer wheel, p and F together make a restoring couple tending to move the stub axle back toward its mid position.

On the inner wheel the effect is precisely opposite, the couple tending to still further rotate the stub axle but, because the angle α is smaller than the angle β the leverage of p about x in the case of the inner wheel is smaller than that of the equal p on the outer wheel. Only when in the straight position do the swivel moments due to p balance perfectly. Consequently there is a recovery or restoring action in proportion to the speed of travel.

Self Righting and Castering

It is not suggested that this restoring action is very powerful. In practice it is perceptible only on fairly smooth roads, but it is none the less really there. The important point is that the restoring or self righting action obtained as a result of the *momentum* of the car is totally different in nature and in effect from the "castering" action due to raking the swivel pins; as will be seen later.

The second common fallacy is that inclining the swivel transversely, so that its axis produced strikes the road at the point central of tire contact, neutralizes the turning moment about the swivel due to rolling resistance. It reduces it a little but so little as to be of hardly any moment.

Remember that all forces applied to the tire take effect at the center of the wheel and can be resolved into forces acting at a point approximately in the middle of the stub axle. Consider Fig. 3. Let the line A B represent a spoke of the wheel with the rolling resistance force F applied to its tip. Remembering that the wheel has friction on its hub, the end A of the spoke is tending to stick to the stub axle and so, if the end of B be pulled away from the paper toward the reader it is obvious that the pull will act through the rigid spoke and the end B will try to follow A in its movement toward the reader. Consequently the force F acts instantaneously at A as well as at B. Now the turning moment about the swivel pin axis due to the force F applied at A is F X, where X is the length of the shortest possible straight line connecting A with the swivel center line. In Fig. 4 are shown the comparative cases for the vertical swivel and for the transversely inclined pin. With the vertical pivot the leverage of F about the swivel is A O, in the other case it is A O cos α and since the inclination of the swivel in no actual example is more than a few degrees, cos α will never be very much less than unity. If there remains any doubt in the reader's mind let it again be emphasized that forces applied to the tire, of whatever nature, can be resisted only by reactions in the axle spindle. In figuring out any steering problem of this sort always work back to the reactions at the axle and the problem will be clarified.

Raked Pivots Lead to Wobble

Wobble is always present when the steering swivels are raked, that is when their upper ends are further back than their lower ends. If wobble is imperceptible with such a setting it is due to frictional damping out, for the tendency to provoke it is inevitably present. Assume that the swivels are vertical as viewed from the front of the car and raked as viewed from the side. In the mid position, when running straight, the stub axle will then be truly horizontal. In Fig. 5 it would be pointing out of the paper toward the observer. Now imagine it turned 90 deg. forward and 90 deg. back into the two positions shown dotted. By the forward rotation the center of the stub axle will be lifted relative to the car, and by backward rotation lowered. This means that in steering one way the tendency is to lift the whole wheel off the ground and in steering the other way the tendency is to push the wheel into the road. Since the road can be assumed to be rigid, the actual effect is to drop the car when the wheel is cut forward and raise it when

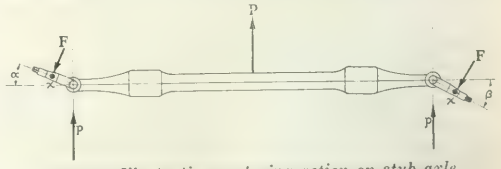


Fig. 2—Illustrating restoring action on stub axle with vertical pivots

cut back. Thus, in making a right-hand turn the left front end of the car is lowered and the right front end lifted (the front end of the chassis is given a list to port) and of course, vice versa for a left-hand turn. In actual practice a drop of a quarter of an inch at the full angle of lock is common and more than this not unusual, meaning a total "list" of double this amount, since one side is raised almost as much as the other is lowered.

This means that the front axle drops on the outside of the curve turned and rises on the inside, which is, of course, wrong; but does not explain why this construction is self righting. The springs tend to keep the chassis in a plane parallel to the plane in which the axles lie, thus when the front axle has been moved by an

action such as that described the front springs are necessarily deformed and they naturally try to restore equilibrium, which they cannot do without bringing the stub axles back to mid position. It is easy to see that the extension of one front spring a quarter of an inch with a corresponding compression of the other provides a quite substantial force. With springs rated at 400 lb. per in. the available force would be 200 lb.

A most interesting corollary is that raking the swivels the other way, with the tops forward and the lower ends aft, provides precisely the same castoring action, only in that case the list given to the front end of the chassis is in the reverse direction, raising the outer and lowering the inner side on a curve.

There is a secondary effect of considerable moment arising from steering swivel inclination, however, which makes the case for the swivel canted forward much better than for the conventional method of raking. In a car with pronounced self righting tendency with the swivels raked aft at the tops, it is usual to find the steering very wild on a heavily cambered road especially

2. A car with swivels raked aft has a pronounced castoring tendency on gentle curves or smooth surfaces, but on sudden deflections invoking strong centrifugal force the self righting action reverses itself and the car tends to plunge in the direction in which it is being steered.
3. A car with swivels raked forward has the same castoring tendency as one with them raked aft, but centrifugal force on violent curves assists the self righting forces instead of opposing them.

Wobble Absent with Vertical Pivots

All the foregoing is preliminary to a discussion of wobble *per se*, but a complete understanding of the preamble is essential before the second part can be made clear. It has been stated that a car with truly vertical pivots cannot wobble from inherent causes. This is a fact which observation taught the writer long before he attempted any analysis of the subject; it has been observed by many others and so there is ample excuse for starting with an explanation as to why wobble does

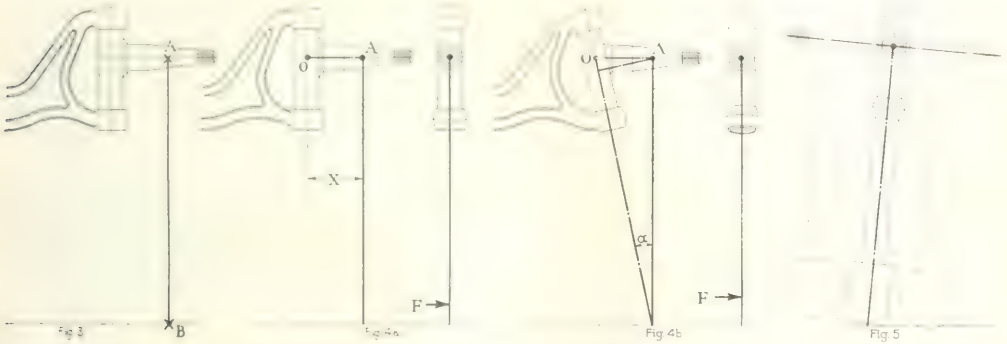


Fig. 3 Fig. 4a Fig. 4b Fig. 5

Diagrams illustrating various points in the functioning of steering systems

if a sudden movement from the road center to the edge has to be made. When the car is being deflected from a straight line path centrifugal force tends to compress the outer and allow expansion of the inner spring. In other words, the load on the outer spring is increased. As we have seen from Fig. 5, the steering movement has dropped the outer side already. Making a left turn actually lowers the chassis on the right side. Conversely, lowering the chassis by applied force has a tendency to steer the car to the left. Steering the car twists the whole front end; twisting the whole front end steers the car.

Action Due to Forward Rake

Suppose, on the other hand, the swivels are raked forward instead of back, then the centrifugal force opposes instead of assists the steering effect. Let it again be emphasized that this action of centrifugal force has no connection with the self righting tendency due to the couples formed by rolling resistance and the tendency to continue straight path motion as described in a previous paragraph. In this case we are considering the effect of the movement of the *front springs* relative to the frame and the consequent reaction on steering pivots which do not turn in a horizontal plane.

In the foregoing we have reached these conclusions:

1. A car with vertical pivots has a slight self righting tendency but does not tend to plunge when suddenly deflected from a straight course.

occur with raked pivots. Assume in the first instance that the pivots are raked aft, that the steering gear is disconnected and that the car is moving in a straight line, the rolling resistance being the same for both front wheels. Now suppose the slowly moving vehicle strikes a stretch of granite block in about normal condition (really good French Pavé is about the finest of wobble makers). The effect will be to cause the rolling resistance to vary, it will rise and fall in wave form for both wheels. This means that first one is given a little switch and then the other. Suppose the right wheel bumps first, it will deflect and the swivel will turn ever so slightly, thus slightly compressing the spring on that side; because with aft raked pivots the wheel that turns inward tends to lift the car. An instant later the left wheel bumps and reverses the action only to have it reversed again the next instant and so on.

So far so good, but it is still difficult to see how such small deflections could produce wobble. However instead of thinking of the deflection of the wheel actually lifting the car, regard the tendency toward lifting as a slight blow on the spring, which is more nearly what happens. Suppose next, that the sequence of bumps is such that, at the existing speed of the car they coincide with the natural period of vibration of the front spring. Every driver knows that striking wavy road at the wrong speed will work up a violent plunging of the whole front end; this is a similar sort of vibration to the wobble vibration, but of

slower period and larger amplitude, probably the wobble period is a harmonic of the plunging period.

Now if, in the manner described, one front spring is set in vibration, and that the other spring is similarly vibrated but with a half period difference in step, it follows that one will compress while the other is expanding and vice versa. The period is far too rapid for the mass of the car to follow it, hence the frame and everything attached to it will not be sensibly disturbed although the vibration of the springs may be felt.

It was stated at the start of this discussion that wobble could always be cured by introducing friction at the swivels, by using plain thrust washers instead of ball bearings. This is because such friction "dead beats" the action, performing upon wobble precisely the same function that the Lanchester vibration damper performs for a weak crankshaft. Many have noticed that wobble is worse if the steering wheel be held tightly and vanishes if it be released, this is because when the wheel is held the movement due to wobble is taken up by spring in the steering arms and connections, whereas, if the wheel is let go, the motion goes to the worm wheel and the friction of the wheel moving against the worm damps out the vibration.

Take the same thing over again from another viewpoint. Think of a car with the drag link and the tie rod removed. Then, if the pivots are vertical and the car standing still it is obvious that either front wheel could be set at any steering angle and would stay there without tendency to move. Then suppose the pivots raked back, and it follows that both wheels would at once toe in; the wheels rolling forward, dropping the whole front of the car; until contact with the frame side rails stopped further movement.

Now suppose that we attach the tie rod and pull the left front toward the left as far as it will go, thus making the left toe out and the right toe in. By doing this the left side of the car must be lifted a trifle and the right side dropped. In this situation, assuming the frame to have remained in a horizontal plane, the left front spring has been compressed and the right extended. This is a condition of unstable equilibrium and the only thing which prevents recovery of the springs is the friction of the tires on the floor. Suppose again, that there was insufficient friction and the springs obviously would recover, moving the wheels as they did so. If there was extremely little friction the movement would not "dead beat" but the left spring would expand past middle position and the right compress; the motion would then reverse and continue pendulum fashion till such friction as did exist had damped it out. Thus with raked pivots once the steering is moved there is a tendency toward periodic swing and if road shocks are applied in tune with that period the amplitude of vibration may well become serious.

One important point to bear in mind is that the initial forces are small. it is cumulative action which gives rise to wobble as we know it in practice.

There is probably another contributory cause due to the gyroscopic action of the front wheels which resist deflection from any plane in which they may be rotating and require more force to move them out of that plane than to keep them moving after deflection has once been started.

In the beginning of this article the writer referred to the fallacious reasoning which led to the transversely raked pivot. An analysis of the effects of such raking is interesting as it may in some instances affect wobble. Suppose the pivot vertical as viewed in side elevation and raked in end view. Then turning it either way from the mid position causes the outer end of the stub axle to rise. This, of course, means that whichever way the steering is turned the *car* is lowered. The wheel in mid position is in unstable equilibrium and is tending to fall out of it. Here again with the drag link disconnected and no friction between tire and floor both wheels would tend to drop to the greatest angle of lock and would be indifferent which way they turned.

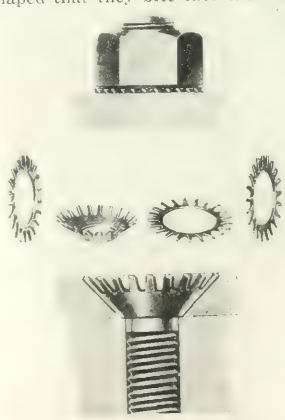
The writer has never been able to prove it practically to his entire satisfaction, but believes that this alone can cause wobble without any fore and aft raking. Follow the possible action through. The wheels start straight, a bump on one of them causes both to deflect say to the left and the whole front of the car drops a fraction of an inch. Then another bump on the left right wheel knocks the steering back again, lifting the car to the mid position of instability where it naturally flops past and brings up against the resistance of the drag link. It is easy to see that periodic swing in tune with the natural vibration period of the steering arm and drag link could be caused in this way without any distorting action on the front springs. The writer's efforts to cause wobble with transversely raked pivots, vertical in the other view, has not been successful and he therefore believes that the natural period is too high to be obtained often. It is, however, conceivable that wobble from this cause may have occurred, and where pivots are raked in both planes, as is conventional, then the two wobble provocations may act together and it would not be possible to divide them.

It is a fact that light front springs tend to make wobble worse; so does a weak front axle and so does weakness or springiness in any of the parts of the steering linkage. Different cars wobble with different periods in proportion as all the factors vary, and whip in any part of the steering is an important factor.

Wobble has probably come to our notice so much in recent years because steering gears are generally better made, because steering pivots are being put on roller or ball bearings and are being better lubricated; better manufacture has shown up an inherent fault in design. Better and easier steering still is much to be desired. Possibly some day we shall have the absolutely wobble proof type with the king pin actually in the plane of the wheel.

A Novel Lock Washer

A NEW type of lock washer is being put on the market by the Shakeproof Screw & Nut Lock Co. of Chicago. This is an extremely light weight type of washer which depends on a number of teeth for its locking ability. The lock washer resembles in appearance very much the small gear wheels found in clock mechanism. The teeth are so shaped that they bite into the surface, preventing loosening of the nut.



Shakeproof lock washers

Among the claims for this lock washer is that it will not loosen under vibration, that it will hold equally well on anything from aluminum to steel, exerting equal pressure at all points without distorting the threads. The lock washers are made up in both flat and counter-sunk form. They have been adopted for many purposes in the automotive field, particularly in body work.

Increased Use of Standards Essential to Future Automotive Prosperity

Marmon executive states: "There is little to be said about the standards in existence, but much to be said about the lethargy and lack of support that these standards have met from the great executives of the industry." Standardization not uniformity.

By F. E. Moskovics

Vice-President, Nordyke-Marmon Co.; Chairman, Committee of Simplified Practice, N.A.C.C.

ALTHOUGH the automotive industry is generally credited with taking the first real step towards standardizing the mechanical practices in an industry and although a group of standards exist for every possible branch, yet these standards have not been as widely adopted as the best interests of the industry demand.

When the Department of Commerce at Washington, through the Division of Simplified Practice, requested the automobile industry to look into the matter, it was quite a shock to realize what a monumental work the Society of Automotive Engineers had performed and what a small proportion of it was actually being utilized.

The authorities at Washington have the feeling that if American industry is eventually to compete with the cheap labor of Europe and with the depreciating currency of our foreign competitors, it must do so purely on the basis of superior efficiency and superior quality. A fundamental law of economics will readily prove that the slightest waste is deadly.

The industry must be awakened to the crying need of not only the adoption of standards by resolution but the adoption into actual practice.

It is very easy to figure how millions upon millions of dollars can be saved to the ultimate consumer and how our industry can be placed on a better footing to eventually meet foreign competition.

There is very little to be said about the standards in existence. They are there. But much is to be said about the lethargy and the lack of support that these standards have met from the great executives of the industry. They seem to feel that standards are an evil being pressed upon their brow for the purpose of making them spend additional sums for new equipment. As a matter of fact exactly the reverse is true. Much misapprehension of the true meaning of standards is current in the industry.

STANDARDIZATION does not mean a throttling of individuality. Not even the most enthusiastic individualist could object to standardization of sizes of ball joints for spark and throttle control connections. Yet an insignificant number of manufacturers are using the S. A. E. standard covering these fittings, to mention only one small item.

This article is written by an automotive executive who has had practical experience in the use and non-use of standards. The company which he represents makes a car that is highly individual in general characteristics. His hearty advocacy of increased use of standards will interest every other executive in the industry.

The adoption of a standard does not mean the instantaneous throwing away of all the equipment and material on hand that is being utilized for existing work. It does mean adopting the idea that as soon as the opportunity presents itself to fit into the plans of the particular organization in question, the standards in existence on that subject will be held in mind when a new design is laid down. In other words, standardization is working rather for posterity than for the present, but the trouble with the executives in the industry is that they have considered the benefits too far in the dim future, or too many generations of posterity away.

If each executive in this industry would merely ask his engineer what he is doing to adopt standardized methods of production in every piece where standards could be reasonably used, much would be accomplished.

The technical side of the industry is almost discouraged by the lack of real co-operation from the executives on the score of standardization. It would take but little help, or little encouragement to accomplish much and the day is rapidly approaching when the fundamental economics of production and design will dictate which concerns survive.

Our industry has been developing so rapidly that each concern has been so wrapped up in its own individual problems that executives were too harassed to think far into the future.

Yet during this time, the technical side of this industry has been woven into a wonderful, well knit organization. Automotive engineers have co-operated with each other as the engineers of no other industry in the history of the world have ever co-operated.

But the time has now arrived when the executive and the technical men of the industry must get together to analyze and review their joint problems.

How to Determine the Best Location for Wing Beams

Since wing beams constitute the largest item of weight in the airplane wing panel, it is important to so proportion and locate them as to reduce their weight to a minimum. A simple method for determining optimum location and depth of section is given.

By Roy G. Miller

THE largest items of weight in a wing panel are the beams. The strength to weight ratio of the beams is largely governed by their location in the profile of the aerofoil. The ribs are also affected, but these should be of secondary importance since their weight seldom exceeds five to eight per cent of the total wing weight.

The ideal condition for the design of economical wing beams would be realized if the center of pressure were always at the maximum ordinate of the aerofoil. Then only one beam would be required and its location would permit the utilization of the maximum aerofoil depth. But the center of pressure varies with the angle of attack and it is, therefore, necessary to use two beams.

In the choice of wing beam location there are two conflicting requirements. If the profile of the aerofoil were a shallow rectangle, obviously the best location for the wing beams would be in the leading and trailing edges. Thich would minimize the load on the front beam for the low speed condition, and the load on the rear beam for the high speed condition. But the aerofoil section is actually tapered, and, with the beams located in the leading and trailing edges, a minimum of beam depth would be afforded. In this case very heavy beams would be required to carry the loads.

The proposed method of beam location is by trial and error. Assume that the location of the front beam for the aerofoil shown by Fig. 1 has been arbitrarily chosen at ten per cent of the chord. The rear beam must be designed for the high speed condition and the load which it must carry is inversely proportional to the distance between the beams.

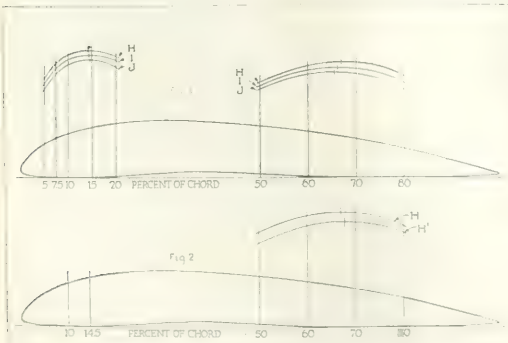
The strength of the rear beam is proportional to the section modulus and the weight is proportional to the sectional area. If the shape is fixed, then the section modulus will be proportional to the cube of the depth and the area will be proportional to the square of the depth. The strength to weight ratio will, therefore, be proportional to the depth. This condition would be true in the case of the wood wing beam. In the case of a trussed metal wing beam the strength is proportional to the depth, if we assume a fixed area. The deep wing beam requires slightly heavier shear bracing, but the weight of the shear bracing is small as compared to the weight of the flanges, and the strength to weight ratio of the complete beam can still be taken as approximately proportional to the depth.

The requirements for an economical beam design are,

(1) That the loads shall be small and

(2) the strength to weight ratio shall be high.

These conditions will obviously be met when the product of the distance between beams times the depth of the rear



Diagrams used in determining best depth and location of wing beams

TABLE I. Location of Rear Beam, U. S. A. 27 Aerofoil

A	B	C	D	E	F	G	H	I	J
Per Cent of Chord	Upper Ordinate	Lower Ordinate	Difference	D—.38	D—.75	A—10	D×6	E×6	F×6
50	10.77	.80	9.90	9.52	9.15	40	396	380.5	366
60	9.52	.25	9.27	8.89	8.52	50	463	444.5	426
70	8.00	.10	7.90	7.52	7.15	60	474	451.5	429
80	6.03	.05	5.98	5.60	5.23	70	419	392	366

TABLE II, Location of Front Beam, U. S. A. 27 Aerofoil

A	B	C	D	E	F	G	H	I	J
Per Cent of Chord	Upper Ordinate	Lower Ordinate	Difference	D—.38	D—.75	66—A	D×G	E×G	F×G
5	6.93	.17	6.76	6.38	6.01	61	412	389.5	366.5
7.5	8.22	.10	8.12	7.74	7.37	58.5	475	453	431.5
10	9.17	.00	9.17	8.79	8.42	56	513	492	472
15	10.50	.10	10.40	10.02	9.65	51	530	511	492
20	11.33	.35	10.98	10.60	10.23	46	506	488	461

TABLE III, Retabulation of Data in Table I

A	B	C	D	G	H
Per Cent of Chord	Upper Ordinate	Lower Ordinate	Difference	A—14.5	D×G
50	10.77	.80	9.90	35.5	351.5
60	9.52	.25	9.27	45.5	422
70	8.00	.10	7.90	55.5	438
80	6.03	.05	5.98	65.5	392

TABLE IV. Best Beam Location for Various Aerofoils

Aerofoil	Beam Location (% of Chord) Front Beam	Beam Location (% of Chord) Rear Beam	Depth of Section (% of Chord) Front Beam	Depth of Section (% of Chord) Rear Beam
U.S.A.-15	13.0	69.0	5.96	5.40
U.S.A.-16	11.0	74.0	4.91	4.51
U.S.A.-23	13.0	63.0	5.46	4.53
U.S.A.-26	14.0	68.0	9.07	7.18
U.S.A.-27	14.5	68.0	10.33	8.21
U.S.A.-29	16.5	69.0	12.12	8.80
U.S.A.-30	16.5	68.0	14.61	12.71
U.S.A.-33	11.0	65.0	12.92	10.51
U.S.A.-34	13.0	64.0	15.63	12.96
M-2	14.5	69.0	12.64	9.58
U.S.A.T.S.-1	18.0	66.0	21.19	17.80
U.S.A.T.S.-2	16.0	72.0	1.42	11.15
R.A.F.-15	11.0	76.0	6.21	4.30
Standard Aircraft 4S	12.5	70.5	4.73	1.04
Loening M-80	13.0	65.5	7.19	5.00
[illegible]	11.0	[illegible]	4.37	[illegible]
Göttingen-17	13.5	69.0	7.36	3.83
Göttingen 255	16.0	61.5	16.20	13.33
Göttingen 344	11.5	76.0	6.72	4.85
Göttingen 387	13.5	61.0	13.45	11.80
Göttingen 389	11.5	62.0	9.14	7.21
Göttingen 420	15.5	80.0	14.68	13.50
Göttingen 426	15.0	58.0	11.69	10.10
Göttingen 429	13.0	56.0	10.26	8.13
Göttingen 130	12.0	57.0	11.59	9.31

beam is a maximum. In Table I the data for the location of the rear beam of the U. S. A. 27 aerofoil are tabulated. The results are shown graphically by Fig. 1. Curve H represents the full aerofoil section with no reduction for a cap strip. Curve I represents the aerofoil section with allowance for a shallow cap strip. In the case of curve J allowance has been made for the deepest cap strip which is apt to be used. It will be seen that the depth of the cap strip has considerable influence on the efficiency, but little influence on the location of the rear beam. The best location for the rear beam is indicated to be at about 66 per cent of the chord.

Assuming the rear beam at 66 per cent of the chord, the location of the front beam is determined by the data in Table II and by the curves in Fig. 1. It will be seen that the cap strip has even less influence on the location of the front beam than it had in the case of the rear beam. The best location is shown to be at about 14.5 per cent of the chord.

Retabulating the data (Table III) and plotting a new curve (Fig. 2) for the rear beam on the assumption that the front beam is at 14.5 per cent, instead of ten per cent, we find little difference in the best location of the rear beam. It should, therefore, be sufficient to plot only one curve for the rear beam and then one for the front in the case of any new aerofoil, especially so if the initial guess is close.

Table IV shows the best beam locations, worked out by the above method, for a large number of modern aerofoil sections.

Testing Cars in Service

THE testing of an automobile engine in a laboratory or testing room is a comparatively simple matter. The engine may be mounted on a suitable stand and operated at constant speed and power output, the power being directly transmitted to some apparatus, such as an hydraulic brake or electric dynamometer, which serves to measure and dispose of the power generated, while the rate of fuel consumption can be determined very accurately in a number of different ways.

The conditions of such a test, however, are not identical with those under which an engine operates when driving a car on the road, since in actual service the power output and rate of fuel supply are continually changing, and the support of the engine itself is in motion. It can readily be imagined that the testing of an engine on the road is much more difficult than on the testing stand. The rate of fuel supply is not constant, and it is, therefore, necessary to devise a means of recording the rate of supply at any instant.

Likewise, in actual service the power generated is disposed of in a large number of ways, such as overcoming friction of moving parts, in so-called rolling losses of tires, in overcoming wind resistance, in accelerating the car, in climbing grades, etc. It is, therefore, necessary to measure the record of these factors separately and add them to find the power output at any instant.

The Bureau of Standards has recently completed the design and construction of apparatus necessary for making such tests, and although, as may be inferred from the nature of the problem, the apparatus is complex, it has been reduced to a very compact form, so that it can be installed in a car in about one day.

The apparatus consists of a photographic recorder, which records the rate of fuel consumption, and another instrument with recording pens which gives on a single strip of paper a record of the following quantities: (1) Engine speed; (2) manifold depression; (3) temperature of inlet water; (4) temperature of outlet water; (5) temperature of oil; (6) temperature of the differential; (7) temperature of air at the entrance to the carbureter, (8) temperature of the atmospheric air; (9) weight of air being used by the engine; (10) acceleration of the car; (11) air speed, and (12) apparent direction of wind.

The record so obtained makes it possible to determine not only the power generated by the engine, but also how its power is used. If it should appear from the record that an excessive amount of power is being absorbed in any one part of the mechanism, improvements in design to reduce the losses would be called for. Systematic tests with apparatus of this kind should result in pointing out where improvements in designs of engines and cars are most needed and may be expected to result in improved designs of greater efficiency than those now in use.

Foreign Items of Interest

THE prestige of American cars is reported by Trade Commissioner Sanger to have increased to such an extent in Australia that the offer of any American motor car agency received favorable consideration immediately whereas it is almost impossible to find an agent willing to take over the representation of an English or Continental car unless it has been long and favorably known.

VICE CONSUL LONGYEAR, Port au Prince, estimates that there are 541 passenger cars, 81 trucks and 28 motorcycles in Haiti. No official statistics are available, but after Jan. 1 next all cars will have to take out a license from the central Government.

OF the 79 passenger cars and 16 motor trucks in the Municipality of Para, Brazil, 95 per cent are eight years of age or over, and a very large proportion have undergone so many changes and repairs that they have lost their original character.

Control of Oil Thrown on Cylinder Obviates Pumping Troubles

Detroit Section of S. A. E. discusses this and other phases of engine lubrication. Over oiling, the chief fault of pressure lubrication, can be avoided by correct location of oil holes or by use of proper shields. Type of ring used is also important.

A VERY vigorous discussion on lubrication followed the reading of a paper by A. A. Bull at the first meeting for the winter session of the Detroit Section of the Society of Automotive Engineers, Sept. 29. Bull read the same paper which he gave at the summer S. A. E. meeting, the idea being to obtain more time both for its presentation and for discussing it, as the summer meeting session was too crowded to permit either to be done properly.

It will be recollected that Bull's paper described a series of tests on oiling principally directed towards discovering the major factors in oil pumping. He showed, by running an engine with the cylinder head removed, that the quantity of oil carried to the piston heads was greatly affected by the nature of the ring used and the fit thereof, also that still more important than the ring is the control of the quantity of oil thrown against the cylinder wall.

His conclusions were that a ring having the ability to expand sideways as well as radially is extremely helpful, but that control of the oil fed into the cylinder is still more important. With respect to the feed he dealt almost entirely with pressure systems and showed that the principal trouble with them is their tendency, first, to supply too much oil when the bearings are worn or poorly fitted in overhauling; second, to give excessive cylinder oiling at high speeds. The remedy which he found the most effective is to change the conventional method of drilling the crankshaft. From the main bearings to the center of the crankpin the usual hole is employed, but the radial hole in the crankpin itself is drilled from the inner side of the pin instead of from the outside. This feeds oil into a bearing area which for nearly the whole revolution, especially at high speeds, is loaded so that with any normal degree of wear the bearing is pressed against the orifice for most of the time, thus preventing the escape of increasing quantities of oil.

WITH the usual method the oil is fed into the portion of the bearing least often loaded so that as clearance grows with wear the oil has a more and more free way out and tends to escape in a spray directly through the clearance. The experimental runs showed that the increase in miles per gallon of oil could be doubled or even trebled by simply changing the oil hole location, and without any effect on the life of the connecting rod bearings.

While strong differences of opinion appeared in the discussion it was obvious that majority opinion was in accord with Bull's conclusions. The objectors brought out the important point that, in some cases, particularly in aviation engines, the maximum feed possible through the crankpin is desirable, because in this case oil is required for cooling as much as for lubrication and such cooling is necessary to ensure the life of the bearing.

One of the principal contributors to the discussion was Otis C. Funderburck, who described experiments he had made with large marine engines using pressure feed at from 10 lb. up to 250 lb. per sq. in. with oil holes in various positions relative to the center. These engines had a very high bearing speed—about 1700 ft. per min. rubbing velocity—and had functioned best with the oil hole in the pin close to the position recommended by Bull and with a pressure of 30 lb.

T. J. Litle of the Lincoln Co., told of remarkably good results he had obtained with rings having a groove cut in them at an angle inward from the bottom edge so that the face of the ring is of normal width, but the lower edge is sharp instead of being a 90 deg. corner. Such rings are, he said, particularly effective when used on a piston having large oil return slots below the bottom ring and they appeared to stand up well.

LITLE also said too strong an emphasis cannot be placed on the importance of finishing cylinder bores to a polish and of selecting rings carefully. He especially favors the honing method of finishing. Properly fitted pistons and the rings of the type described had in his experience been known to increase oil mileage from 400 to 2000 per gal.

Captain Woolson of the Packard Co., and F. E. Watts of the Hupmobile Co., both attacked Bull's theory of crankpin drilling, saying that it was against the principles of bearing lubrication to feed anywhere except to the unloaded area. Woolson spoke of the necessity for a large flow of oil in aviation engines apart from lubrication requirements. He favors the use of splash guards arched over each crankthrow which protect the cylinders from an oversupply and still permit any quantity to be circulated through the connecting rod bearings. Both he and other speakers stated that the conventional baffle placed right across the bottom of the bore is utterly useless because the air draft through the central crank carries up immense quantities of oil.

Woolson said that oil economy can be carried much too far, that it is not desirable for a passsenger car engine to do more than 400 or 500 miles to the gallon

since, if it does the owner rarely puts in fresh oil and the lubricant is used in a worn out condition. Watts supported him strongly on this point and said that frequent supply of clean new oil is highly necessary and most easily ensured by a moderately rapid oil consumption.

E. V. Rippingille said he considered that piston clearance is important, having noticed that many engines would give excessive cylinder oiling when cold but perform properly when warmed up. A proper skirt fit is necessary to insure the quare facing of the ring against the cylinder wall.

There was some more discussion on this point, following closely the lines of that at the New York meeting last week, the points brought out being that piston cocking due either to improper skirt fit or to too high a placing of the wrist pin necessarily provokes trouble in the cylinder.

A. Ludlow Clayden of the Sun Co., in support of methods for restraining the supply of oil to the cylinders, mentioned the extremely small quantity of oil used on the old-fashioned systems where individual leads were used to supply all points with fresh oil that was never recirculated. He expressed himself as very much in favor of placing the crankpin hole in some such position as that used by Bull.

In his reply Bull said he thought it necessary to emphasize that his preference for the ring with expansion both ways is that it compensated for wear of the groove. No other form of ring can do this. If ring proportions are chosen so that wear is slow, that merely puts off the inevitable end, whereas his preferred form completely neutralized it. He said that a ring of this sort permits the use of alloy pistons on all classes of engines giving them a much longer life and utilizing their great advantages without the drawback of short life.

IN the matter of crankpin drilling, likewise, his desire is for a design which gives the same performance new or old, since ample oil is fed the bearing for all passenger car and truck purposes and the quantity is constant throughout the life of the engine. Roundness of cylinders when at working temperatures is very important and this is one of the chief advantages of the sleeve type cylinder liner. This last is a subject worthy of much more study since it is very difficult to discover the actual shape of cylinder bores under working conditions.

American Cars 65 per cent of Total in Sweden

THE growth of the automobile industry in Sweden, from an importation standpoint, during the first six months of the present year, has been the largest in the history of the nation, automobile import figures of that country show.

During the period of January-June of this year there were 4018 automobiles imported, compared to 3158 during the same period last year, hailed, at that time, as a banner year.

While the importation of automotive vehicles was greater by nearly 1000 machines this year, the aggregate value of the imports were approximately $1,000,000 less. The value of the imports of the first six months of the present year were 10,398,237 krone, or $2,787,731, being less than that of January-June, 1921, by 3,730,223 krone, or $1,000.060.

The value of the imports of the automobile trucks was less by $322,747 this year than last. The figures show that 798 trucks were imported from foreign countries the first six months of this year compared to 548 same period last.

The imports of motorcycles, the first six months of the present year, were only about one-third of that in January-June, 1921, having been but 721 in number compared with 2165 in the corresponding period of last year.

The import of benzine and gasoline in January-June of the present year has been unprecedented, the quantity having reached a total of 21,621,000 kilos against 9,935,604 kilos during the period January-June, 1921.

Definite figures are not available as to the American automobile industry's share of the Swedish business of imported automobiles for the first six months, but "unofficial" figures place the amount as being between 60 and 65 per cent of the total, England exporting approximately 25 per cent of the Swedish imports, the remainder being scattered.

From Fourth Place to First in Ceylon Market

AUTOMOTIVE products manufactured in the United States have gained a firm foothold in the Ceylon market, says Consul Vance, Colombo, in a report to the Department of Commerce. The popularity of American motor vehicles is illustrated in the following statistical excerpts:

Products Imported	1919	1920	1921
Passenger cars:			
Total	217	881	434
From United States..	201	540 (plus 175 from Canada)	180 (plus 123 from Canada)
Motor trucks:			
Total	46	109	29
From United States...	42	59 (plus 24 from Canada)	19
Accessories:			
Total	Rs. 261,220	Rs. 596,387	Rs. 455,455
From United States..	146,823	252,908	237,487
Motorcycles:			
Total	132	471	142
From United States..	45	147	30
From United Kingdom	86	316	93

American passenger cars, which formed only about 25 per cent of the total motor car imports into Ceylon before the war, now hold the first rank, although during 1921 they did not supply as large a percentage as during the three or four previous years.

In spite of the fact that a new tariff favoring goods manufactured within the British Empire which was agitated during 1920 and 1921, was turned down by the Legislative Council in Ceylon, American cars manufactured in Canada have been imported in increasing numbers since 1920.

As is the case for passenger cars, the United States is the leading supplier of motor trucks and accessories.

How Will the New Tariff Affect Automotive Exports?

American automotive products in unique position and can meet competition. Power to raise or lower tariff rates may be used to force lower tariffs from other countries. Removal of customs barriers and embargoes would be step to aid of export business.

WHAT is the tariff bill going to do to American industry?

What is it going to do to automotive export business?

These questions are running through the minds of many executives.

Assuming that there will be a large number of products virtually excluded from the American market because they cannot meet competition under the provisions of the new tariff law and that foreign nations as a result will be apt to buy elsewhere when possible, the questions are timely.

A close survey of the situation indicates that automotive products will be one of the least affected. Our superior, large scale production permits us to give better value and undersell competitors in spite of tariffs in the automotive line.

There are seven features to the new tariff bill which are of special interest to the automobile industry, however, affecting to a greater or lesser degree automotive exports:

(1) The measure provides a flat 25% duty on all automotive equipment, vehicles, parts and accessories.
(2) It carries a 90% ad valorem duty on all re-imported vehicles.
(3) A duty of 5 cents per pound on crude aluminum and 9 cents per pound on aluminum in coils, sheets, etc.
(4) A duty on ball bearings of 10 cents per pound and 45% ad valorem.
(5) Crude oil remains on free list.
(6) Administrative provision authorizing the President to increase or decrease tariff rates to a maximum of 50% in the case of countries discriminating against the United States.
(7) The enlarging of powers of the Tariff Commission and giving that body authority to make factual investigations for the President and Congress in determining the justification of any rate considered unreasonable.

IF the administrative provision authorizing the President to increase or decrease tariff rates to a maximum of 50 per cent can be used successfully to force lower tariffs from other countries some export handicap may be removed.

Of greater importance is the recovery of European buying power and the stabilizing of exchange rates. Reduced tariff rates will not solve the problem of increasing exports to all countries.

The first provision of the bill, lowering the tariff to a flat rate of 25 per cent, offers a uniform basis with which to deal with all countries alike. We are able to maintain control of the major portion of the world's automotive business even with a lowering of our own tariff. This reduction offers a platform from which to obtain a lowering of tariffs in those countries in which a higher than a 25 per cent tariff rate is now demanded.

The second feature of the bill is a distinct triumph for the automotive industry and is of more immediate importance, especially to truck manufacturers, than anything else it contains. Decision to impose a 90 per cent ad valorem duty on reimported vehicles follows a campaign which has been continued for more than two years.

AUTOMOTIVE INDUSTRIES first pointed out the menace to the truck industry resulting from the reimportation of thousands of army motor trucks from France and England and their re-sale in this country at a fraction of their list value. Many of these vehicles were practically new and their sale here exerted a most depressing effect on truck makers and dealers who had suffered most severely from the general depression.

Many of these trucks, already in the United States, remain unsold and there are thousands more of them on the other side which ultimately would have been dumped on the American market had not this heavy duty been levied. Truck manufacturers will breathe more freely now that they have been barred out, to all intents. They have interposed a serious barrier to the sale of new vehicles.

The entire industry became aroused after AUTOMOTIVE INDUSTRIES had told the results of the first shipment, which was sent to California. Ultimately, Representative Graham introduced a resolution proposing a 90 per cent duty on reimported products. It was passed by the House but held up in the Senate and ultimately included in the tariff bill. The provision covers not only trucks but many other American products sold to speculators after the armistice.

The sixth provision gives a definite means for negotiation with other nations to have embargoes and discriminatory tariffs removed. Whether this provision will be used in a bargaining sense remains to be seen. Table 1 shows a portion of the countries to which the sixth provision may be applied.

The application of authority given to the President to increase or decrease tariff rates would vary according to

TABLE 1

Manufacturing Nations

High Tariffs

France—U. S., 45 per cent, plus 90 francs per 100 kilos of weight over 5500 lb.

Italy—U. S., 35 per cent, plus 60 to 120 liras per 100 kilos, according to vehicle weight.

Great Britain—U. S., 33⅓ per cent c.i.f. value, less value of tires.

Discriminatory Tariffs

Finland—U. S., 40 per cent; France, 10 per cent.

Poland—Favors France by about one-half U. S. duty. Now negotiating with Switzerland for favoring tariff.

Canada—U. S., 35 per cent; France, Belgium, Holland, 30 per cent; Great Britain, 20 per cent.

Discriminatory Tariff Due to Colonial Policy

British Colonies:	United States Per Cent	England Per Cent
Australia	12½	7½
British Guiana	20	15
British Honduras	20	15
West Indies	20	15
Malta	15	10
New Zealand	26	11
South Africa	20	17

French Colonies:

Algeria, Tunis, Indo-China and West Indies—U. S., 45 per cent, plus 90 francs per 100 kilos of weight more than 5500 lb.

France Duty Free in All Cases

Italian Colonies:

Eritrea—U. S., 8 per cent; Italy, 1 per cent.

Somaliland—U. S., 15 per cent; Italy, 1 per cent.

Embargoes by Manufacturing Nations

Germany.

Austria.

Discriminatory Embargoes

Czecho-Slovakia.

whether the country is a producer of automobiles or not. In the event that it is a manufacturer and a request is made to secure a reduction in tariff making it equal to our own, it would be possible to increase our tariff by 50 per cent if the negotiations were unsuccessful. It is now made possible by this provision to take action against those countries which have an embargo against our products, to have the embargo removed or retaliate and place an embargo against them.

Agricultural countries which apply a discriminatory tariff on automotive products against the United States and are unwilling to make a reduction may suffer retaliation under this new provision by having a high duty placed on some other product which is now favored by a low tariff.

Italy, for example, has been collecting a duty of 35 per cent from the United States plus an additional sum of 60 to 120 lires according to the weight of the vehicle. Indications are that Italy will be willing to lower her tariff rate once the United States takes the initial step.

Discriminatory Tariff Rates

A very good example of a discriminatory tariff is shown by our northern neighbor, Canada. Canada has a tariff of 35 per cent against the United States, 30 per cent for France, Belgium and Holland, and 20 per cent for England. That means that the American exporter has to overcome a handicap of 15 per cent when competing with England for the Canadian market. Canada does not produce many automobiles outside of those which are manufactured by American concerns in Canadian plants, hence an unwillingness to afford us the same favors as those given to other countries might have to be met by other means than an increase of our own automobile tariff rate, if the retaliatory act was to carry any weight.

Finland allows the French automotive exporter to pay a duty of one-fourth of what the American exporter must pay. Poland favors France by a duty of approximately one-half of that imposed on the United States. Still another example is Czecho-Slovakia which has an embargo against automotive products which applies to all countries with the exception of Italy. This gives the Italian exporter a complete advantage over the American.

Great Britain has a tariff of 33 1-3 per cent for the United States and 22 2-9 per cent for Canada. British colonies all favor the mother country as against the United States. These and many other inequalities have the possibility of being adjusted by the measure in the new tariff bill.

The export features of the tariff bill should be helpful in opening up trade with colonies of other nations. This country has been very much handicapped in carrying on business with colonies of the United Kingdom, France and Italy because of the great tariff discrimination. Such French colonies as Tunis and Algeria make a discrimination of charging us 45 per cent plus 90 francs per 100 kilos of weight more than 5500 pounds while France pays nothing.

If the sixth provision is wisely handled and agreements can be made whereby equality of treatment is granted us by those nations which now make discriminations or place embargoes against our product, there should be a stimulus given to our automotive exports. Assuming that this is achieved there still remains the drawback of unfavorable rates of exchange and decreased buying power in many countries. The normal consumption of automotive products will not come until the European situation is pulled out of the slough.

Equality in tariff rates, if secured, will probably show immediate greater returns from colonial possessions and from those countries which do not have such a severe handicap in the rate of exchange, than from such countries as Germany, Austria and Czecho-Slovakia which now have an embargo against American automobiles and a very unfavorable rate of exchange. Business will grow as the countries get on a sound footing, but the removal of unnatural tariff barriers will assist our getting it.

If the administrative provision of the new tariff bill is utilized and the abolition of discrimination is secured without antagonism, it should be considered a favorable step and the paving of the way for an increased export business in the future.

THE Automovil Club Argentino is proceeding with the organization of a road commission which, through the work it will undertake, should have a most important bearing upon the growth of automobile touring throughout the Republic, the construction of better roads and, likewise, the future expansion of automobile use. The commission will draw up maps of the roads of all parts of Argentina, for the convenience and guidance of tourist parties, and it likewise will put up sign boards of a uniform type over these roads, indicating distances and other useful information. This work, which already has gotten under way, is considered to be one of the most significant steps that has been undertaken in recent years for the enlargement of cross country automobile touring there.

Highway Developments Improving Southern Motor Market

Roads connecting important commercial points make increased car sales immediately possible. Farm to market highways lacking. Truck development likely to be slow. Motor vehicle taxes must be used for road construction in some States.

By James Dalton

HIGHWAY transport in the South is in its infancy. It is lagging far behind other sections of the country, but the next few years will bring a wonderful development and a highly profitable market.

The one fundamental reason for the indifference felt in the South toward the commercial vehicle is lack of farm to market highways.

There are numerous secondary reasons, however. The most important is that little effort has been made to educate the farmer to the economy of motorizing his farm. As a matter of fact the gospel of good roads has been preached far more vigorously than that of motorization.

An intimate relationship exists between the two phases of the problem. Farmers who feel slight interest in trucks scarcely can be expected to feel a strong urge toward the payment of taxes for the construction of highways which he does not feel he needs.

Any one who thinks, however, that the South as a whole is indifferent to the need of good roads is vastly mistaken. On the contrary, it is keenly alive to the importance of building them if it is to progress as it proposes to progress in the next ten years.

The Carolinas have gone farthest in highway construction and they have profited accordingly. Georgia is on the job and some kind of a bond issue proposal will be adopted at the present session of the Legislature. Alabama already has provided for a bond issue. Louisiana is farther along than any other state in her program of construction. Texas is building more highways than any other commonwealth, with 1484 miles under way. Tennessee has met with many discouragements but will do something. Arkansas is carrying too great a good roads burden. The other states are swinging into line.

IT is not surprising that the South has fallen behind in highway building. Good roads cost a lot of money and the states below the Mason and Dixon line are comparatively poor. Assessed property values mean little unless all the facts behind them are understood, but if assessments in all states were made upon a full valuation basis those in the South would be found far behind those of similar population in most other sections.

There are long stretches of territory in the South where little in the way of real estate is to be found except humble farm houses and negro cabins. Land values are not high and to assess against this property the original cost of highways would be ruinous. It has been tried in Arkansas with disastrous results. The South, which up to this time has been essentially an agricultural area, feels about real estate taxes as do other sections devoted principally to crop raising, which means that it doesn't like them.

Taxation and possible sources of revenue present the most perplexing problems with which state legislatures have to deal. Politics per capita is no less dense in the South than in other parts of the country even though party lines are less closely drawn. Democratic majorities are like the Republican majority in Congress, only more so, and politics play no mean part in highway legislation.

For example, the automotive interests in Tennessee have been plugging hard for an improved road between Chattanooga and Nashville. It was supposed an agreement had been reached but before it could go through it was necessary to get the signature of a certain judge. Unfortunately, it was not obtained prior to the primary election and this particular judge was not re-nominated. He now will have nothing to do with the highway plan and neither will the man who was nominated to succeed him.

TENNESSEE furnishes another example of the difficulties confronting highway missionaries. At the last session of the legislature the road question was debated at great length and the plan practically agreed upon in committee was to build one mile in each county in the State. Automotive interests vigorously opposed this preposterous plan and it was defeated, but it serves to illustrate some of the obstacles placed in the way of highway promotion.

Good roads advocates in all states find many difficulties in their way but there are more of them in the South than elsewhere.

It must not be assumed, however, that there are no good roads in the South. So far as passenger cars are concerned there are not so many handicaps as might be assumed. Most of the states are traversed by good roads from north to south and from east to west. Good highways radiate in all directions for considerable distances out of the leading cities. Pavements in the larger places are fully as good as they are in cities of similar size in other sections. As a matter of fact, the little towns of from 5000 to 10,000 inhabitants have done more in this respect than northern and eastern villages. The residents are proud of their home towns and they propose to make them up-to-date.

Motor trucks rather than passenger cars are suffering from lack of highways and as a consequence their use has

been restricted rather closely to the cities and towns. It is significant, however, that motor transport has expanded coincidentally with the hard road system. Motor freight and bus lines have been established almost as soon as highways have been opened. In Georgia, for example, competition from them has developed to such an extent that the railroads have made an unsuccessful attempt to have them placed under the regulatory control of the state railroad commission.

Use of commercial vehicles will increase in direct proportion with the mileage of good roads.

Federal aid has been a boon to the South. There now is a well defined movement in nearly all the states for the construction of good roads which will connect the county seats. When this work is completed, or even when it is well under way, it will give tremendous impetus to the use of trucks.

Automotive interests and business generally are fully alive to the bearing good roads will have on the industrial and agricultural development of the South. They have progressive ideas and are not in any sense selfish.

In the more populous states in other parts of the country, it is contended that abutting property and society as a whole should bear the original cost of highway construction while the taxes paid by users of the highways should be devoted to their maintenance. This plan is not practical in the South because of the comparative dearth of taxable property and the small revenues of the states and counties.

Automotive interests, therefore, including users of motor vehicles, have taken the broad view that it is entirely legitimate to use the revenue derived from motor vehicle taxation for highway construction. They are content that only a small part of it should be reserved for maintenance. The feeling is that once the roads are built some means will be found of maintaining them.

In Georgia, for example, the bond issue which will be authorized for highway construction, will be based annually upon 90 per cent of the fees from motor vehicles. Tennessee motorists have consented to a gasoline tax for road building. A similar attitude has been taken in most of the other states. The main thing is to get roads, and taxes are not plentiful. Such is the dearth of revenue that it is proposed to levy a tax on soft drinks in Georgia and merchants, especially druggists, now pay a multiplicity of taxes.

ONE obstacle confronting the southern states in road building with Federal aid is found in the fact that the Federal aid act makes no provision for bridges. Framers of the bill seem to have assumed that bridges now in use might be sound enough to carry the traffic, but this is not the case in the South. As a result the counties are having to foot the cost of constructing bridges and it is rather a heavy burden.

Bridges in the South were made strong enough originally to carry mule teams drawing loads of reasonable weight. When the passenger car invasion began, these structures were strengthened sufficiently to hold these vehicles but there was no way of making the old structures stout enough to hold up trucks even of moderate capacity. Good roads are of little value if the operator of a commercial vehicle finds, after driving 10 or 15 miles, that he is held up by a weak bridge. This, therefore, is another obstacle in the path of road making.

THE advantages of building roads connecting county seats are even more manifest in the Southern than in other states. They will open up much fertile country which now is of little value because of the inaccessibility of markets. There is a very definite limit to the distance mule teams can go dragging heavy or unwieldy loads over poor roads.

Once these districts, remote at present, are brought within a few hours of markets by good roads, they will be developed rapidly. As an example, the northern part of Georgia, which is now almost poverty stricken, offers every advantage for the raising of apples and other fruits. This industry will be developed when good roads bring markets within reach. All the other states have similar districts.

THE growing industrial activity of the South makes it an excellent potential market for cars and trucks. This section of the country can absorb far more vehicles than it has at any time in the past. But—

Good roads are essential. Truck sales, in particular, will increase in direct proportion to the mileage of improved highways. These roads must be built as quickly and as economically as possible.

Money obtained from motor vehicle taxes will have to be used in many instances. This is opposed to the practice advocated by the motor vehicle bodies in general, but conditions in many southern states seem to make road building impossible by any other means.

As the situation stands to-day there is just as good a market for trucks in the industrial cities of the South as in industrial cities anywhere. Manufacturers and wholesalers are using them in fleets to distribute their products and bring in supplies. They have found them economical and fleets are being enlarged continually. This applies to the heavier vehicles, up to two tons capacity. There are few trucks in use heavier than that.

There is a fairly good market to-day for light delivery vehicles, both in the cities and the smaller towns. With the steady improvement in business sales in this class are increasing. In any study of the Sout hit must be remembered that sales will be better next year than they have been this year.

So far as the farms are concerned there is practically no truck market to-day. Contract trucking is practically the only development in this direction except the establishment of motor transport lines over good highways in some sections. The farmer never has been sold on the economy and utility of motor vehicles. He knows more about tractors than he does about trucks and he admits that tractors are a good investment. There is a fair market now for light tractors and it will increase as the farmers get out of the woods financially.

But when it comes to trucks the Southern farmer can't see why he should buy them, even if his farm is on a good road. Mules are cheap and feed for them can be raised on the farm while gasoline takes real cash. Crops are not diversified as they are in other sections of the country. Most farmers have some staple money crop which is marketed in not more than two or three weeks. During that period he may wish he had a truck, but he doesn't see profit in maintaining a commercial vehicle the year round.

Much missionary work remains to be done before the Southern farmer becomes a live prospect for the truck dealer, but he is not by any means as indifferent as he was a few years ago and intelligent educational work will bring him into the market.



An Old Idea Revived?

Editor, AUTOMOTIVE INDUSTRIES:

Jerram's differential gear illustrated and described in the Aug. 17 issue of AUTOMOTIVE INDUSTRIES, page 318, evidently is a resurrection of an old idea, dressed up and improved. The basic principle was shown in "Self-Propelled Vehicles" by Homans, edition of 1906. In the differential gear shown by Homans, the spur gears were fixed on short shafts set at an angle of say 30 deg. to the axis of the axle housing. They were connected to the live axles by universal joints of the square block and fork type. In Jerram's differential the angularity is reduced to a very slight degree by making the joint connections at the wheel hubs instead of near the center—a decided improvement.

It is hardly a fair assumption that the entire torque of the car is through a single pinion tooth, as that statement conveys an erroneous impression. When driving straight ahead or backward, the two pinions revolve around a common axis without relative rotation; the tendency of one to rotate on its individual axis is resisted by the opposing tendency of its mate to turn in the opposite direction. Thus no gear tooth action takes place. It is true, of course, that the load is on one tooth, but a static load is quite different from that imposed when one tooth interacts with that of a mating gear. Tooth action occurs only when the differential operates.

This brings up another interesting feature in regard to the alleged irregularity of turning action due to the imperfect universal joints. The angularity of the shafts with the respect to the wheel hubs is unchanged when driving straight ahead or backward. Hence, turning action is uniform except when rounding corners. Then the shafts rotate relatively and the angular relation to the wheel hubs changes, causing irregularity of wheel rotation. Evidently the inventor believes that this irregularity is inconsequential in a light cheap car to which the differential seems adapted.

FRED E. ROGERS.

Standards for Electrical Apparatus

Editor, AUTOMOTIVE INDUSTRIES:

The subject of standardization of electrical apparatus for automotive applications is one that has never been given very much consideration in the past, with the exception of mounting means and dimensions, and, therefore, I think the time is opportune to standardize on the electrical output of generators and the mechanical output of motors in such a way that the progress of development for both the electrical manufacturer and the car manufacturer will not be retarded, and, at the same time, give the two different organizations a yardstick to measure quality and quantity which will be consistent with the manufacture of this electrical equipment to-day.

Careful consideration must be given by the standardization committee of the Automotive Electrical Association to the equipment now on the market giving good service, and these standards must be built up around these commercial machines, rather than to lay out a group of machines which, from a theoretical standpoint, would be most suitable.

The standardization committee must not lose sight of the fact that none of the manufacturers can afford to consider any of its present designs obsolete, whether it is a motor, generator, crankcase, chain drive construction or method of application, and, therefore, its scope of standard for the present time must be very wide. As time goes by they should be slightly altered, with the idea of eventually having a set of standards approaching the ideal.

The standards which have been considered by the Automotive Electric Association at Old Orchard, during their summer meeting, I do not think represent the simplest conception possible. I believe that for the generator a set of standards could be so laid out whereby the question of generator class and car class can be eliminated. This, I think, would be taken care of by

1. Specifying the temperature rise above the room temperature of the machine operating under full load.
2. Specifying car miles per hour for at least three points on the curve.
3. Specifying that the generator output should exceed or balance the lamp loads up to a certain car speed.

This would give us, indeed, a very simple specification—one which would apply to all classes, and one which would be very easily interpreted and easy to check by the car manufacturer without elaborate equipment and electrical machine knowledge.

The standardization of motor characteristics would not be quite so simple as for generators. Here, I believe, the motors must be segregated into classes by giving at least two points on its characteristic curve.

L. B. EHRLICH,
Gray & Davis, Inc.

Editor, AUTOMOTIVE INDUSTRIES:

Regarding generators suitable for motor bus service, the following data, based on our experience, may be of interest:

1. Maximum charging rate: This should occur around 15 m.p.h. for city work. A higher speed is allowed for interurban work.

2. Cut in speed: Speed at which cut-in occurs should not be above 5 m.p.h. for city work.
3. Maximum speed: Generator should be capable of running up to 4000 r.p.m. for short periods of time.
4. Output: Maximum output should be between 20-25 amperes on a 12-volt unit, or 40-50 amperes at 6 volts.

It is imperative that some form of reliable regulation be employed, since all coaches do not necessarily have the same demand for current, this being dependent on the presence of head lamps, self-starter, battery, ignition, etc.

Some consideration should be given to a device for preventing overcharging of the battery. Just how serious this problem is we are not prepared to state, since we are still gathering data on this phase of the situation.

We have in course of development now another type of coach, for which we doubt if either the No. 5 or No. 6 generators would have suitable output, this being the enclosed upper deck design. The output required from a 12-volt unit would, we believe, be in the neighborhood of 30 amperes.

G. A. GREEN,
Vice-Pres. and Gen. Mgr., Fifth Avenue Coach Co.

Editor, AUTOMOTIVE INDUSTRIES:

In connection with the standardization program of the Automotive Electric Association, as covered in pages 480 and following of the issue of Sept. 7, you ask for criticisms and suggestions. The following comment, it seems to me, may throw some light on the interest which the entire automobile industry has in these standards and on the viewpoint from which the Standardization Committee of the Automotive Electric Association is working on the problem for wider adoption of these standards.

The casual reader in noting that these standards are adopted by the Automotive Electric Association may feel that they do not come into immediate contact with the body of the industry, but it should be borne in mind that there is a direct relation between the Automotive Electric Association and the Society of Automotive Engineers and that any standards which are adopted by the Automotive Electric Association will in time probably be endorsed by the Society of Automotive Engineers. This immediately makes the question of these standards a matter of direct interest to all manufacturers of internal combustion engines for passenger cars, trucks, tractors and other uses. While the standards discussed in your article seem to apply only to electrical ratings, it is the purpose at a future date to have them apply also to mechanical dimensions, and this makes them directly a matter of concern to engine builders.

It was felt by the Automotive Electric Association that the old standards of mechanical dimensions for electrical equipment adopted by the Society of Automotive Engineers were not widely enough used and generally recognized.

There are many explanations for this and some very good reasons.

In some cases, the design of the engine was such that S.A.E. standards could not readily be worked in.

In other cases, the designer of the engine working for distinctive results felt that special electrical equipment was desirable.

In a third class, insufficient attention and thought was put upon the problem to make possible the adoption of standards.

These and many other reasons were thoughtfully considered with a view to making standards of more general application and benefit. Arguing from this basis, Joseph Bijur, chairman of the Standards Committee of the Automotive Electric Association, advanced the constructive idea that the problem could be attacked starting from the basis of electrical ratings. Enjoying the combined experience of practically all builders of electrical equipment, who are in very fair agreement, it was felt that the Automotive Electric Association could adopt authoritative standards as to the electrical ratings and speeds of generators, and the gear ratios and torques of starting motors. A preliminary discussion indicated that there was practically a unanimous agreement on these questions. In the next place, it was the opinion that if the generator and motor ratings were agreed upon, it is a short step to agreement by the electrical designers on the main mechanical dimensions of the machines. There are some fundamental conditions and specifications which would have to be established but these are fairly simple, and, beyond that point, the establishing of these main mechanical dimensions seems to be a perfectly feasible procedure.

The next step in the standardization after the main mechanical dimensions are agreed upon would be the method of mounting and the dimensions of mounting flanges, brackets, drilling, etc. Since this has once been accomplished in a fairly broad way, there is no reason to believe that changes in the existing standards or any revised standards could not be generally endorsed. If they were logical, and, assuming the logic of such standards, their general adoption would necessarily follow. I say this because there are such evident and strong commercial reasons in favor of standardization.

There is perhaps no subject which is so attractive in the abstract and so difficult of realization in the concrete as standardization, but in this particular case if the reasons for standardization were broadly and generally understood by all engine builders and if it could be proved to them that the ultimate benefit in dollars and cents was very considerable, the general adoption of standards could not be postponed.

Among these broad general advantages can be mentioned, first, the equipment of different manufacturers of electrical equipment becomes mechanically and electrically interchangeable. This means that in times of stress such as strikes in the works of individual concerns, difficulty in obtaining material, or any other reasons of this nature, the facilities of all manufacturers become available in tiding over the threatened interruption to production. It also insures that in changing the source of supply, it will neither be necessary on the one hand for the engine builder to make troublesome pattern and tool changes nor will it be necessary for the manufacturer of electrical equipment to produce a special design with consequent delay and expense which cannot but be reflected in the cost of the equipment to the user.

Second: The motor car builder with limited production can use the same electrical equipment which is used on similar cars of large production and so avail himself of the manufacturer's lower cost resulting from such large production.

Third: The manufacturers of electrical equipment by the reduction in the number of different mechanical designs required and the elimination of difficult special designs can improve their own manufacturing conditions, which is a direct economic benefit to the entire industry.

To suggest and attempt standardization is nothing new. New ideas in connection with the accomplishment of standardization are frequently proposed. As I see it, the present attempt by the Automotive Electric Association is nothing that should be considered novel or startling or upsetting in the industry but it seems to have a chance of accomplishing general standards, and their adoption, which looks very good, and there is no question but what the establishing and adoption of such general standards would mean a considerable financial benefit to the entire automotive industry.

A. M. DUDLEY,
Mgr. Auto. Engrg. Dept., Westinghouse Elec. & Mfg. Co.

Personal Aspirations More Important to Worker Than Economic Laws

Operation of general laws produces widely different effects in particular cases. Employees are chiefly interested in the specific application of general business laws. Management must establish individual relations with workers.

By Harry Tipper

ECONOMIC laws have been receiving a great deal of attention from the business man and in public discussions of business for some time. The law of supply and demand has been quoted time after time, particularly in connection with labor. The discussion has been worded, frequently, in such a way as to suggest that the law applied to all individual cases with an equal degree of effect. Apparently, the writers have not fully understood the meaning of a law.

The law of gravitation is an effective law as far as our terrestrial conditions are concerned, regardless of the controversy as to its universal effect, promoted by Einstein and others. Because of the law of gravitation, anything which is released above the ground falls to the ground, and the speed of its fall and the force effect of its contact can be calculated.

But the individual practical effect of a fall varies very considerably. A man falls from a height of 20 feet and gets away with no particular damage. Another man stubs his foot on the carpet at home and breaks a leg or suffers concussion of the brain. The law was operating equally in both cases, but the practical effect of the law was influenced by a great many varying factors in the individual case, all of which it is necessary to consider in connection with the individual effect.

In matters connected with industry, the same thing is true. The law of supply and demand works with very definite effect at all times but the number of variables entering into its complete operation in any individual case, influences the effect of this law so that the results may present very wide differences.

It is true that if the demand for bricklayers is greater than the supply, the wages will have a tendency to rise, and if the supply is greater than the demand, the wages will have a tendency to fall; but if the bricklayers in a particular town are able to maintain 100 per cent union, limiting the apprentices, the effect of the variance in the supply in other quarters will be diminished and may become invisible. It is quite true that all wealth is the result of labor productivity and that the more produced, the greater will be the wealth. It will be hard work to convince a skilled mechanic of this fact, however, when he has been laid off because there were more goods in stock, and has been kept on because there were more orders than could be produced. As far as he is concerned, the effect of more production has been to glut the market and the effect of less production has been to keep a job for him. It may be very much better for me as a consumer, if the worker can turn out three times as much work in the same time and therefore enable me to buy the product for a smaller amount of money, but the effect of this decrease in price may not react visibly on the worker's position and consequently he may be without any visible incentive to develop his own capacity.

THE law of gravitation operates universally, but its effect differs materially in specific instances. One man may fall 20 feet without injury, while another may fall over a chair and break his neck.

The individual is most interested in the application of a general law to his specific case.

It will always be hard to convince a skilled worker that he gains by increased production so long as his experience shows that he loses his job when too much has been produced and holds it when demand exceeds supply. Such factors as this are uppermost in the minds of employees.

The problem of management is to establish individual relationships with each worker. Incentives to more efficient production must be such as to give a visible reward. The worker must be able to see readily the advantage of greater and more efficient effort on his part.

All general laws vary in their effects because within the operation of the law are many subsidiary factors which vary so as to alter, through an infinite series of differences, the operation of the law in the individual case. The introduction of a thick mattress on a hard floor will break the effect of a fall. The force of the fall is exactly the same, but the introduction of the mattress has altered the other factors to such an extent as to change the entire effect.

A full discussion of this subject would lead to a consideration of the place of economic laws and the place of psychological laws in the development of industrial

life. That might be interesting but would not be important to the individual manufacturer. This variation in the effect of any law does, however, point out the reason for the individual competition and the individual reward in the endeavor to induce the worker to put forward his maximum effort. The only effect which becomes visible to the worker is the effect upon himself. No amount of argument as to the general effect upon business will be of any service in inducing the worker to do his part. The operation of the law of supply and demand must take its time and cannot become visible to the individual.

IT is part of the duty of the manager of business to translate what he knows; to be interested in the personal incentive so that the development will take place along sound lines which, because of his larger education, he appreciates as the necessary lines of development. Unless there is a personal and individual incentive for a man to produce, the production will tend to establish a minimum pace.

The psychological condition of the worker, the character of his aspirations, and his more imperative desires, are a much more potent influence than any academic consideration of general economic laws, the effect of which is scarcely visible to him. Most of his discussions upon the subject of labor have failed at this particular point.

There are many excellent discussions of the system of industry, the economic place of the worker, the efficiency of labor, incentives, and other items, but the consideration of the growing aspirations and desires of the worker as a foundation of his actions, has been very meager. The manufacturer is prone to quote the economic law in connection with his labor operations. He points out quite truthfully that prices have decreased and argues, therefore, that the wages should decrease. The position of the individual worker, however, in relation to his desires and responsibilities, does not depend upon these economic increases and decreases of price. A hundred individual circumstances, pertaining to his personal surroundings are far more important in their effect upon his economic position than these indexed prices, which are quoted in connection with the demand that he work for less money or produce more.

THERE is no equality in the individual position from an economic standpoint, even among groups of workers in the same field, and in the same occupation. These inequalities in the surroundings, together with the variations in the individuals themselves, are potent factors in determining the point of view which the worker will take.

Furthermore, the employer himself cannot be too hide-bound in his consideration of the application of economic laws to the circumstances of his particular business and his position competitively in the industry. Judgment secured from experience and contact must amplify and modify the ideas secured from the considerations of general effects such as are indicated in the law of supply and demand, and similar considerations. He himself cannot become wealthy merely by making more goods. If he does not possess the power to market these goods and the buyers are not inclined to take them, the production is to that extent useless and becomes an embarrassment or liability instead of wealth.

Supply and demand have their effect upon his operations but this effect is strictly limited by his own foresight and conservatism and the local surroundings in which his operations are carried on. Similarly, the rules and regulations he establishes for the discipline of workers and the orderly conduct of the business, themselves require modification in the individual case in order that they may apply justly to the individual considerations of a particular operator.

Just and fair treatment is an individual relation. The economic condition is an individual matter from which certain conclusions can be drawn by an observation of the general tendencies in their action and reaction to large masses through the infinite variation in the individual case.

This means simply that the worker's desires, personal considerations, aspirations, and general tendencies of thought are more important matters of consideration to the individual manufacturer than the general economic laws which operate only through these variable individual relations. The job of management is establishing individual relations with each single worker, which will bring out maximum capacity, permanent productivity, loyalty and co-operations. As a consequence, the basis of the consideration must be an understanding of the individual and the relation of the individual to the mass.

BEFORE the advent of the industrial system, many centuries had been spent on the development of the right relations between the master and the worker as individuals concerned with the same operations. The development of the industrial system with its requirement of mass co-operation, enlarged and emphasized the mass consideration so that the attention of management, engineers and all who deal with human affairs, has been directed more and more to the elements of mass growth. This consideration has travelled so far that the individual relation has been neglected almost entirely. The individual relation remains the most important and the first element of consideration in management. The problem of management in human affairs in the future is a problem of maintaining the proper individual relation with the worker, while securing a sufficient co-operation to obtain maximum efficiency in mass effect.

To the individual worker and the supervisor, his individual situation is of primary importance. His relation to his work is of secondary importance. His relation to the other masses of workers and the system of industry falls into third place a long way behind the other considerations. It is a part of management to know how to place these matters and how to deal with them so that the greatest efficiency without interruption can be secured in the development of industrial operations.

CONVINCING evidence of the popularity of medium- and low-powered cars in Denmark is given in the following figures taken from official sources by Assistant Trade Commissioner Sorensen, Copenhagen:

Private Passenger Cars

Horsepower	No.
6-8	2,878
8-10	3,001
10-12	6,800
12-20	2,686
Over 20	270
Total	15,635

While a certain low-priced American car is widely distributed, a great number of very small cars of German and French makes enjoy considerable popularity because of their low cost of operation. Other low and medium-priced American cars are represented to a smaller extent. Improved parts service would undoubtedly make for increased sales of American motor vehicles in Denmark.

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A New Selling Appeal

A STRONG utility appeal was the dominant note of the recent Closed Car Show in New York. Flashy colors, extreme body lines and unusual nomenclature were missing. The exhibitors seem to have caught admirably the proper buying appeal to closed car prospects. They succeeded rather well in combining dignity and conservatism with attractiveness and life.

There was nothing drab or dull about the exhibits. They were interesting and well arranged. The salesmen added that touch of liveliness and vitality that vivid paint jobs and high-sounding names were called upon to supply in some former years. The new system is more productive of sales and educational value than the old.

The average closed car buyer desires a useful all-year-round automobile. Most of them want the greatest possible value for their money, and they are judging value more and more on the basis of utility and durability. The general sales appeal of the New York Closed Car show was well in accord with the trend of buying demands. Its merchandising methods carry an idea for factory salesmanagers.

Competition for Dealers

WHILE some financial interests have been worrying about the possibility of a ruinous price war in the automobile field, especially among manufacturers with closely competing lines, another form of competition has grown up, almost unnoticed, which is even more serious for the smaller companies.

This is competition for dealers. In some cases it has reached cut throat proportions. The larger production companies are constantly expanding their dealer organizations, especially in the big cities. Hundreds of sub-dealers have been appointed with the expectation that they will carry on intensive sales campaigns in their limited territories. Some of them have service stations but a majority have only sales rooms. In addition, many garages have been given agencies which permit them to sell cars without carrying them in stock.

Intensive sales effort is highly commendable, but the sad part of the present situation is that a good many of the additional sub-dealers who are being signed up by the big production companies have been representatives of makers with a comparatively small output. The result is that these companies are left without representation or are compelled to take on as dealers untrained men who know little about the business.

Another by-product of this competition has been the lengthening of discounts by the smaller manufacturers in an effort to make their dealerships attractive enough to hold the men who have them. These longer discounts make it possible for their men to make larger allowances in trades and get business which might otherwise go elsewhere. They also tend to make a comparatively small volume of business, with a large discount, as profitable as a materially larger volume with a much smaller discount.

No one expects or wants a uniform dealer discount. Any agreement in this direction probably would be declared illegal. There must be free competition. The big production companies, which are keen rivals, probably are justified in resorting to almost any legitimate means to increase their sales. But it is equally true that if the big fellows are raiding the sales organizations of the small companies they are justified in employing any handy weapon in warding off these attacks.

The crux of the situation is that there are not enough good dealers to supply the demand. They must be found and educated more rapidly than they have been in the past. If the expansion of dealer organizations by the large companies and the attendant lengthening of discounts by the smaller ones continues indefinitely, the motor vehicle business may soon find itself in the same position as the tire industry, which is conspicuous because of its instability.

It's a good deal like the used car question. There is

no panacea, for it is largely an individual problem. When the individual problems are not solved wisely, however, the entire industry suffers. The shortage of good dealers is about the hardest nut the industry has to crack at this time and it will require a lot of constructive thinking to break it.

British Strive for Low Prices

UTILITY and low-price as a basis for success in automobile manufacturing seems to have taken hold firmly in England, after many years of luxury car building. There was some movement in this direction during the last two years, but preliminary reports about the London Show which will be held in November, indicate a very strong tendency in this direction this year.

Commenting on the coming exhibition, for instance, the London *Times* says: "The great aim this year will be to show how inexpensive motoring can be made. Luxury cars will be seen, of course, but the heavy slump in the motor industry has shown conclusively that buyers of this class of car are limited and that the general appeal must be made to the man of general means."

British manufacturers are evidently going to try their best to accomplish what American makers have been doing for some years. They are far from anything like mass production as we know it in this country, but it is worth while to note their determination to make progress in this direction.

Effect and Measurement of Oil Dilution

DILUTION of crankcase oil by fuel is well recognized as one of the evils which results from the use of fuel with relatively non-volatile constituents, but there appears to be little precise information either as to how far such dilution can proceed without serious effect or even as to what constitutes a satisfactory method of measuring the percentage of dilution in a sample of used oil.

As dilution proceeds the oil becomes less and less viscous, but there is question as to whether the change in viscosity is proportional to the dilution. Even if this point were clear there would still be uncertainty as to whether or not viscosity is the proper criterion on which to judge the value of the diluted oil as a lubricant. Is an oil, the viscosity of which has been reduced from 250 to 150 sec. by fuel dilution as good a lubricant as a new oil of 150 sec. initial viscosity?

There is, so far as we are aware, no reliable data on the basis of which to answer questions such as this, yet without such data, or some more definite information of a closely related character it is impossible to judge intelligently when it is wise or in the interest of economy to draw off old lubricant and substitute new.

Advice given in instruction books usually cautions the user of an automotive vehicle to drain the crankcase every 1000 miles or thereabout. Obviously, this is little better than a guess, because the time of year, quality of fuel used, original quality of lubricant, condition of the engine, character of service and numerous other factors, any of which may vary through a wide range, determine the dilution, and the user may thus be led either to waste good lubricant or to use oil which has ceased to perform its function.

Rapid wear is supposed to accompany the use of a badly diluted lubricant, but whether the wear is due to the diluent or to dust which is washed over the cylinder bore, rings, piston and bearings is not entirely clear, nor is it known how far dilution can proceed without serious injury.

The matter is of great importance and should be made the subject of careful study and research work. Such an investigation could well be made at the Bureau of Standards. The industry could serve itself well and easily by making arrangements to this end.

Show 'em How to Sell

WHEN the automotive industry collided with the depression in 1920 it had a severe jolt and manufacturers soon realized that instead of accepting orders for their products they would have to sell them.

Dealer mortality was terrible while the period of depression lasted, but generally speaking those who survived were pretty good business men. Big gaps were left in the selling organizations and most of the companies in the field have been trying to plug up the holes. Many temporary expedients have been adopted, but there is only one real solution of the problem.

The solution is the education of more men of the right kind. This can't be done in a week or a year. The automotive industry is new and it has not reached the point of stabilization attained by older industries. Selling hardware or dry goods, for example, is vastly different from selling motor vehicles or motor vehicle parts and accessories.

Competition for good dealers is keen in all branches of the industry. The dealer's desires command a good deal more respect than they did a couple of years ago and few factories are in a position to take an arbitrary stand on points which do not involve business principles or fundamental policies.

The time has come when factory sales organizations have got to do a good deal more than they have in the past to aid and educate dealers. They can't simply ship the goods and then leave it to the man on the firing line to get rid of them. They must show him how to sell in a scientific way. They must teach him a great deal more than he knows now about finances and market analysis. While they're teaching him they'll learn themselves, just as all good teachers do.

A high class, brass tacks course in salesmanship and finance would be a mighty good thing for many factory sales departments. The lessons learned could then be passed on to the dealers.

Plants Operate on Big Schedules

Chief Car Producers Follow Earlier Pace

Higher Priced Makers Keep Production at Close to 100 Per Cent Capacity

DETROIT, Oct. 3.—Though production has fallen off perceptibly with the advancement of the season, the larger factories, the "ten percenters" of the industry, are holding close to the schedules set earlier in the year. Cars in the high-priced field have been less affected by the change in seasons, and unsettled business conditions, and are maintaining schedules of close to 100 per cent capacity.

Ford Motor Co., since its resumption, has made a quick return to its former high operating schedule, and is once again approximating the 5000 daily mark. There is no indication of a slump in sales, according to Ford officials, and preparations are to continue at factory capacity. Production in September approximated 100,000.

Behind with Orders

Dodge Brothers is holding close to its daily schedule of 600 and is still unable to keep up with orders on its new closed models. Buick is operating at new high marks with the addition of the former Scripps-Booth plant, and established a mark exceeding 700 daily in the latter part of the month. Production will continue at approximately this mark in October. Studebaker is continuing to operate at capacity, approximating 450 cars daily.

Cadillac is building approximately 100 cars a day. Orders signed by distributors at the recent convention are reported to warrant this output to the first of the year. Packard is approximating 2000 cars monthly in all models and has placed commitments on this basis to the first of the year. Lincoln orders are several months in advance of deliveries and work is under way for a plant addition which will permit of a large extension in manufacturing facilities. Wills Sainte Claire will build more cars in October than in any previous month and reports a volume of business approximating 30 cars daily.

Hudson-Essex production is running at the rate of about 250 cars daily, a large percentage of which is in closed models. Paige-Jewett production for September approximated 3000 and operations will be continued at close to this rate in November. Hupp Motors is maintaining a schedule approximating 125 daily. Reo is building about 250 vehicles a day and is aiming to increase this to 200 because of demand for its speed wagons and the popularity of its new passenger models. Oldsmobile is approximating 125 cars daily and is experiencing increases in sales under the stimulus of its recent price cut.

Oakland is running at about the same rate. Chevrolet manufacturing in the past month has been limited because of manufacturing reasons, but preparations are complete for entering upon a schedule which will be increased to about 2000 daily by the first of the year. Columbia Motors is operating at the rate of about 60 daily. Liberty is building about 25, Dort about 75, and Rickenbacker con-

(Continued on page 694)

Business in Brief

NEW YORK, Oct. 3—Trade and industry are in better shape now than a year ago. Fall business is opening up nicely, commodity prices are steady to higher; collections have improved; crops have escaped the frost, and there is less non-employment. This is the bright side of the picture.

On the other hand there is the railroad situation which promises to blight industrial efforts because of the transportation congestion that is expected, due to the necessity of hauling coal and crops. Higher prices for grain have put an additional burden on the carriers, but the long warm autumn is helping considerably in solving the traffic problems.

Because of this railroad situation, it is interesting to note that our loadings for the week ending Sept. 16 showed 945,919, not only the largest of the year, but the largest recorded in any week since Oct. 22, 1921. Coal loadings totaled 172,241 cars, the heaviest since last April.

Bank clearings for the week ended Sept. 28 aggregated $6,490,332,000, a loss of 12.9 per cent from the preceding week, but a gain of 8.3 per cent over this week last year.

In the stock market, prices moved downward, railroad and industrial shares declining. Bonds were irregular, money firm and exchanges heavy.

Business failures for the week held about the same, 375 as against 392 the preceding week, but fewer than the same week a year ago by a considerable margin.

September Will Show Decline from August

Various Factors Enter Into Situation—Parts Business Continues Steady

NEW YORK, Oct. 2—September doubtless will show a falling off from the high mark established in August, when a total output of 272,000 cars and trucks placed the month second in the production history of the industry. It is not likely, however, that the decline will be as great as a year ago, when September showed a difference of 12 per cent from the previous month.

A short month, during which there was a holiday, and the temporary shutdown of the Ford factories, will prove the chief contributing factors in the expected decline, although a decrease in sales, somewhat more noticeable during the last few days, has had its effect upon factory operations.

Year Held Up Well

The year has borne up exceptionally well, with the seasonal decline in sales beginning 30 days later than usual and then in no serious volume. That the tapering off in demand has not come earlier is one of the surprising features of a year that has been notable for its consistently high production records each month. The curtailment of factory schedules, slight as it may prove, merely follows the policy of the manufacturers to produce only enough cars to meet the actual demand and to refrain from piling up inventories of finished models either in the factories or on the dealers' floors.

Farmer demand is centering in the lower priced cars, which are benefiting from aggressive sales campaigns. Manufacturers of the medium and high priced cars are centralizing their efforts in rural sections along the seaboards and in districts where the harvest has been most satisfactory.

The coal situation has proved of particular benefit to the sale of light delivery trucks, for which there appears a remarkably good demand.

With the parts makers, business has kept on a pace with August, which showed a 5 per cent gain over July in the volume of sales. Indication of the

(Continued on page 694)

Marvin Asks Relief from Car Shortage

Traffic Head of N. A. C. C. Sees Transportation Difficulties Growing Serious

NEW YORK, Oct. 2—Railroad congestion and embargoes have so increased shipping difficulties that James S. Marvin, head of the traffic department of the National Automobile Chamber of Commerce, has gone to Washington to confer with the Interstate Commerce Commission and the Car Service Commission in an effort to gain some relief for the industry.

It is admitted that the situation is a serious one and that driveaways and motor transport are expedients manufacturers will have to adopt this winter to get material into their factories and their finished product into the hands of their agents. This will make the matter of snow removal a most important issue, and the Chamber will make every effort to keep the roads open this winter.

Before he left, Marvin said:

With railroads one after the other issuing embargoes against accepting freight from connecting lines, the opinion is quite generally entertained that these conditions will continue during the next several months. There may be some abatement, dependent upon volume of traffic, and weather conditions, but there are abnormal quantities of coal to move as well as large crops. These conditions are likely to exert a restrictive influence on steel and other manufacturing industries dependent on extensive transportation facilities.

The Chamber has been active during the past several weeks impressing railroad officials with the large volume of automobile production and its shipping requirements. The American Railway Association's Car Service division at Washington has been advised and urged to maintain its general instructions which require that automobile cars be moved promptly, loaded or empty, to the lines of the roads owning the cars or nearest automotive territory. Within the past month this Car Service Division has reissued these instructions. Our efforts will be to direct more attention to them and the economic importance of keeping automobile plants operating and labor employed.

More Driveaways Needed

DETROIT, Sept. 29—Shortage of freight cars and congestion of shipping on the lake boats is causing factories considerable difficulty in shipping automobiles and is adding daily to the number of cars that must be driven to dealers. One company has gone to the extreme of notifying all distributors within one thousand miles of the factory to plan for driveaways on all cars required in the next ninety days.

The freight car shortage is more acute in the adjoining cities to Detroit than in Detroit itself, but even here shipments are being held up for several days to get shipping accommodations. There is almost a complete dearth of the big automobile cars, and companies making shipments to the Coast are compelled to resort in a great many instances to cars holding only three automobiles, as compared to five in the larger cars. This is entailing an additional burden to the already high cost of Coast shipments.

Congestion in the Cincinnati railroad terminals is causing many factories to advise dealers in districts reached through Cincinnati to arrange for driveaways where cars are required quickly. Congestion in Eastern shipment is also marked, and many delays are ensuing in getting cars through to cities in New England and along the Atlantic seaboard. This condition is made worse by the difficulty in obtaining space on the Buffalo boats. Independent boat companies are helping out somewhat, but infrequent sailings make this meagre at best.

Because of delays in getting cars on the boats, distributors and dealers are compelled to hold their driveaway crews for days at a time in Buffalo and Chicago and in an increasing number of cases the crews are coming through to Detroit and making the driveaway over the entire distance. Permanent driving staffs will be formed by many distributors for several months at least, it now appears.

Care Should Be Exerted by Manufacturer in Naming Right Sort of Dealer to Represent Him

By D. Henry Bonner

Sales Manager, Gray Motor Co.

Detroit, Oct. 3.

WITH hundreds of persons in all parts of the country eagerly seeking opportunities to get into the automobile business there can be no question of the volume of the business which lies immediately before us. It is reasonable to assume that these persons would not be willing to invest their fortunes in a business whose possibilities in their districts they had not carefully investigated.

One of the most important duties a sales manager can perform is to make certain that only the right type of person is awarded a dealership. There are still hundreds of persons of no experience in the automobile field who are anxious to get into business. To get the person whose qualifications indicate a reasonable opportunity for success is an important and painstaking task. No factory can afford to risk the inferior dealer.

Business possibilities in the low priced car market are borne out by the number of dealers in better priced cars who are desirous of signing up low priced lines. In most cases this is a desire to round out their lines, but there are some instances where dealers in higher priced lines want to sell the low priced car exclusively. There is no restricted territory in low priced cars. Every resident in any city or town may be regarded as a possible buyer.

Recognition of the possibilities in the low priced field is shown by the preparations of leading manufacturers to enter this field on a large scale in 1923. Indications at this time are that there will be a manufacturing capacity for approximately 9000 cars daily in the $500 class. This is the largest number of automobiles ever planned for this particular price class, and will require greater merchandising effort than ever before to realize on it fully.

The competition in the low priced field means that automobiles in this class will be better than ever before and must give the utmost in owner satisfaction and economy of operation. Pride of ownership will be given more play and the diversification of lines will give opportunity for buyers to express their particular desires to a greater extent. Dealers must be prepared to make more vigorous selling efforts than ever before to obtain and hold their share of this business.

There is probably more of a demand for low priced American cars in foreign markets than in the United States. Dealers in almost every country are making serious efforts to secure selling rights for cars of this type and a large part of the cars manufactured may be expected to find their way into the hands of owners abroad. Taking all things into consideration 1923 may be expected to be the forerunner of many years of low priced car prosperity.

Crawford Makes Strides Following Reorganization

HAGERSTOWN, MD., Oct. 2—The Crawford Automobile Co. of this city has placed an order with the Woonsocket Manufacturing Co. amounting to $50,000 for sedan bodies to be built at the company's plant here. The Crawford company will make the chassis and turn out the completed car from its local plant. It is announced that the first of the new cars will be produced in about fifteen days.

The Crawford company has been making rapid strides since the reorganization about two months ago, when all of the stock was purchased by M. P. Moller, one of the largest stockholders in the concern and a prominent pipe organ manufacturer of this city. Herbert M. Ross of New York is manager of the concern.

AUGUST ENGEL DIES

MILWAUKEE, Oct. 2—August Engel, vice-president of the Milwaukee Brass Manufacturing Co., died at his home here at the age of 69 years.

Holmes Makes Plans for Reorganization

Will Market Car Developed by Old Concern Which Is Now in Receivership

CANTON, OHIO, Sept. 30—E. A. McCluskey has been appointed by Judge Westenhaver of the Federal Court as receiver for the Holmes Automobile Co. on petition of creditors and with the approval of stockholders of the company. He is a member of the law firm of Herbruck, Black, McCluskey & Ruff.

At a meeting of stockholders of the company it was voted to consent to the receivership in order to liquidate as a step in the reorganization of its affairs.

The creditors' petition was filed by Attorney C. A. Fisher and, as the consent of the company was presented at the same time, the appointment of the receiver was made immediately.

The Holmes company was organized shortly after the United States entered the war, to manufacture a six-cylinder air-cooled car. About eighteen months ago it felt that a larger field was offered by a low priced four-cylinder car and devoted its efforts chiefly to such a development. This car has been completed and subjected to rigid tests and scrutiny of automotive engineers.

Officer Makes Statement

At the time of the court action, an officer of the company said:

With such a product, creditors and stockholders immediately set about to effect a reorganization whereby all parties in interest would be protected. After a careful analysis and efforts by local public-spirited citizens, it was ascertained that new capital would refrain from going into the reorganized company under the plan that had been presented.

The matter was fully presented at the stockholders' meeting Tuesday and it was concluded to consent to liquidation of the company through a receiver, and plans are already being formulated looking to the organization of the company to manufacture and sell the car that has been developed by the old company. Creditors and stockholders are assured that if some plan is found to be practical they will be asked to participate in it on terms with others who may be induced to support it.

Each Month Shows Gain In Mitchell Production

RACINE, WIS., Oct. 2—The Mitchell Motors Co., Inc., has completed a new paint and trim shop which will be operated as a part of its 45-acre plant and accommodate every phase of the final finishing of Mitchell coach work. The building is of modern, daylight construction, four stories, 92 x 320 ft.

The Mitchell company is experiencing remarkable success in marketing its new line of passenger cars powered with the new F-50 engine developed by Chief Engineer Peter Batenburg, formerly occupying the same position in the Four Wheel Drive organization at Clintonville, Wis. This has been pioneered for about a year and each month since the beginning of 1922 has witnessed a substantial gain in production over the previous month.

The Mitchell factory on Oct. 1 was employing more men than at any time since the early part of 1919.

Asks for Receivership for Cleveland Rubber

CLEVELAND, Oct. 3—Alleging that the officers and directors spent $400,000 through mismanagement, Charles L. Thompson of this city, a stockholder, has petitioned common pleas court to appoint a receiver for the Cleveland Rubber Corp. which was formed in 1918 with $1,500,000 of preferred and $1,500,000 of common stock. Thompson says there are outstanding $1,400,000 in preferred and $800,000 in common stock, and bonds to the amount of $364,000. From sales of these issues the company realized $1,625,000.

According to Thompson, the company invested $700,000 in land and buildings and $190,000 in equipment for machinery. The petitioner says debts of $105,000 require immediate payment with no cash on hand and only $10,000 of accounts receivable are good. Thompson charges stock was issued to promoters and officials without consideration. A hearing will be held soon.

Goodyear Plant Restores Schedule as Ford Reopens

AKRON, Oct. 2—The Goodyear Tire & Rubber Co., has restored to its former operating basis of five and a half days a week, its plant 2 which is confined to manufacturer of Ford sized tires. The restoration of the full-time schedule came Sept. 30, and followed re-opening of Ford's motor car factories.

When Ford, on Sept. 1, announced he would close down the sixteenth of the month, Goodyear immediately put their plant 2 on a four day weekly basis, cutting 36 operating hours from the plant's weekly schedule and reducing production of tires for Ford by 28 per cent.

Under the full-time production ticket Goodyear will average over 6000 tires for original Ford equipment a day, running the plant in three 8-hour daily shifts.

HANSON EXPORT COMPANY

ATLANTA, Oct. 4—The Florida Hanson Motor Co. has been incorporated at Jacksonville, Fla., according to announcement here by George Hanson, president of the Hanson Motor Co., to handle the export end of the Hanson business. The company has established relations with a number of foreign dealers and is annually shipping many Hanson cars for foreign sale. Officers of the concern above are: E. J. Wrigley, president and treasurer; W. G. Ryan, vice-president; Paul D. McGarry, secretary.

Receivership Holds Back Republic Suits

Company Agrees to Court Action While Reorganization Plans Go Ahead

ALMA, MICH., Oct. 2—On petition of the Acme White Lead & Color Works, creditor, the United States District Court has appointed the Security Trust Co. as receiver of the Republic Motor Truck Co., Inc.

The petition alleges that $2,500,000 claims of creditors have been secured by a mortgage on the plant which should be reviewed. The company has answered the petition and has joined with the petitioner in consenting to the receivership. The assets are claimed to be in excess of $7,000,000.

F. E. Smith, president of Republic and also of the Republic Truck Sales Co., said to-day that the sales company is not involved in the receivership of the manufacturing company. Sales of the trucks will continue as formerly under the direction of the sales company's officers. Business is showing gradual improvement, Smith said, and with the reorganization of the manufacturing company's affairs should progress rapidly.

Receivership Defensive Action

The receivership action, Smith declared, was purely a defensive proceeding designed to protect the company against suits by creditors objecting to the reorganization plans which had been drawn and approved by about 70 per cent of the note holders. With the receivership in effect, the bankers' committee headed by C. N. Gillett, vice-president of the First National Bank of Chicago, will work to secure the acquiescence of the remaining 30 per cent.

Proposed reorganization plans included extension for five years of the $2,500,000 7 per cent first mortgage notes, the maturing of $500,000 of which, with the defaulting of payment of both principal and interest, in November last, precipitated the company's financial difficulty. Under the extension, the interest rate on notes would be increased to 8 per cent. Depositing note holders were extended the privilege of purchasing common stock at $8 a share to the extent of ten shares for each $1,000 note.

The company is operating under a temporary financing program which has been arranged by the company with its banking committee.

Hill Wins Fresno Race in Special Miller Car

FRESNO SPEEDWAY CAL., Oct. 2—Bennett Hill, driving a Miller engined special, took first place from Tommy Milton in the 150-mile race here, by a margin of less than 15 yards. Time for the winner was 1 hr. 27 min. 46 1 5 sec., an average of 102 m.p.h., the fastest time ever made on this wooden bowl.

Diamond Cab Built by Driggs Company

Contract Given to Produce Vehicles—Expected Production of 2,000 Within Year

NEW YORK, Oct. 2—Driggs Ordnance & Manufacturing Corp., with a plant at New Haven, Conn., whose connection with the automobile industry has been featured by the production of the Driggs passenger car, has contracted with the Diamond Taxicab Co. of New York to produce the vehicles which this new concern will put into operation. It is expected that 2000 taxicabs will be turned out inside the next year.

Inasmuch as the Diamond Company has announced that it will furnish transportation at 20 cents a mile, Driggs has been called upon to produce a light vehicle that will give from 20 to 25 miles to the gallon in the way of fuel consumption and capable of economical operation.

Engine Like Driggs

The Diamond taxicab is powered with the same four cylinder engine that is used in the Driggs passenger car, an L head type with block cast cylinders 2⅝ x 4½. The chassis, however, has been especially designed to meet the demands of taxicab operation. The wheelbase is 108½ in., with the frame pressed steel and 2 in. alloy steel springs. The front axle is a drop forged I-beam section of 40-50 point carbon steel, and the rear axle, of Driggs design, is of the three-quarter floating type. Cooling is thermo syphon and lubrication pump and splash. The carbureter is a Zenith and the ignition American Bosch. The weight of the chassis is 1400 lb. and the taxicab complete weighs 2200 lb.

The body is made of 22 gauge steel and is a landaulet of peculiar design, to meet taxicab conditions. One of the features is a removable panel in the rear which permits of replacement of that part in case of collision damage without forcing the cab to go to the repair shop. The official colors of the Diamond cabs are to be blue and white.

Price $1,950 in New York

The Diamond Taxicab Co., for which this vehicle is being built, will sell it to the individual taxicab operator for $1950, delivered in New York City. If desired this will be sold on time payments, one third down and the balance paid in daily installments, which are taken out of each day's receipts as remitted by the driver. It is the intention of the Diamond company to extend its operations to other large cities.

The financing of the Diamond company is being handled by James L. Moore of Hayes, St. John & Moore. The offering is 25,000 shares of first preferred 8 per cent cumulative stock at $10 a share and 25,000 shares of common at $5 a share. For each share of preferred stock subscribed at $10, one share of common will be allotted at $5 per share.

Officers of the company are: President, William P. Hawley, vice-president of the Minneapolis & St. Louis Railroad; treasurer, H. M. Gaylord, vice-president, Julius Kessler Co., New York City and secretary, Stephen Peabody, president, Stephen Peabody & Co., New York City. They, with General F. T. Hines, former chief of the transportation service of the War Department, United States Army, and R. R. Moore, president of the Commercial Trust Co., New York, constitute the board of directors.

Thornycroft Co. Evolves Portable Gas Producer

LONDON, Sept. 25 (*by mail*)—A portable suction gas producer for use on trucks has been evolved by the Thornycroft Co. after 16 years' experience with units of this type. The producer is fitted to a standard British war office type chassis.

The Thornycroft producer plant differs from other plants on the market in several essential features. The steam is generated in a separate generator (not attached to the producer at all) by the heat of the exhaust gases from the engine itself. The steam generator can be taken entirely apart for cleaning by detaching it from the engine. The plant is started by means of a hand blower; gasoline is dispensed with. The plant will work efficiently with anthracite peacoal or charcoal.

A number of these producer gas trucks are now being made by the Thornycroft company both for use in England and in the British colonies.

Dodge and Rickenbacker Make More Closed Cars

DETROIT, Oct. 3—Dodge Brothers will devote approximately 35 per cent of its production in the latter months of the year to closed car production. This compares with a closed car proportion last year of 13 per cent.

DETROIT, Oct. 2—Rickenbacker Motor Car Co. production in September will approximate 75 per cent closed cars, according to a factory statement. Indications are that October production will run ten per cent higher in closed vehicles.

ENJOINS PISTON RING MAKER

BALTIMORE, Oct. 2—Judge Hugh M. Morris of the United States District Court of the District of Delaware, has enjoined the Bowman-Gould Co. and restrained it "permanently from making or selling, directly or indirectly any one-piece piston rings so similar to the peculiar and distinctive type of piston rings manufactured by the No-Leak-O Piston Ring Co. as to be liable to deceive purchasers."

Yellow Cab Acquires Bus Line in Chicago

May Manufacture Own Vehicles in New Factory Now Under Consideration

CHICAGO, Oct. 2—Coincident with the shelving by the City Council of Mayor Thompson's project to spend $3,000,000 for municipal buses, it is announced by John Hertz, president of the Yellow Cab Manufacturing Co., that he and associates have purchased the stock of the Chicago Motor Bus Co. and that they are planning a vast extension of the bus system to include all the city's boulevards.

The new company, which will be capitalized at about $3,000,000, will scrap all but six of the buses now in operation and will install new buses embodying all the most modern features for the convenience and comfort of the passengers, Hertz said. Eventually he expects to use 250 or more of these buses on the city's boulevards. Permission will be asked at once from the Illinois Commerce Commission and city park boards to install the new bus lines.

Discuss Yellow Manufacture

Hertz said that it had not yet been decided where the new buses will be built, but that an announcement in this connection probably would be ready in two weeks. The probability that the new buses will be manufactured by the Yellow Cab Manufacturing Co. is being widely discussed. It is known that for some time officials of the Yellow Cab Manufacturing Co. have been making a study of bus construction and operation and that plans have been considered for adding to the company's factory.

It is probable that if the buses are manufactured by the cab company a new plant will be erected for that purpose. The present factory facilities are said to be taxed to capacity by the production of 400 Yellow cabs a month, the market for which is increasing steadily.

Although Hertz expressly announced that the new bus company will not in any way be connected with the Yellow Cab Co., operators of Yellow cabs, of which he is also president, it is expected that he will apply to the bus company the same principles of operation that have made the various Yellow Cab companies so phenomenally successful. "The finest bus service in the world for Chicago" is the way Hertz describes his objective. He also has in mind a reduction from the present 10-cent fare as soon as conditions warrant.

SWEDEN TO HOLD SHOW

STOCKHOLM, Sept. 25 (By Mail.)—An international automobile exhibition, sponsored by the Royal Automobile Club of Sweden, will be held in Gothenburg from May to July, 1923, as part of the Gothenburg tercentenary exposition.

Overland Has Best Quarter This Year

Approaches Banner Period During 1920—Current Assets Placed at $28,791,096

TOLEDO, Oct. 2—The greatest quarter of this year or last and close to the banner quarter of 1920 when 37,400 cars were produced is reported by the Willys-Overland Co. for July, August and September, in which period the production exceeded 37,000 vehicles.

Total current assets of $28,791,096 and total current liabilities of $26,843,347 show in the balance sheet, which is as follows:

	June 30, 1922	Dec. 31, 1921
Current Assets		
Cash	$8,905,212	$5,128,403
Misc. invest.	101,171	133,170
Notes rec.	909,191	806,221
Accts. rec.	2,933,752	1,545,505
Due fr. agts. etc.	.....	190,683
Inventories	15,941,770	17,696,814
Liberty bonds	.....	128,793
Total current assets	$28,791,096	$25,629,589
Current Liabilities		
Notes pay.	.....	$18,479,645
Accts. pay.	$6,083,316	2,770,262
Funded debt	17,357,500	.....
Trade accept. pay.	1,033,995	.....
Dealers init. payment	539,509	444,534
Salaries, etc., accd.	711,970	176,671
Accd. taxes and interest	955,500	470,370
Prov. for ref. ctfs.	158,440	62,535
Misc. prov.	.....	200,000
Due assoc. co.	3,117	.....
Total current liabs.	$26,843,347	$22,604,017
*Net wkg. cap.	$1,947,749	$3,025,573

*Based upon statement of current assets and current liabilities as above.

Districts Amalgamated

TOLEDO, Oct. 2—The grouping of the entire wholesale territory in Ohio, with parts of Michigan, Indiana, Kentucky and Pennsylvania, under the head of R. L. Butler, who has been head of the Willys-Overland, Inc., branch at Toledo for six months, is expected to result in the signing of a contract to sell 20,000 Overlands and Willys-Knights in that territory during the coming year.

The big territory will result from the amalgamation of the Toledo and Cleveland wholesale districts.

This one contract will be the largest sales instrument ever signed by the Willys-Overland Co., here and will involve about $15,000,000 worth of business or about one-eighth of the total for a year.

The headquarters of this new wholesale division will be located in the Administration Building of the company here rather than in the branch headquarters.

The new alignment brings such important dealer points as Akron, Massillon, Athens, Zanesville, Canton and a number of other cities under the Toledo wholesale control.

SOUTH BEND GIVEN PARK BY ERSKINES

SOUTH BEND, IND., Oct. 3—A. R. Erskine, president of the Studebaker Corp., and Mrs. Erskine have presented to the city 120 acres to be used as a park. The property is valued at $240,000 and is almost opposite the Erskine home on Miami Road. The acreage is sufficient to permit of a golf course, ball park, picnic grounds and a general park for the public.

At a special meeting of the city council, called by the mayor and held during a dinner given by that official at which the gift was announced, it was decided to call this public playground "Erskine Park."

G. M. Acceptance Corp. Business Big Since 1919

NEW YORK, Oct. 2—Since its inception in 1919 the General Motors Acceptance Corp. has financed under its retail plan more than 200,000 motor vehicles, reports President C. C. Cooper. Under the corporation's wholesale plan more than 140,000 have been financed. The retail value, under both plans, totals more than $400,000,000. During its existence the corporation has negotiated more than $290,000,000 of its obligations with banking institutions throughout the United States.

Dealers Shift Lines of Cars in Cleveland

CLEVELAND, Oct. 3—Automobile row here received its biggest shake-up of the year when on Oct. 1 distribution of the Hudson, Essex, Chandler and Olds was placed in new hands.

The Stuyvesant Motor Co., which in 1920 built a $1,500,000 sales and service plant to handle the Hudson and Essex, has relinquished those two cars and has taken over the Chandler six from the Simmons Motor Co.

The R. J. Schmunk Co. has taken over the distribution of the Hudson and Essex models. Schmunk was for many years sales manager for the Peerless Motor Car Co. He left that company when R. H. Collins of Detroit acquired control of the majority of the stock.

The Simmons Motor Co. has taken over the distribution of the Oldsmobile from the Ohio Oldsmobile Co.

SOUTHEAST IMPROVED

ATLANTA, Oct. 3—Material improvement in general business and industrial conditions of the Southeast of late is resulting in an increased demand for the higher priced automobiles

G. M. Truck Installs Testing Equipment

Replaces Road Trials — Consists of Battery of Ten Rear Wheel Dynamometers

PONTIAC, MICH., Oct. 3—The General Motors Truck Co. has completed the installation of an extensive new testing equipment intended to do away with road tests and at the same time give more accurate information covering points which the ordinary road test reveals only in an uncertain and imperfect way. The equipment consists of a battery of ten complete rear wheel dynamometers upon which every truck which comes through production will be tested.

A complete record of the performance of each truck is thus made possible while the personal equation which enters to a large extent in road testing is virtually eliminated. The equipment used will be described in some detail in an early issue of AUTOMOTIVE INDUSTRIES, but it can now be stated that it includes means for measuring the friction of the chassis as well as the power output when a load equal to that carried in normal service is applied to the frame of the vehicle.

Tests Are Improved Upon

The apparatus has already brought to light certain significant facts not even thought of in connection with former road testing work.

The dynamometers employed are the Sprague 50 hp. electric type geared to the drums on which the driving wheels of the truck rest. All controls are arranged in a central position, convenient to the operator and recording instruments are provided to give a graphical record of the test. The testing equipment is located in a new 40 x 104 ft. wing which has been added to the machine shop and has sufficient capacity to test daily all trucks which come off the production line.

Attorneys and Receivers in Willys Action Get Fees

TOLEDO, Oct. 2—Partial allowances for attorneys and receivers granted in Federal Court here last Saturday by Judge John M. Killits in connection with the Willys Corp. receivership amounted to $145,000.

Tracy, Chapman & Welles, who represented both plaintiffs and defendants, received $50,000; Receiver Frank P. Kennison, E. J. Marshall, solicitor for receivers and bank creditors' committee, Rathbun Fuller and Forrest Jeffries, solicitors, each received $25,000; Receiver Francis G. Caffey, $12,500; Special Master Curtis T. Johnson, $5,000 and some were allowed actual expenses.

The allowances covered most of the work done in selling the Electric Auto-Lite property here from the sale of which it was reported the net proceeds amounted to $4,741,674.

Heavy Duty Trucks Show Better Demand

Makers of Engines Meet with Constant Improvement — Milwaukee Outlook Good

MILWAUKEE, Oct. 2—A great deal of satisfaction is expressed in the automotive industries over the excellent results of September operations, and the fact that the volume of orders on books at the beginning of October is even larger than a month before, while prospects for November and October are equally as favorable. This refers principally to manufacturers of parts and equipment, both for car manufacturers and the jobbing trade. The latter interest is placing more business than a year ago at this time, due to greater confidence as reflected by orders for late winter and spring shipment, which a year ago were of small volume because of the hand-to-mouth buying policy of many distributors.

Ford Equipment Plants Open

Naturally, the quick recovery of Ford production and the short duration of the intermission of operations was most pleasantly received, for there are numerous large concerns here that devote considerable of their production to stock Ford equipment. There was no appreciable let-down in operations, for reinstatement of shipping directions came before it was necessary to cut down production, while jobbers' demands were sufficient to occupy any vacancy.

Manufacturers of engines are pushed to capacity by orders, and it is significant that those specializing in heavy-duty units for trucks are meeting with constant improvement in business. The same is true of shops making tractor engines and power units for self-contained generating and pumping units for farms and other isolated places. This class of business is getting back into a good swing, with the added advantage of a good present and excellent prospective trade not only among farmers, but among owners of small-town garages, creameries, cheese factories, etc.

Farm Machinery Gains

Power farm machinery manufacturers, while not yet operating at a very substantial part of their maximum capacities, nevertheless are gaining every week and making preparations for a regular production at a high rate within a short time, when manufacturing for spring delivery will be instituted. Field men of such concerns are more enthusiastic over prospects than they have been for at least two and a half to three years.

Foundries supplying the automotive industries with steel, malleable, cast iron and non-ferrous castings are able to sustain production at the recent high point, and such shops, save those producing medium and heavy castings, find that automotive business is one of the principal sources of their patronage.

Makers of and dealers in machine tools likewise attribute the greater part of current business to motor vehicle industries, which have sustained their positions for the past eight to twelve months in the absence of any decided interest on the part of other divisions of the iron, steel and machinery industries.

September held its own in volume of sales compared with August in the cities, while in the rural districts, reports show, retail trade was heavier and approached the April and May volume. In the centers of population there was evidence that the ranks of prospects have been thinned out by the remarkable selling movement of the last six months, but encouragement is lent by the recovery of trade in September in comparison with July.

AUGUST SALES OF M. A. M. A. MEMBERS SHOWED INCREASE OF 5 PER CENT OVER JULY

NEW YORK, Oct. 1—Reports from members of the Motor and Accessory Manufacturers Association show that sales in August, 1922, were 5 per cent better than in July and that for the first eight months of this year the total sales amounted to $271,555,370 or $112,058,516 more than for the corresponding period of 1921. Collections are 8.21 per cent slower than in July, as is shown by the past due column, which reports $3,705,000, while notes outstanding total $2,398,350 or 8.15 per cent more than in July.

The following table shows the sales by members of the association, the total past due accounts and the total of notes held for all the months of 1921 and the first eight months of 1922:

1921	Total Sales	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	$6,264,587	.....	$8,099,727	.....	$4,359,871	
February	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,069,118	39.08 Inc.
March	20,120,386	93.30 Inc.	5,603,992	16.57 Dec.	5,069,877	16.38 Dec.
April	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc.
May	26,781,350	.13 Inc.	4,505,176	15.64 Dec.	4,460,355	16.77 Dec.
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec.
July	23,096,214	1.68 Inc.	5,242,046	10.79 Inc	3,690,154	7.90 Dec.
August	23,397,640	1.31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec.
September	23,141,891	1.09 Inc.	4,358,545	.22 Inc.	3,677,500	5.24 Inc.
October	22,053,327	4.70 Dec.	4,512,680	3.54 Inc.	3,463,500	5.82 Dec.
November	18,998,490	13.85 Dec.	4,352,000	3.56 Dec.	3,661,900	5.73 Inc.
December	14,349,750	24.47 Dec.	4,220,450	3.02 Dec.	3,384,250	7.58 Dec.
1922						
January	17,320,000	20.61 Inc.	4,450,000	5.45 Inc	3,146,000	7.02 Dec.
February	22,720,000	31.17 Inc.	4,070,000	8.57 Dec.	3,483,000	10.74 Inc.
March	28,670,000	26.14 Inc.	2,890,000	28.86 Dec.	2,657,000	23.69 Dec.
April	33,830,000	18.07 Inc.	3,000,000	2.00 Inc	2,500,000	1.05 Dec.
May	43,700,000	28.06 Inc.	2,900,000	2.75 Dec.	2,450,000	6.05 Dec.
June	42,000,000	3.85 Dec.	2,840,000	1.25 Dec.	2,320,000	5.00 Dec.
July	41,001,670	2.42 Dec.	3,423,850	20.42 Inc	2,217,670	4.49 Dec.
August	43,700,000	5.00 Inc.	3,705,000	8.21 Inc.	2,398,350	8.15 Inc.

HAYES EQUIPS NEW PLANT

CHATHAM, ONT., Oct. 2—The Hayes Wheel Co. of Canada, Ltd., has bought the factory of General Forgings & Stampings, Ltd., at Merritton, and is equipping it for the production of automobile rims. It is transferring the metal stamping equipment to its Chatham plant, but the forge plant at Merriton will not be disturbed and the business in this line will be expanded.

Star Orders Placed Reach 500,000 Mark

NEW YORK, Oct. 2—Of orders received for 500,000 cars for delivery by Aug. 31, 1923, Star Motors, Inc., has accepted 120,000. Of 10,000 applications for appointments as distributors and dealers, 1000 have been accepted.

While the Star is in production right now at four plants—Lansing, Leaside, Oakland and Long Island City—deliveries are slow at present. It is expected, however, that by the end of the first week in November the various plants will be up to the scheduled production and turning out 8000 Stars a month. Contracts accepted call for the construction of 18,000 cars by the first of the year and it is thought probable that this obligation will be met.

Whether or not Durant will manufacture to capacity between now and the end of its fiscal year, Aug. 31, 1923, is a question that has not been settled. The various plants have a capacity of 330,000 for both Durants and Stars in this period.

DOUBLE DRIVE IN NEW PLANT

BENTON HARBOR, MICH., Oct. 2—The Double Drive Truck Co. is now located in its new plant, which it recently purchased, in this city, and is now equipping and getting ready for production.

Pontiac Sees Month Equaling September

Car Plant Reported Oversold on Closed Models—Demand for Trucks Steady

PONTIAC, MICH., OCT. 2—September was the biggest month of the year in production and sales for the Oakland Motor Car Co. During the month the plant surpassed the mark of 150 cars daily, set as a maximum.

Prospects for October are that the sales and production will be greater than last month, with the two new closed models contributing largely. The Oakland sedan and five passenger coupe put on display in New York last week have brought an unexpectedly large response and they will be rushed into production which will start about Oct. 15. Both the sport model and the two passenger coupes are oversold at present and demand is heavy for phaeton jobs.

General Motors Truck Co. foresees a steady demand with a gradual increase of business. A total output for October is scheduled equal to that of September.

Fisher Body Co. expects to get into quantity production of Chevrolet open bodies at the local plant, recently taken over from Beaudette, within a week. The resumption of work on Ford bodies took place during the past week and a steady run through the winter is anticipated.

Establishing Reserve of Engines

Wilson Foundry and Machine Co., making engines for Willys-Overland, has reduced its force somewhat and has placed material orders to maintain a steady run during the winter with about 2000 employees. This will carry up to Feb. 15. The plant is establishing a reserve of Knight engines, which it has not been able to do since moving to Pontiac a year ago.

Demand for all season tops is brighter this year than ever before according to the Van Auken Top Co. C. M. Van Auken, following eastern and western trips, reports a record demand. The plant last month exceeded its highest record on production.

Factories Near Chicago Close for Brief Period

CHICAGO, Sept. 30—Two automobile factories in the territory surrounding Chicago have been shut down for short periods. The R. & V. Knight plant at Moline, Ill., was closed because the acuteness of the railroad shopmen's strike interfered with obtaining materials. It has now resumed operation. The Mitchell plant at Racine, Wis., closed for inventory and cleaning up some factory details, but expects to resume Oct. 2.

The Ford Motor Co.'s Chicago branch has returned to its normal schedule of assembling 250 cars a day. The Diamond T truck factory is operating on a fair schedule, finding an increasing demand for trucks in Chicago and other large cities but very little demand from the small towns and farms. This company this week inaugurated a policy of giving every truck produced a 30-mile test under full load before permitting it to leave the factory.

International Reopens

SPRINGFIELD, OHIO, Oct. 2—After being closed for three days for inventory the Springfield works of The International Harvester Co. resumed operation to-day. Recently the company received an order for 25 high speed trucks from Australia. These are being prepared at the Springfield works and will be shipped this week. The 25 truck a day schedule will be maintained, the factory announces.

The Springfield works has submitted a bid for furnishing speed trucks for the motorizing of the service of The American Railway Express Co. in this city. The company has an order for twelve trucks for the express company's organization at Dayton. Ford Motor Co. has furnished 21 of its trucks to the Dayton office of the express company.

Truck Sales Holding Up, General's Reports Show

PONTIAC, MICH., Oct. 3—Sales of trucks are continuing in encouraging numbers, according to W. L. Day, general manager of the General Motors Truck Co., although the volume of business is not as large as earlier indications had led the manufacturers to expect.

The local plant has had no shut-down and anticipates a steady run through the fall and winter, while sales continue in anything like their present volume. Retail sales throughout the country are holding up well, the weekly reports of the plant show.

Milk Producers to Discuss Trucks at Annual Meeting

WASHINGTON, Oct. 2—The National Milk Producers' Federation will hold its sixth annual meeting in Springfield, Mass., Nov. 9 and 10, when the Federation is expected to take some definite action on its problem of milk transportation among its 200,000 producers and consumers.

In the announcements, being sent out this week to the 26 regional association members, who in turn notify their individual members, advising them of the convention, the members are informed that they will be called upon to settle two questions of paramount interest, viz: "Ways and means of cutting the cost of distribution, and transportation questions such as the motor truck vs. the railway in hauling milk."

"We shall definitely take up the question of transportation of our product by the inauguration of fleets of trucks," declared Charles W. Holman, executive secretary of the Federation.

Expect Trade Gain from New York Show

Public Interest Sitmulated in Closed Cars—Sales Made —Prospects Obtained

NEW YORK, Sept. 30—The Automobile Merchants Association's second annual closed car show was closed to-night with a decidedly satisfactory record of business. Dealers in practically all lines made some sales and quite a number in the popular and near-popular classes had sales records far exceeding what would be done in an ordinary fall week on the salesroom floor.

Aside from getting immediate business the show served two other important purposes:

First, it educated a great many people in the metropolitan territory regarding the utility and comfort of the closed car, and also regarding the widespread reduction of the differential between open and closed car prices. This education will have its effect in better closed car business throughout the fall and in promotion of the closed car idea.

Second, the show served as an accommodation to a great many people who had their minds made up to buy closed cars but were uncertain as to the make or model which would meet their desires. The show enabled these people to compare makes and models without the inconvenience of traveling from salesroom to salesroom. That this convenience was appreciated was evidenced by remarks of many show visitors made throughout the week.

Attendance Large

The attendance was large for a closed car show. Newspapers gave the show and the closed car idea a great deal of constructive publicity. Even some of the distributors and branch managers who went into the show only half convinced of its value admitted at the end of the week that they had got their money back in profits on immediate sales and, in addition, had added to their prospects lists names that they might not otherwise have obtained.

Westcott Doubles Output With Good Month in View

SPRINGFIELD, OHIO, Oct. 2—First deliveries were made during the past week from the plant of The Westcott Motor Car Co. of a new type of closed car, the four-passenger brougham. This is somewhat smaller and more compactly built than a sedan.

The past week has brought a doubling in production at the plant, based on orders for fall delivery. The present outlook is that October will be the best month in the point of shipments that the company has experienced.

Export business has shown a tendency to improve.

Men of the Industry and What They Are Doing

Willys Locates in Toledo

John N. Willys will rent an up-river home in Toledo and expects to build next summer with the idea of permanently establishing his home there. This is a part of his plan to bring back the Willys-Overland Co., and make it his one big business concern, as he announced last spring.

Fergusson in Consulting Work

David Fergusson, who resigned some time ago from the Pierce-Arrow Motor Car Co. after being identified with it for more than twenty years as chief engineer, will devote himself to consulting engineering work in connection with high grade motor cars and trucks. He will continue to be located in Buffalo.

Columbia Names Export Men

Samuel Fitzpatrick has been placed in charge of the export sales department of the Columbia Motors Co. From 1909 to 1916, Fitzpatrick was engaged in similar work for Studebaker and from 1916 to 1918 he served as the Studebaker special representative in Brazil. The following year he was appointed export manager for the Lalley Light Corp. H. W. "Jack" Russell, another veteran in export work, has been named European representative for Columbia. In 1912, Russell was connected with the White Co., and from 1912 to 1918 served as traveling representative for Studebaker in Central America, Scandinavia and Russia. For two years, until his health failed, he acted as general export manager of the Chalmers Motor Car Co.

Fred I. Tone Resigns

Fred I. Tone has severed his connections with C. H. Wills & Co., Marysville, Mich. Tone has been engineering executive during the development and production of the Wills Sainte Claire car. For several years previous, he was identified with the industry in Indianapolis.

Wilford to Locate in Lansing

J. W. Wilford has resigned as superintendent of General Motors axle, gear, forge and power plants and will take a two months' vacation, following which he will enter the manufacturing business in Lansing.

Wetmore Leaves New York

John C. Wetmore, well known throughout the industry with which he has been identified since its inception as automobile editor of the New York *Mail*, has retired from the field of daily journalism. He is removing to Los Angeles, which will be his future home. He will continue his connection with the industry through the medium of a publicity bureau which he will establish on the Pacific coast. Wetmore is succeeded by C. E. T. Sharps, sales manager of the Poertner Motor Car Co., New York agent for the Durant and formerly automobile editor of both the New York *Tribune* and *Sun*.

Wetherald Promoted

C. E. Wetherald, general superintendent of the motor and axle division of Chevrolet Motor Co., has been made assistant to Charles F. Barth, general manager; William Notman, succeeds to Wetherald's former position, and F. O. Tanner, chief inspector of the motor and axle division becomes superintendent of the gear plant, Detroit.

Swanson Has New Connection

H. J. Swanson, for six years associated with the Detroit Machine Tool Co., has resigned as vice-president and general sales manager to accept the position of general sales manager of the Peerless Machine Co., Racine, Wis. He was for two years chief engineer of the Detroit company, and for the past four years occupied the executive office. He was instrumental in developing high speed drilling machines and centerless grinders for the Detroit concern.

Ellis Goes with Courier

Roy C. Ellis, for the past four years assistant sales manager and field representative of the automotive division of the Standard Steel Car Co. of Pittsburgh, has joined the sales staff of the Courier Motors Co. of Sandusky as factory representative. Ellis will devote much of his time to special dealer work.

Lee H. Smith Advanced

Lee H. Smith, formerly in charge of appointing of service stations and the sale of equipment to the regular trade in the Cleveland district for the Briggs & Stratton Co., has been made assistant to H. V. Rohm, sales manager for the Briggs & Stratton Co. From now on Smith will make his headquarters at the Milwaukee office of the Briggs & Stratton Co. While acting as Rohm's assistant he will give the major portion of his attention to the manufacturers in the Cleveland district.

Core to Market Bonds

Guy C. Core has resigned as advertising manager of the Reynolds Spring Co., Jackson, to become identified with the marketing of bonds and securities.

De Bear in Philadelphia

Harry J. De Bear, Maxwell-Chalmers distributor in New York prior to the establishment of a factory branch there, has organized the De Bear Motor Car Co., Philadelphia, to take over the distribution of the same cars in that district.

Hoffman Engineer for Hendee

E. E. Hoffman of New York has been appointed plant engineer of the Hendee Manufacturing Co. He will have direct supervision of product design, tools and tool design, maintenance, inspection, material specifications and standardization. Hoffman was graduated from Columbia in 1910 and first served the New York Central Railroad as mechanical engineer in the electric division, later joining the Willys-Overland forces. He was research engineer and later assistant production engineer at the Toledo plant, and more recently production engineer for the Willys Corp. For the past two years he has been in business for himself as engineer and builder.

U. A. Hicks, for two years manager of the Hendee Chicago branch, has been called back to the home office to assume a responsible position in the sales division. Glenn Crandall, for many years a member of the Hendee organization, succeeds Hicks at the Chicago post.

G. M. Williams Returns

G. M. Williams, general manager of the Dayton-Wright Co., has returned from England on the Empress of France.

"Great Britain has just appropriated about $10,000,000 for the purchase of Government airplanes to make the Royal Air Force the most powerful air power in Europe," Williams said. "The development of commercial airplanes and motors by both England and France is being given every possible governmental support by subsidies. By encouraging airplanes to operate on air lines they are keeping available trained flyers and mechanics who can be used in any crisis."

Surrell Joins Distributor

W. W. Surrell, who has been assistant sales manager of the Jordan Motor Car Co. for five years, has left the company. He will have charge of the wholesale department of Peterson Motors, Inc., Philadelphia, and Peterson Motors, Inc., Baltimore, distributors of Jordan cars. His headquarters will be in Philadelphia.

Advance Rubber Names Golden

Arthur Golden has been named assistant sales manager of the Advance Rubber Co. of Brooklyn.

Daniels Joins Buick

H. S. Daniels has resigned as advertising manager of the Dort Motor Car Co. to become a member of the advertising staff of the Buick Motor Co.

Heinemann Makes Change

W. E. Heinemann, formerly eastern representative of the Templar Motors Co., is now with the Matthews Engineering Co., Sandusky, Ohio.

Used Car Situation Grows More Serious

N. A. C. C. Directors Told That Dealers Are Again Indulging in Overtrading

NEW YORK, Oct. 4—Directors of the National Automobile Chamber of Commerce met this morning, preliminary to the general meeting of members scheduled for to-morrow, when the drawings for space at the national shows will take place.

The directors were told that during September there was an increase in sales in some sections of the country, while in others there was a decrease. On the whole, however, it was a better September than usual.

Closed cars averaged about 35 per cent of the sales. In sections like the Carolinas the sales of closed cars averaged about 18 per cent, but in sections like Maine, Michigan and South Dakota they ran as high as 75 per cent.

The used car situation again bobbed up, the menace being even greater than during the summer months. Dealers, it would seem, are making too big allowances for this season of the year. They seem to be unable to realize that they cannot get spring prices in the fall. Lower prices allowed on used cars taken in at this time of the year seem to be one of the possible solutions of what is regarded as a grave problem.

Reporting on the traffic situation, Chairman W. E. Metzger told of the cooperation that is being given by the Car Service Division of the American Railway Association.

Factories Are Operating On Big Output Schedules

(*Continued from Page* 686)

tinues on its schedule of 25 daily which represents the normal capacity of its plant. Earl is building 60 to 75 cars daily.

Maxwell is producing about 300 daily and Chalmers, pending the reorganization of its financing, continues on the existing schedule of about 25 a day. Durant is building about 125 daily in its Lansing plant and is lining up its material sources for early production of the Star. A start on this is expected at any time now, the principal difficulty being in obtaining an ample supply of bodies.

Gray Motors is now building 80 cars daily and will increase this to approximately 200 by the first of the year. The company is meeting with a large demand for its product both in the United States and abroad, but is compelled to restrict its dealer appointments pending an increase in its production. As in a number of cases, Gray's problem is also one of bodies but these are expected to come through in sufficient quantity soon.

The industrial situation in Detroit shows that manufacturers are expecting a gradual paring off in business from now until show time, but new prices and new models are keeping business at a higher point than might otherwise have been expected. The creation of new values in many lines of cars is having the apparent effect of giving preference to certain manufacturers. Good business, however, is being done by all manufacturers according to the strength of their sales organizations.

September Will Show Decline Over August

(*Continued from Page* 686)

improvement throughout the year is shown in the fact that business transacted for the first eight months more than doubled that for a similar period a year ago. There are indications that car manufacturers, expecting a shortage of railroad transportation, are placing orders for parts well in advance.

Employment Drops in Toledo

TOLEDO, Oct. 2—Seasonal slump in the automotive plants here was reflected in the employment statistics gathered by the Merchants' & Manufacturers' Association for the department of labor which indicated a drop of 3,669 employees between Aug. 31 and Sept. 30.

The total employed in the 21 Toledo plants with a normal of more than 500 employees was 20,945 on Sept. 30 as compared with 24,613 on Aug. 31. July was 536 better than August.

Willys-Overland dropped from 11,300 to 7,585 and the Toledo Chevrolet laid off 300. Slight reductions were made by the Electric Auto-Lite Co., Doehler Die Castings Co., Milburn Wagon Co., Champion Spark Plug Co., and Bock Bearing Co.

Chalmers Joins Joyce in Body and Top Concern

DETROIT, Oct. 4—Hugh Chalmers has identified himself with Frank H. Joyce in the formation of the Joyce Manufacturing Co., which will begin operations in November as a body paint and trim company and manufacturer of tops. Chalmers is to be chairman of the board of directors and will make his executive headquarters at the plant. The active management falls to Joyce, who is president and treasurer. William M. Joyce is secretary. The company is incorporated for $500,000 and will have capacity for 150 bodies daily.

Chalmers since his retirement from the automobile company bearing his name, has maintained private offices in Detroit where he continued his personal business. He is giving up these quarters to be closely in touch with the new venture.

Joyce was an original incorporator of the American Auto Trimming Co., acting as general manager and treasurer for 12 years until his recent retirement.

Automotive Exports Improved in August

Returns Show That Annual Mid-Summer Decline Was of Short Duration

WASHINGTON, Oct. 4—Automotive exports from the United States improved materially in August, in comparison with July, according to an announcement to-day by the Automotive Division of the Bureau of Foreign and Domestic Commerce. The total shipments for August were: 1262 motor trucks valued at $884,139; 6133 passenger cars valued at $4,286,299; parts and accessories, not including engines and tires, to the value of $2,678,941; 1011 motorcycles valued at $241,676 and 2352 automobile engines valued at $237,013.

The major items of the month's shipments were well ahead of the July totals and the August returns show that the annual mid-summer decline in automotive exports was only of short duration. The gains over July were recorded for trucks, passenger cars and motorcycles, with the parts shipments showing a small drop and engines declining considerably.

The August passenger car shipments were subdivided as follows: value up to $800, 3931, $1,902,395; value up to $2,000, 2026, $1,849,226, and over $2,000, 186, $534,678. The truck shipments were: up to one ton, 827, $339,973; up to 2½ tons 369, $335,235, and over 2½ tons, 66, $168,931. The August shipments from Canada have not been announced. Details of the August shipments from the United States will be published in the next issue of AUTOMOTIVE INDUSTRIES.

New Rolls-Royce Appears in Paris, But Not at Show

PARIS, Oct. 4—(*By Cable*)—The seventeenth annual Automobile Salon, which opened to-day, is featured by the large number of American exhibitors.

One of the sensations here is the appearance on the roads of France of a 20-hp. six cylinder Rolls-Royce, which, however, is not in the show. The car still is in an experimental state and it will be several months before it will be in production. The new model will not be made in the American plant and orders will not be accepted in America for some time. The Rolls-Royce stand in the show, however, placards the fact that orders for European delivery can be booked at the present time.

Ford Now Producing New Four-Door Sedan

DETROIT, Oct. 5—Rumors that Ford is about to bring out an additional model is answered by the announcement that a four-door sedan is in production. It will be listed at a higher price than the present sedan, which will be continued.

Firestone Rim Plant Ready Within Month

Operations Will Begin There on Basis of Two Nine-Hour Shifts Daily

AKRON, Oct. 2—The new rim plant of the Firestone Tire & Rubber Co. of Akron will be in operation within a month, according to Harvey Firestone, Jr., with an initial productive capacity of 20,000 rims and 4000 solid truck tire bases a day.

The new rim plant is one-sixth of a mile long, 250 feet wide and one story in height. It is equipped with electric traveling cranes and hoists, and also contains railroad sidings within the factory, so that freight cars loaded with steel may be pulled into the plant and unloaded. These spurs also permit loading of finished rims direct from loading platforms inside of the factory, the railroad sidings connecting directly with trackage running through all the Firestone plants as part of the company's plan of inter-rail accommodations. Firestone has its own switching engines and crews as well.

The present rim plant of the Firestone company, which was the first Firestone tire plant back in 1904, will be sold as soon as vacated. It served as both a tire and rim plant until the new Firestone plants were completed, and since 1915 has been used exclusively for the manufacture of rims. The old plant has floor space of 37,000 square feet as compared to five acres or 217,800 square feet of floor space in the new plant.

Firestone now is making over 60 per cent of the world's total output of rims and solid truck tire bases. The new plant will start operations on a basis of two 9 hour shifts daily, but, according to Harvey Firestone, Jr., if the demand for rims continues to increase the new plant will be forced to go to a full 24 hour day of three 8 hour shifts.

Dort Builds New Sport Models Priced at $1,015

DETROIT, Oct. 4—The Dort Motor Car Co. has added two new sport models, a phaeton and a roadster, on its standard chassis. Each of these new cars lists at $1,015, f.o.b. factory. Bodies are finished in maroon with aluminum stripe. The cars are trimmed in genuine leather, and the top and side curtains are of khaki. The special equipment includes nickel plated drum type head lamps, cowl [illegible] and combination stop and [illegible] and front bumpers. A Moto-[illegible] on a key locking device is also standard. The windshield is fitted with side wings and wiper.

NEW C. G. SPRING PLANT

KALAMAZOO, MICH., Oct. 3—The C. G. Spring Co., of which Christian Girl is president, plans to build a plant in the vicinity of New York City to handle the eastern territory. The factory at Kalamazoo has been rearranged and the plants at Detroit and Cleveland are operating.

ESTIMATES FOR SEPTEMBER PLACE PRODUCTION SLIGHTLY IN EXCESS OF 206,000

NEW YORK, Oct. 4—With shipping returns in from 80 per cent of its membership the National Automobile Chamber of Commerce estimates that September production of passenger cars and trucks slightly exceeded 206,000. This is a decrease in production of 24 per cent over August, but is the best September the Chamber has recorded, the previous best September being in 1919, when 185,000 vehicles were produced. Comparing September of this year with the same month in 1921, this September is 31 per cent better.

While this is a record September, still it would have been much better had it not been for the Ford shutdown. Had Ford kept up his August pace, when 136,000 were turned out, the industry's total for the month would have been phenomenal for this time of the year. It had been predicted that Ford would not show much of a slump in production despite his shutdown of four days, but advices from Detroit say that his count was below 90,000, and that his production was about 35 per cent smaller than it was in August.

	Output	Carloads		Driveaways			Boat		
	1922	1920	1921	1922	1920	1921	1922	1920	1921	1922
January	91,109	20,057	6,485	15,357	29,283	3,185	7,479	....	93	143
February	122,366	25,505	9,986	19,636	43,719	7,507	10,173	....	95	180
March	172,720	29,236	16,287	27,753	57,273	9,939	16,917	....	75	560
April	219,558	17,147	20,187	31,334	64,634	14,197	22,381		1,619	2,960
May	256,219	21,977	18,608	33,416	74,286	15,193	28,827		2,381	7,406
June	289,011	22,516	20,269	34,230	60,746	18,834	33,857	8,350	3,947	7,737
July	245,414	23,082	19,514	28,412	52,342	15,533	28,022	8,702	3,726	6,855
August	271,005	23,386	20,350	32,563	34,060	14,290	36,603	7,095	3,565	10,038
September	206,000	20,804	20,150	26,288	24,431	13,550	30,332	5,469	3,580	8,754

Factory shipment for the other months of 1920 and 1921 follow:

	Carloads		Driveaways		Boat	
	1920	1921	1920	1921	1920	1921
October	17,209	17,323	14,127	11,257	2,519	2,300
November	13,253	14,061	9,497	10,509	659	1,385
December	11,802	12,100	6,469	7,500	89	134

New Body, Sport Phaeton, Added to Nash Six Line

KENOSHA, WIS., Oct. 4—The newest body to be added to the Nash six line is a sport phaeton at $1,645. The finish is deep maroon on the body, ecru top and nickeled trimmings. The headlamps are of the barrel type and nickeled bumpers are furnished front and rear. The upholstery is in Spanish leather. The standard equipment includes a trunk mounted at the rear, nickeled bars on the rear of the body, six disk wheels with cord tires, windshield wings, Moto-Meter, one piece windshield, etc.

Roadster with Khaki Top Being Built by Chandler

CLEVELAND, Oct. 4—The latest addition to the Chandler line is a special roadster with khaki top and what has come to be known as "sport equipment." The body is finished in maroon and five wire wheels are regularly fitted. The top is unusual not only in material but in design and is framed by polished nickel beading around the front and rear top bows. Polished aluminum bars on the rear deck protect the body when the top is lowered. Spacious luggage capacity is provided under the rear deck and an additional compartment back of the seat holds a standard suit case.

Allis Provides Room for Tractor Growth

MILWAUKEE, Oct. 2—In order to give the tractor division the full benefit of all facilities provided by extensive construction work based on the present and future needs of this department, the Allis-Chalmers Manufacturing Co. of Milwaukee has started the work of erecting a one-story brick and steel shop building, 175 x 400 ft., at the main works in West Allis. A site of ten acres has been acquired adjoining the present large works for the present extension.

When the new building is completed, all of the various departmental activities which have been using parts of the tractor plant will be transferred, and the tractor shops will be utilized exclusively for the manufacture of tractors. It is officially stated that "the time has come when the tractor division requires all of the space and facilities of the tractor plant." When completed about three years ago, this group provided some excess capacity which was utilized by other departments until such time that its maximum capacity was demanded by the purposes for which it was originally built.

The Reliance works, the original plant of the Allis-Chalmers organization, which is located within the city of Milwaukee, has been placed on the market. The flour mill and sawmill machinery departments, housed there until now, will be transferred to the new building at the main works at the end of this year, together with the activities now occupying parts of the tractor plant.

Statistics to Show Details in Exports

New Classification of Commerce Bureau Will Make Service More Valuable

WASHINGTON, Oct. 2—Beginning with January of next year, the export classification of automotive shipments now distinguished in the monthly statistical service of the Bureau of Foreign and Domestic Commerce under the heading of "Automobile Parts, except engines and tires," will be changed to show three divisions, namely, unit assemblies, parts and accessories and service equipment.

The decision to make this change, which has been desired for some time by automotive exporters, so that they may have better records of their overseas business, was reached to-day at a conference between customs officials and representatives of the industry meeting in conjunction with Gordon Lee, chief of the automotive division of of the bureau

Exporters Must Co-operate

The practice in the classification of the monthly shipments has been to group a vast amount of automotive equipment under the one all-inclusive heading, with the result that exporters were unable to determine the various classes of equipment that were shipped. To obtain the change, it will be necessary for the exporters themselves to make their export declaration show which of the classes constitutes the shipments; without such declarations, the customs officials and statistical experts of the Bureau of Foreign and Domestic Commerce will be unable to list such shipments under their proper headings. Engines will be listed as heretofore.

"It now rests with the shippers themselves as to whether we are successful in getting these changes, which we have asked for so earnestly," Lee stated, after the conference with the bureau officials. "The new plan would group all such replacement parts as axles, frames, wheels, etc., which are unit assemblies, under one head. Accessories and equipment such as spark plugs, horns, lamps, etc., would come under another head and service station equipment would be under the third. Exporters, however, will have to declare which of the headings properly describes their shipments or the new plan will not be acceptable."

Plans for Season Outlined

To-day's meeting brought together with Lee the foreign trade secretaries of the various automotive associations which have been co-operating with the department in the promotion of foreign trade. Plans for the work throughout the coming season were outlined, and a basis was laid on which the various organizations will work closely with Lee in disseminating the information and material worked up by the division and its hundreds of representatives abroad.

A survey of the export methods and practices of the industry is being completed, and within a few days the Division will announce its first summary. This will cover the field of passenger cars and motor trucks, and it will show in what way export sales are handled, how the various companies function and other details of foreign trade methods. Similar surveys will follow within a short time, covering such other sections of the industry as parts, accessories, equipment, motorcycles, marine engines, airplanes, etc.

The division is also undertaking commodity surveys, through its representatives abroad that will cover, in a detailed manner, the various equipment lines, among which are springs, storage batteries, spark plugs, etc. These surveys will be made in co-operation with the Motor and Accessory Manufacturers Association and the Automotive Equipment Association.

Discuss Motion Pictures

The conference informally approved a proposal relating to the use of the unpaid balance of the Boxer reparations claims for the building of good roads in China. The President is authorized in a resolution recently adopted by the Senate to remit to China approximately $2,000,000 yet unpaid on these reparations claims. This money, according to the conference recommendation, would be expended for road construction in China.

Several other matters taken up by the conference related to production of motion pictures through the Department in co-operation with individual firms, setting forth the story of the American automobile; the placing of nationals of other countries in automobile plants for educational purposes, and revision of the division's methods of disseminating its trade information. The conference also was urged to lend its aid in furthering all standardization work.

Federal Jury Indicts Birmingham Officials

WASHINGTON, Oct. 2—Twenty-three officials of the Birmingham Motors Co., headquarters in Jamestown, N. Y., with promotion offices here, were named in a formal indictment returned to-day by the grand jury, charging them with illegal use of the mails. Seventeen of the twenty-three named were also named in a presentment to the grand jury last summer on a charge of using the mails to defraud. The charge of conspiracy also was contained in the indictment.

The Birmingham Motors Co., it is alleged, has sold several hundred thousand dollars' worth of stock in Washington, capitalizing a "no-axle" automobile. In the prospectus of the concern, it was claimed the "no-axle" automobile would revolutionize the automobile industry.

Using this as a basis for their campaign, the indictment charges, the men are said to have sold several million dollars' worth of stock in various cities where branches were maintained.

Kettering Pictures Car 5 Years Hence

Tells Dayton Section of S. A. E. That It Will Be No More Than One Ton in Weight

DAYTON, OHIO, Oct. 4—"The car of the future," said C. F. Kettering, president of the General Motors Research Corp., in addressing the Dayton section of the Society of Automotive Engineers, "will bear tools plainly marked for their intended use. It will have an improved top that may or may not be lowered. It can be given a finish as good as new in an hour. It will have springs that will make it ride as well as the two-ton car of to-day and it will handle even poorer fuel than is being sold now. This is all coming in the next five years."

Kettering declared it would be no more than one ton in weight, with better spring suspension, better adapted to fuel of varying quantities and adapted to changing traffic conditions. The psychological element must enter largely into its construction, he said, as the public will not accept changes when they are in too marked departure from what is the custom.

Lubrication Important

Comparing an automobile of 14 years ago and the present model, Kettering showed that they had the same fundamental parts and that the only improvement was through refinement of parts. This refinement will be carried much farther in the next five years, he predicted.

The question of lubrication, he said, is one of the most important of the unsolved mysteries of the engineering profession and one about which the least is known.

With the public demanding pre-war prices and with labor and materials still above that scale, Kettering said that the economic problem of the present situation rests upon the engineer.

Better training along economic lines must be given in engineering schools, he added, in order to meet the exigencies of the situation.

Continental Motor Corp. Wants Capital Increased

DETROIT, Oct. 3—Stockholders of Continental Motor Corp. will vote at a special meeting in Richmond, Va., Oct. 18, on an amendment to the corporation's charter to provide for the issuance of 3,000,000 shares of no par value stock in lieu of the $1,500,000 of common stock of $10 par value now authorized. Under the plan stockholders would surrender present common stock and receive one share of new for one of old. There are 1,406,845 shares now outstanding. It is also proposed that directors be authorized to sell the balance of stock at any time they may desire.

Aviation Executives Hear of Flyer Body

Coffin, in New York Address, Also Speaks Enthusiastically of Detroit Meet

NEW YORK, Oct. 3—Howard E. Coffin, chairman of the advance committee on organization of the National Aeronautic Association, addressed the Aeronautic Executives' luncheon to-day and told New York aviation interests all about the national organization — the A. A. A. of the air—that is to be formed next week at Detroit. Coffin also spoke most enthusiastically of the plans which are being made for the big air meet which will be held at the same time.

The National Aeronautic Association will have its national headquarters at Washington and its board of governors will be made up of 18 members, two from each of the nine districts into which the country will be divided, according to the proposed constitution. These 18 governors in turn will elect 12 additional governors-at-large, making a total of 30. The board then selects from its members an executive committee of from three to nine members whose powers will be the same as that of the board of governors between board meetings. The board will elect a general manager.

Nine Districts to Be Formed

The nine districts will be grouped as follows:

First District—Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut.

Second District—New York, New Jersey, Delaware, Porto Rico.

Third District — Pennsylvania, Maryland, District of Columbia, Virginia.

Fourth District—Tennessee, North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana.

Fifth District—Ohio, West Virginia, Kentucky, Indiana.

Sixth District—Illinois, Michigan, Wisconsin.

Seventh District—Minnesota, Iowa, Missouri, Kansas, Arkansas, North Dakota, South Dakota, Nebraska.

Eighth District—Texas, Oklahoma, Colorado, New Mexico, Arizona.

Ninth District—Washington, Oregon, Idaho, Montana, Wyoming, Utah, Nevada, California, Alaska, Hawaii.

Dues range from $500 for life members down to $5 a year annual dues for individual members. A sustaining member is to pay $50 a year.

As for the national airplane races, Coffin told of several innovations that are to be tried, chief of which is the flying of the Pulitzer race over Lake St. Clair in order to make for greater safety for the contestants. Speeds of from 220 to 225 m.p.h. are expected

Hartford Air Meet

HARTFORD, CONN., Oct. 2—The second annual Hartford aviation meet will be held Nov. 10, 11 and 12 at the Hartford municipal airport, comprising over 100 acres. It is hoped to make this meet the largest ever held in New England and a demonstration to the public of the practicability of commercial aviation.

FRENCH AIR SERVICE PLANS LONGER HAULS

PARIS, Sept. 20 (*by mail*)—The French commercial airplane service covered 1,460,000 miles in 1921. More attention is being given to development of long hauls because of the difficulty in short hauls due to air stations being some distance from cities and the necessary transportation to them.

The French Moroccan service increased the carrying of letters from 22,738 in June 1921, to 119,258 in June, 1922. Planes are in project which will carry 50 passengers from Paris to London in 2½ hours. The Paris-Constantinople service will soon be inaugurated with 16 four-engined planes for passenger-carrying.

National Air Institute Has Convention Program

NEW YORK, Oct. 3—The program for the National Air Institute, to be held at Detroit, Oct. 11, has been announced. Various phases of aviation as affecting finance, law, insurance, transportation, etc., will be discussed.

Prof. Herbert C. Sadler, of the University of Michigan, will preside. The speakers and their subjects are as follows:

Lewis E. Pierson, "Commercial Aviation and the Commercial Bank—Their Relation to Each Other and to Trade."

William P. MacCracken, "Air Law."

Edmund Ely, "Insurance needs of aviation."

Joseph S. Ames, his experiences on scientific aeronautical progress during a tour of the major European countries last summer.

E. P. Warner, "Commercial Aeronautical Development in Europe."

J. Rowland Bibbins, "The relation of air transport to the older forms of transportation by rail, road and water."

Col. Paul Henderson, "Air mail service."

Charles F. Redden, "The experiences of the Aeromarine Airways, Inc."

C. G. Peterson, "A study of investment and operating costs."

Stout Company to Build Metal Commercial Plane

DETROIT, Oct. 3 — Incorporation papers of the Stout All Metal Airplane Corp. will be filed this week in Lansing. The company will make an all-metal thick wing monoplane for commercial use. It will be backed by a group of men closely identified with the growth and commercial development of the automotive industry.

The plane which it is proposed to make will sell for about $4,000 and will have a useful load capacity of about 650 lb.

Light Car Race Won by Talbot-Darracq

Winner at French Grand Prix, Held at Le Mans, Has Displacement of 91 Cu. In.

PARIS, Sept. 18 (*by mail*)—Averaging 73.4 miles an hour, for a distance of 375 miles, Kenelm Lee Guinness yesterday captured the French Light Car Grand Prix race at Le Mans in a Talbot-Darracq of 91 cu. in. piston displacement. There were only five starters; the team of three Talbot-Darracqs, which won last year, an English Crouch and a French Corre La Licorne.

To oblige the competitors to push, a time limit of six hours was imposed. The Talbot-Darracqs never were threatened, all the competition being between the English driver, Lee Guinness, and the Frenchman Albert Divo in an identical machine, who finished three seconds behind the leader. Over the flying kilometre Guinness averaged 94.4 miles an hour.

This run being made against a strong headwind, it can be estimated that the maximum speed of these cars is very little below 100 miles an hour. Segrave, the third Talbot-Darracq driver, changed a magneto during the race and took down his entire gasoline line, the two stops costing him 31 min. This was practically the only pit work done during the race. The English Crouch with a British-Anzani engine and the French Corre La Licorne were not sufficiently fast to threaten the Talbot-Darracqs.

Cycle Car Race Run

PARIS, Sept. 18 (*by mail*)—With a four cylinder Salmson cycle car of 67 cu. in. piston displacement, Benoist won the French Cyclecar Grand Prix at Le Mans by averaging 61.2 miles an hour for a distance of 246.6 miles.

Although the distance was increased, the average speed went up nearly seven miles an hour compared with last year.

Out of the 18 starters, only nine finished, for the fast pace set by the Salmsons and Amilcars killed off the weaklings. Among the nine to finish were three cars of only 45 inch piston displacement, the fastest of which was a Senechal, driven by its maker, which averaged 48.6 miles an hour.

All the winning machines had four cylinder overhead valve engines, the Salmsons having a couple of overhead camshafts and the others a single camshaft in the basechamber. With these lightweight machines the problem of suspension is a difficult one.

Changing their design, the Salmsons used semi-elliptics in front and quarter elliptics at the rear, with Hartford shock absorbers. The body was modeled on an airplane fuselage, with head rests for the driver and mechanic and with sufficient stiffening so that if the car rolled over the body would not collapse.

Commercial Favors Buying Continental

Both Companies Handle Automobile Credits—Sale Rests with Stockholders

NEW YORK, Oct. 2—Stockholders of the Continental Guaranty Corp. of New York have been asked to vote favorably on an offer of the Commercial Credit Co. of Baltimore, which seeks to purchase the entire capital stock of the New York concern, or failing in this, to take over not less than two-thirds thereof.

Both these corporations have been prominent in the handling of automobile credits, the New York company numbering John N. Willys and J. D. Dort among its directors. If the deal goes through, the Commercial Credit Co. and its affiliations will have aggregate resources of about $55,000,000 and the combined annual volume of business will total in the neighborhood of $135,000,000. The cash capital will be $9,000,000, and the surplus and undivided profits, $2,100,000.

The Continental Guaranty has financed sales of motor vehicles to the aggregate value of $265,000,000. Organized in 1916, of late it has branched into other fields than automobile finance.

Robert Garrett & Sons, Baltimore, are financing the Commercial Credit Co. in the deal, underwriting $1,000,000 of 7 per cent cumulative preferred stock at $26.50, $1,000,000 Class B 8 per cent cumulative preferred stock at $27.50 and $500,000 common stock at $52.50 a share, par in each case being $25. In addition, $200,000 common stock will be offered to employees of the Commercial company and its affiliations, the Commercial Acceptance Trust, the Chicago & Commercial Credit Co., Inc., New Orleans, and of the Continental Guaranty Corp. at $52.50 a share. A 15 per cent common stock dividend will be paid on or before Nov. 1, 1922, to common stockholders of record Oct. 21.

Continental Guaranty Corp. stockholders have prior rights to purchase Commercial new stock.

No Ford Plant in Trieste Unless Imports Are Free

WASHINGTON, Oct. 3—The Ford Motor Co. will establish an assembling plant in Trieste, Italy, for the distribution of cars for the markets of Eastern Europe and the Levant, the automotive division of the United States Department of Commerce has been advised.

Establishment of the plant is contingent upon Ford's success in securing a more or less unusual concession from the Italian government—that of permitting him to import parts, etc., free, assembling them in his proposed plant and shipping the cars out of Italy without import or export duty.

The expectation is that the Ford company will build its bodies, frames, etc., in Trieste, shipping only engines to the plant for distribution in that territory. Negotiations for the establishment of the Trieste plant, the department is advised, have been under way for more than two years.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

During last week the trend of quotations for call money was irregular, with firmness developing toward the end of the week, due chiefly to the preparations for the usual month-end payments. The range was between 4 per cent and 5 per cent, as compared with 3½ per cent to 6 per cent in the preceding week. No change was noted in the rates for fixed date maturities, the quotations for 60 and 90 days' maturities ranging from 4½ per cent to 4¾ per cent, and for 4, 5 and 6 months' maturities from 4¾ per cent to 5 per cent, the same as in the preceding week. The prime commercial rate also remained unchanged at 4¼ per cent to 4½ per cent.

For the week Sept. 18-23, soft coal production was estimated at 9,800,000 tons, as compared with 9,661,000 tons actual output in the preceding week, and 8,791,000 for the week ending Sept. 9. Anthracite production for the week ending Sept. 23 was placed at 1,850,000 tons, against an actual production of 1,-064,000 tons in the preceding week, and 1,754,000 in the corresponding week of 1921.

Total car loadings for the week ending Sept. 16 amounted to 945,919, which is the largest number of cars loaded not only this year, but for any week since Oct. 22, 1921. The gain over the preceding week was 113,175 cars, and 93,367 over the corresponding week a year ago, but this record amount was 45,247 cars less than for the corresponding week in 1920. Coal loading alone totaled 172,241, the heaviest total since last April, when the labor difficulties in this industry began.

The Federal Reserve statement as of Sept. 27 showed increases of $15,066,000 in total gold reserves and $13,257,000 in total reserves. Bills on hand increased $14,122,000 and total earning assets $26,-583,000. There was a decline of $13,656,-000 in total deposits, and Federal Reserve notes in circulation increased $24,620,000. The reserve ratio advanced from 78.3 per cent to 78.4 per cent.

Schedule of Locomobile Shows $3,129,000 Assets

BRIDGEPORT, CONN., Oct. 3—The Locomobile Co. of America has filed a schedule of assets and liabilities in bankruptcy court here. Assets are estimated at $3,129,200 and liabilities at $5,908,161. This is the beginning of final steps in the adjudication of the affairs of the company, preliminary to its formal sale to W. C. Durant.

The creditors who approximate 900 in number will hold a meeting this week.

FINANCIAL NOTES

Black & Decker Manufacturing Co. has declared a dividend of 2 per cent on preferred stock for the third quarter of 1922. This makes a total of four dividends on the preferred this year, totaling 8 per cent, with the likelihood of an additional dividend to be paid at the end of the year. The company states that it has experienced a large increase in sales due to a considerable extent to its reduction in prices made the first of the year.

Wickwire Spencer Steel Corp. has reduced its capital stock by $400,000 through the retirement of 80,000 Class A common shares of $5 par value on surrender, cancellation and exchange for new common stock at the rate of 1½ shares of new common for each share of Class A common. The corporation has changed 600,000 shares of $5 par common into an equal amount of no par value.

Martin-Parry Corp. earnings for the last six months have averaged $50,000 monthly after all charges and Federal taxes, or at annual rate of $600,000, equivalent to $6 a share on the 100,000 shares of no par capital stock outstanding. Sales for the first seven months this year exceeded $3,780,000, compared with $3,725,434 for all of 1920.

Ajax Rubber Co. shows a net profit for the six months ending June 30 of $191,536, after taxes, depreciation and interest charges. This is the equivalent of 45 cents a share on the capital stock of no par value. Total income was $368,489. Net sales amounted to $5,447,193 and operating expenses were $5,131,969.

American Rubber & Tire Co., Akron, Ohio, has declared a quarterly dividend at the rate of 8 per cent per annum, payable Oct. 2. This makes the twenty-sixth consecutive dividend on the preferred stock, the company's earnings during the readjustment period having been at all times more than sufficient to cover requirements.

Seiberling Rubber Co. will probably take no preferred stock dividend action until the first of the year, according to F. A. Seiberling, president. The company's quarterly payment of 7 per cent preferred was due Oct. 2 and is the third preferred dividend payment deferred this year.

Spicer Manufacturing Corp. provided funds for the payment of $200,000 of 6 per cent gold notes, due Oct. 1, 1922. Payment was made at the Guaranty Trust Co., New York, on Oct. 2 at par and accrued interest.

Grand Rapids Tire & Rubber Corp. has authorized the payment of the regular quarterly 2 per cent dividend on the outstanding preferred stock of the company to stockholders of record Sept. 20.

Continental Motors Corp. has declared the regularly quarterly dividend of 1¾ per cent on preferred stock payable Oct. 15 to stockholders of record Oct. 7.

Firestone Tire & Rubber Co. has declared the regular quarterly dividend of 1½ per cent on the 6 per cent preferred stock, payable Oct. 15 to holders of record Oct. 1.

Kelly-Springfield Tire Co. has declared a quarterly dividend of $2 on its 8 per cent preferred stock, payable Nov. 15 to stockholders of record Nov. 1.

Gray & Davis, Inc., shows net profits for August after all charges of $28,586. The net profit for eight months after charges was $180,710.

Railway Convention Accepts Motor Bus

Finds Industry Has Developed Vehicle of Service to Electric Lines

CHICAGO, Oct. 3—The motor bus, once considered a dangerous competitor by the electric railways, has been taken into the family circle and occupies an important place in the exhibits and deliberations of this year's convention of the American Electric Railway Association, being held this week at the Chicago municipal pier.

The report of the committee on railless transportation, which will be presented and discussed Thursday morning, declares that "the automotive industry has developed a vehicle suitable for passenger transportation service," and that the bus serves an important function in feeding and supplementing the service of the electric lines. The important parts of the report are summarized as follows:

The automotive industry has developed a vehicle suitable for passenger transportation. The operating cost per passenger is higher with buses than with electric cars, but in spite of this handicap, the bus is, in some cases, more economical for handling light traffic.

The public interest requires that electric railways should be the sole passenger transportation agency in their respective communities, this makes for the cheapest transportation for the public. It also involves the duty of studying all available transportation methods.

Development of railless transportation by electric railways, if intelligently carried out, should not affect adversely the railways financially. While a demand for a more expensive service for certain parts of the larger cities may be filled by the use of buses, their principal function is, and will be, as adjuncts to electric railway service.

Further Study to Be Made

The report recommends that the association appoint another committee to make a further study of the subject.

Meanwhile the use of buses to supplement the service of the electric lines is rapidly growing, and six manufacturers have installed elaborate displays of buses in connection with the association's equipment show. Republic, Selden, Fageol, Ace, White and Garford buses are exhibited. The White Co. shows six different models; Republic, two; Selden, two, and Fageol, two. One of the Fageols, built for the newly announced suburban service of the Chicago elevated lines, is equipped with air brakes. The Buda Co. has an exhibit of engines for buses.

TROY WAGON REORGANIZED

CHICAGO, Sept. 30—A reorganization of the Troy Wagon Co., of Troy, Ohio, to be known as the Troy Trailer & Wagon Co., has been effected. The new company has been incorporated in Illinois.

Officials state that the manufacture of wagons, trailers, and later, tractors, will make up the production of the company. Incorporators are E. M. Blankenheim, Walker Butler and Joseph F. Cervinka. Offices are now located at 29 S. La Salle Street, this city, but it is expected that these will be moved to the plant location when all plans are completed.

INDUSTRIAL NOTES

Teetor Manufacturing Co., Indianapolis, manufacturer of piston rings, has changed its name to the General Piston Ring Co. Its product will be known as the General piston ring. The change is in name only, the ownership, management and business policy remaining as heretofore. Action was taken for the reason that there is another Teetor ring on the market, manufactured by the Indiana Piston Ring Co., Hagerstown, Ind., a company constituted of members of the same family but a few years longer in the field.

Ottumwa Auto Top & Upholstering Co. is establishing a factory in Ottumwa, Iowa, utilizing equipment being transferred from Flint, Mich., and will specialize in the California top. The firm consists of J. W. Bertron and his three sons, one of whom, Eugene, was identified with the experiment department of the Buick Motor Co.

Ziegler Manufacturing Co., Alexandria, Ind., reports that production of stampings has grown so greatly this year that it has increased its equipment in both branches over 50 per cent since June 1. The company is constructing a new building 60 x 200 feet, one story to provide more floor space.

Ajax Auto Products Co. of Racine, Wis., manufacturing lifting jacks and other items of car equipment, is erecting an addition to its plant in that city. It is overcrowded with orders and the basis of unfilled bookings at present will require maximum capacity for a considerable time forward.

Hinckley-Myers Co. has taken over the plant of the Vulcan Engineering Co., Jackson, Mich., and will equip it for the manufacture of motor stands, burning in machines, reboring mills, etc. The plant is modern and contains much equipment adapted to the uses of the Hinckley-Myers Co.

F. A. Luthy Co., Jackson, Mich., has taken over the exclusive manufacture and sale of the Tu-Ford valve tool, formerly made and sold by the Tu-Ford Company, Bay City.

Otis R. Cook, vice-president and general sales director of the **Howe Rubber Corp.** announces that all advertising matters in future will be cared for by F. M. Griffin, Cook Building, Cleveland.

Adams Axle Co., Findlay, Ohio, will erect an addition to its factory in that city, supplementing an addition recently completed. The monthly output of the concern is stated to be 5500 axles.

Stewart-Warner Speedometer Corp. reports sales this year 80 per cent over a year ago. The high record of sales made in the second quarter has been equaled in the third quarter and no let-up is in sight.

William R. Johnston Manufacturing Co., Chicago, has erected a new factory at 1300-1340 Fletcher St., for the manufacture of automobile windshield wings, windows and mirrors.

Clucker & Hickson have taken the eastern distribution for Perfection silent timing gears made by the Perfection Gear Co., Chicago.

METAL MARKETS

Surface conditions in the steel market in this, the opening week of the year's fourth quarter indicate little change from the criss-cross state of affairs which of late has obstructed a clear view of the situation. Next week's unfilled tonnage statement of the United States Steel Corp. is expected to reveal a marked increase. Undoubtedly this will be exploited to the full by those who continually pounce upon every development that lends itself to a bull argument, no matter how fallacious premise and conclusion. It is conceded that whatever increase in unfilled tonnage the corporation's statement may show will be solely due to the placing of orders for rails. Rail mills, however, may be idle or working to capacity without either condition exerting any influence on other steel products, save perhaps for the minor consideration of the lessened or enhanced consumption of steel making materials.

Surely an increase in the Corporation's unfilled tonnage as the result of the placing of rail contracts should have no effect on the steel products that enter chiefly into automotive consumption, but, anomalous as it may seem, it will in all probability help to retard the liquidation of early delivery premiums on sheets. The car shortage is another convenient peg on which to hang arguments for a continuance of relatively high price levels. Unquestionably there is a shortage of good order rolling stock, but, except for one or two isolated instances there has been no curtailment in production because of this nor has there been so far any spectacular piling up of steel at mills for want of facilities to move same.

The sheet market waits for readjustment upon two factors. In the first place, the leading producer who has been out of the market for several weeks must sooner or later make a bid for new business. The second factor is the shrinkage of immediate shipment orders which may be expected to taper off from now on. Some of the recent advances in sheet prices by independents showed clearly that they were made because of the limited character of the business that is being placed.

Pig Iron.—Blast furnace interests claim to have received numerous inquiries for first quarter and first half 1923 shipments. They say they will not quote on any tonnages on which it is impossible to estimate production costs. There is very little doubt that producers have the advantage over consumers at this time as the latter are bare of reserve supplies. The 75c. per ton duty, however, is not keeping out imported iron and British and French foundry irons are selling at $4 a ton below domestic in the seaboard zone. Competition of imported and scrap irons may be looked for to impose considerable restraint on the market for domestic pig iron.

Aluminum.—The first price advance by the domestic producer since enactment of the new tariff law appears to have gone into effect, amounting to 2 cents per lb. on ingot and flat sheets and 1 cent per lb. on coiled sheets. The new prices, it appears, are applicable only to 1922 contracts, and a new price level for 1923 contract is expected to be announced in the near future. The changes just announced are the first since November 1921. Holders of imported aluminum when disposed to make quotations, name the domestic producer's price.

Copper.—Domestic consumption is slightly better. Market unchanged.

Calendar

SHOWS

Oct. 7-14—New York, Electrical and Industrial Exposition, Grand Central Palace.

Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8-13 — New York Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Oct. 4-15 — Paris, Automobile Show, Grand Palais.

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 9 - 19 — Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

Dec. 15-Jan. 2 — Paris, Aeronautical Salon, Grand Palace. Chambre Syndicale des Industries Aeronautiques, 9 Rue Anatole de la Forge.

Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

May - July, 1923 — Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

CONVENTIONS

Oct. 2-7—Detroit, Fourth International Steel Exposition and Convention of the American Society for Steel Treating and the American Drop Forging Institute, General Motors Building.

Oct. 7-14—Detroit, Second National Aero Congress and National Airplane Races.

Oct. 9-11—Chicago, Annual Convention of the American Gear Manufacturers Association.

Oct. 18-20—Chicago, National Association of Farm Equipment Manufacturers, Congress Hotel.

Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

S. A. E. MEETINGS

Oct. 6 — Aberdeen Proving Ground, Md.

Oct. 26-27 — Detroit, General Motors Building.

Jan. 9-12—New York, Annual Meeting.

Kelly-Springfield Tire Makes Price Reductions

NEW YORK, Oct. 2.—Kelly-Springfield Tire Co. announces a new net price list effective to-day, which shows average reductions of about 20 per cent on fabrics and 10 per cent on cords. In addition, the excise tax is included in the new list, whereas in the old one this tax was extra. The list that was superseded to-day was put into effect Dec. 1, 1921.

Making the change in prices brings the Kelly-Springfield company's list to the same level as the other big companies which reduced in August. The company feels that the prices now quoted are the lowest that the public can expect and that they have been reached by economies in distribution and overhead instead of taking the reductions out of the quality of the tire.

The 30 x 3½ size cord, K.S. or B.B. formerly quoted at $18.75, is now $14.65, and the same size in the fabric, K.S., previously listed at $14.90, is $11.90.

The 32 x 3½ cord, K.S. or B.B., was $25.90, and is now $23.00; the fabric K.S., in this size, formerly quoted at $21, is now listed at $16.80.

The 34 x 4½ cord, K.S. or B.B., is now $39.50, as against $44.30 under the old lists.

The 35 x 5 cord, K.S. or B.B., is $49.25; the old price was $54.40.

Similar reductions are made with the remaining sizes.

Ford of Canada Earned $5,006,521 During Year

DETROIT, Oct. 4—The annual statement of the Ford Motor Co., Ltd., of Canada shows net earnings of $5,006,521 in the fiscal year ended July 31, equal to 7½ per cent on the $7,000,000 stock outstanding. Cash on hand July 31 was $6,147,715, investments totaled $3,971,184; plant inventory, $4,560,908, and goods inventory, $9,806,276. During the year dividends totaling $2,100,000 were paid.

The company produced 45,000 cars and 1192 tractors as compared with 46,832 cars and 3063 tractors the preceding year. Total sales amounted to $29,273,254, a reduction from the preceding year of $8,563,219, due chiefly to a lower selling price.

Rubber Statistics Show August Gained Over July

NEW YORK, Oct. 4—Reports compiled by the Rubber Association for August show an increase over July in the production of pneumatic casings, inner tubes and solid tires.

Inventory, production and shipment figures follow:

Pneumatic casings: Inventory, 4,629,392; production, 2,905,209; shipments, 3,029,823.

Inner tubes: Inventory, 5,207,228; production, 3,808,224; shipments, 4,220,055.

Solid tires: Inventory, 189,698; production, 84,313; shipments, 69,435.

Rutherford, Brown, Clarke Back After Trips Abroad

NEW YORK, Oct. 4—W. O. Rutherford, vice-president and L. D. Brown, treasurer, of the B. F. Goodrich Co., returned from Europe on the Majestic just in time to attend the monthly meeting of the directors of the Motor and Accessory Manufacturers' Association.

NEW YORK, Oct. 3—Louis S. Clarke, vice-president of the Autocar Co. of Ardmore, Pa., accompanied by Mrs. Clarke, has arrived home on the S. S. Pan American of the Munson Steamship line after a pleasure and business trip to South America.

BUS LINE INJUNCTION

NEW YORK, Oct. 4—Supreme Court Justice Mullan, acting on the petition of Edward Schafer of Schafer Bros., bankers, has granted an injunction which will force the discontinuance of every bus line in the city operated or supervised by the municipal authorities.

Railroad Dump Car Maker Enters Automotive Field

NEW YORK Oct. 4—The Goodwin Car & Manufacturing Co., producer of steel railroad dump cars, has established an automotive department and is manufacturing a 30 passenger coach chassis, to list at $5,000. Present plans call for the production of 100 chassis of which the first are now coming through the Poughkeepsie plant.

Specifications of the chassis include a Buda model EBU engine, 4¼ in. x 5½ in., Leece-Neville starting and lighting equipment, Ross stearing gear and Timken wheel bearings.

The wheel base is 196 in. or 184 in. as desired. The tread is 71 in. The frame has a kick-up over the rear axle which with underslung rear springs permits of a frame height from the ground of 24 in. front and 26 in. rear. The chassis has an overall length of 25 ft. and an overall width of 80 in.

William H. Taylor is president of the concern.

Stage Set for Annual Drawing for Show Space

NEW YORK, Oct. 4—Eighty-six applications from car manufacturers for space in the national shows at New York and Chicago will be acted on at tomorrow's meeting of the National Automobile Chamber of Commerce. Last year ninety-three were cared for.

Among the new faces this year will be Gray, Star, Kelsey, Jewett, and Climber, while among those not drawing are Holmes, Hanson, Leach, Dupont, Grant, Stevens-Duryea and Commonwealth.

LAMBERT DOUBLES OUTPUT

AKRON, Oct. 4—The Lambert Tire & Rubber Co., maker exclusively of cushion tires for automobiles has doubled its output and now has a production ticket calling for 350 tires a day, the second time it has doubled this year.

AUTOMOTIVE INDUSTRIES
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Paris Automobile Show Largest Ever Held in France

One tendency is toward slight increase in price. Several concerns announce smaller models. Lighter reciprocating parts, especially aluminum pistons, now employed. Four-wheel brakes are extensively used. Rolls-Royce to produce a 20 hp. six

By W. F. Bradley

PARIS, FRANCE, Oct. 6, 1922.

WITH 1050 stand holders the Seventeenth Paris Automobile Show was opened yesterday by Minister of Commerce Dier in the Grande Palais here. This is the largest automobile show that has ever been held in France. It has been necessary to erect temporary buildings with a floor space of 140,000 sq. ft. in order to take care of all those desiring space. These additional buildings have been erected on the Esplanade Invalides near the main show building. Trucks, bicycles and automobiles with a piston displacement of less than 67 cu. in. are located in this annex.

President Millerand, accompanied by leading members of the government, made a formal visit to the show. The salon is representative of the entire continental automobile industry, but there are only three British firms represented, while the American exhibitors are but six in number. American firms are working at a great disadvantage in seeking business because of the exchange situation and the high import duty on American automotive products. Ford, with a stronger position in the French market than any other American firm, has not thought it worth while to apply for space in the shows.

A slight tendency toward increased prices is in evidence, although practically no price changes of importance have been announced. The trend toward slightly higher prices is due to a combination of three factors.

1—Increased raw material costs.
2—Slightly increased labor rates.
3—Lack of foreign competition with the exception of Italian.

French manufacturers seem to be unaware of the fact that America has lowered her automotive import duties.

Coincident with the opening of the show came the announcement of a new Rolls-Royce 20 hp. six-cylinder model with an engine of 76 mm. bore and 115 mm. stroke. The chassis is not on exhibit, but it is stated that the engine will be a valve-in-head type with detachable head and with camshaft in the crankcase. Engine and gearset are to be joined to form a unit powerplant. Battery ignition will be employed. Semi-elliptic springs will be used both in front and in rear. This marks a distinct change from former Rolls-Royce practice in which cantilever springs were used on the rear. This new chassis is not to be shown here or at the London Show. It will sell in London for £1,100.

The announcement by Rolls-Royce of this smaller model is quite typical of a general trend that is evi-

dent throughout the Paris show this year. There are but few companies which do not now market a smaller model than ever before. Lorraine-Dietrich, Renault, Hotchkiss, Lancia and Itala, among others, are all showing smaller models which are characteristic of this general trend. Hispano-Suiza is about the only important manufacturer who is still concentrating on a single large model in the higher price class. The new Lancia car, with its radical design combining the body and frame, is one of the chief features of the show. A complete description of this interesting car appears on other pages of this issue of AUTOMOTIVE INDUSTRIES.

Decrease in Engine Size

The show this year embodies many points worthy of close engineering study. Its most pronounced tendencies are a decrease in engine size, high rotative speed made possible by lighter reciprocating parts including, in particular, the extensive use of aluminum pistons. Some magnesium pistons are in evidence. There is a great increase in the number of overhead valve engines being used in sport cars. The progress made by battery ignition last year has been arrested, magneto ignition having recovered some lost ground.

Four-cylinder engines dominate the show. The Fiat is the only twelve-cylinder model exhibited. There are no new eight-cylinder jobs shown and there is very little production on the eights already in existence. Some gains have been made by the six-cylinder engines, but they have been of little importance and have been confined to engines in which the piston displacement is 122 cu. in. or less.

Four-wheel brakes are being used far more extensively than ever before. The Perrot system alone is used on thirty-five makes. The Adex system is used by three firms, while the Isotta Fraschini and similar types are employed on about a dozen different cars. In addition to these, there are about twenty individual types of front brakes now applied by conservative firms of high reputation, such as Unic, De Dion, Delaunay-Belleville, Hotchkiss and Renault. Front wheel brakes are also found on small cars with a piston displacement as low as 91 cu. in.

In addition to the large number of firms now using four-wheel brakes as standard equipment, many others announce them as optional equipment. When front brakes are fitted they are usually operated by the foot. Hand brakes operating on the propeller shaft are still used, but in many cases have been abandoned altogether. There is some tendency to do away with rear wheel brakes. This practice is the result of racing experience and has been followed by Chenard & Walcker and Bignan. These firms have Hallot type servo transmission brakes and a pair of brakes on the front wheels.

The hydraulic brake system has not made any progress. It is used only by Rolland-Pilain and Bugatti. The use of the servo mechanism is increasing. It is now being employed by Ballot, Hispano-Suiza, Fiat and Renault, beside others mentioned above.

Considerable attention has been given this year to changes in the construction of the rear spring suspension. No single type predominates but the cantilever and semi-elliptic types are strongly in evidence and about equally divided. The objection brought against cars equipped with the cantilever type of springs is that they do not hold the road at high speeds as well as cars with other types of springs.

Several unconventional spring suspension types have made their appearance, one of these being the De Ram system, a combined hydraulic and coil spring used on the Bignan. This is somewhat similar to the type of front springs on the Lancia frameless chassis. The practice of building shock absorbers as an integral part of the chassis is becoming more pronounced.

Poppet valve engines dominate the field, although Panhard has continued its sleeve valve engine and has dropped all poppet valve models. Mors, Minerva and Voisin also continue to use sleeve valve engines. Peugeot has added one sleeve valve type and is also preparing to market the special two-stroke cycle semi-Diesel type engine for passenger car work. This engine, described some time ago in AUTOMOTIVE INDUSTRIES, has been used, up to the present time, only in trucks and in stationary work.

Bignan has placed on the market this year a valve gear which positively opens and closes the valves. This design was used with much success last season in racing cars of the same make.

The great demand for economy in operation has been responsible for considerable work in connection with high speed engines of the overhead valve type with small piston displacement. Speeds of 3000 r.p.m. for normal type engines are quite common.

Sixty-seven per cent of all the cars made by Continental manufacturers are fitted with aluminum pistons. Bignan and Voisin announce the use of magnesium pistons on their sporting type engines. In developing valve-in-head engines Continental designers have favored the location of the camshaft in the crankcase. This construction appears in a majority of cases. The overhead type of camshaft generally is used on the more expensive cars, although there are some exceptions. Fiat, for instance, has produced a high grade six-cylinder valve-in-head engine with the camshaft in the crankcase.

In this case the timing gear chain is located in the rear and all engine accessories, including the carbureter, are carried between the crankcase supports and are hidden by detachable covers.

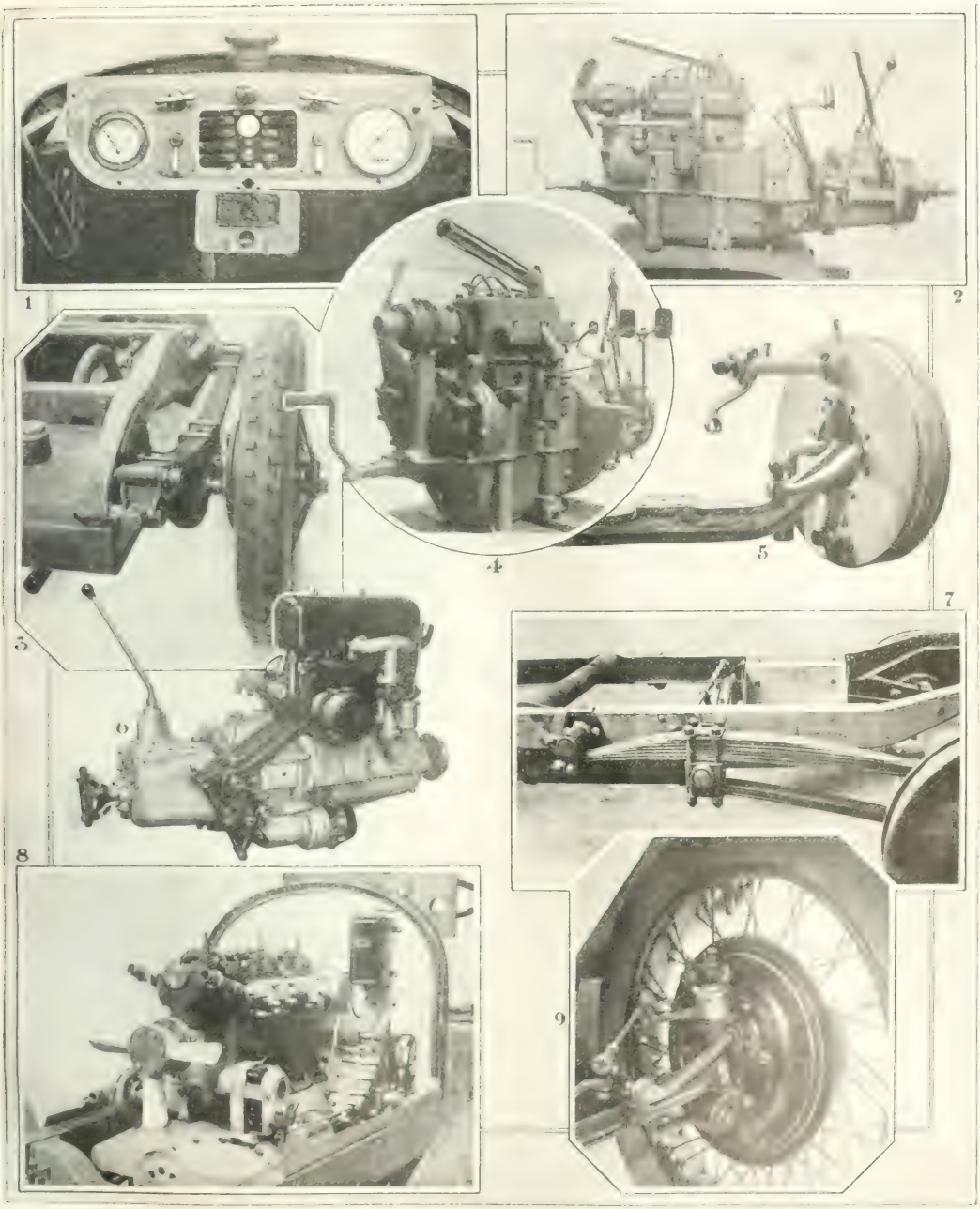
DeDion-Bouton has adopted overhead valves for both its 12 and 10-hp. models. Both of these jobs are fitted with Perrot front wheel brakes. Delaunay-Belleville is showing a new type 80 x 150 mm. overhead valve engine with overhead camshaft and detachable head. This model is also fitted with Perrot front brakes.

Hotchkiss has a small four-cylinder model with an L-head engine of 80 mm. bore and 120 mm. stroke. A return has been made to the Hotchkiss drive on this new chassis. This is a medium-sized car capable of making 65 m.p.h. It is now equipped with Hotchkiss type front brakes which were formerly used only on the Hotchkiss big six.

Renault Adds Small Model

Small two- and three-seated models with a 96-in. wheelbase have been added to the Renault line. This new chassis is equipped with a four-cylinder engine of 50 mm. bore and 90 mm. stroke. This car is in the same general class as the one produced by Citroen about a year ago and will come into direct competition with the Citroen model. Its mechanical features are similar to those of the four-passenger 10-hp. Renault which is being made on a big production basis. The only essential difference is in the use of a detachable head.

Renault has adopted diagonal cantilever springs on all cars above 10 hp. The radiator formerly in back of the engine is now placed in such a position as to form a continuation of the hood on each side of the car, thus changing completely the external appearance. The Citroen line remains unchanged except for details, but a sport model has been added. This is fitted with alum-



1—*Switches centered on instrument board of the new Unic.* 2—*Side view of 10-hp. Unic engine.* 3—*Delaunay-Belleville; Houdaille shock absorber mounted under spring pad.* 4—*10-hp. Unic, unit construction engine and gearset.* 5—*Front wheel brakes recently adopted on the 12-hp. Delaunay-Belleville.* 6—*Chenard-Walcker four-cylinder, overhead valve engine.* 7—*Unic cantilever spring and three leaf, ¼ elliptic spring which is neutral under normal load.* 8—*Overhead valve engine of new 12-hp. Delaunay-Belleville.* 9—*Detail of front wheel brakes on new 10-hp. Unic*

inum pistons and the other reciprocating parts are also made lighter in order to realize an engine speed of 3000 r.p.m.

Ballot is now ready to market a 122 cu. in. touring model. The engine of this car is an overhead valve type. Four wheel brakes are standard equipment. This car is said to be capable of making a speed of 65 m.p.h. when carrying a four-passenger body and is reported to run 20 miles per gallon of gasoline.

Mathis has produced two small sixes, one with overhead valves, the other with side valves. The bore and stroke of the overhead valve model are 60 and 70 m.m., respectively, while the side valve model is 55 x 80 m.m. These are the smallest sixes in the show. Because of their small size they are fitted with the new Bosch 12 m.m. spark plugs. The Mathis engineers declare that this plug is just as satisfactory as the larger sizes, and express the opinion that it will eventually displace the large models.

Mathis is using on the small sixes a rear axle made of aluminum silicon alloy. Another example of the use of cast aluminum alloy housing with steel tube liner is that employed on the Bignan cars. Rear axle construction, however, in general, is tending towards the pressed steel welded type with spiral bevel gears. All other types of final drive for passenger cars are going out of existence.

The Salmson Aviation Co. has come into the market with a light four passenger car carrying a 70 cu. in. overhead valve engine with overhead camshaft. This new model is practically identical with the type used for racing purposes during the last two years.

Talbot-Darracq Adopts Magneto

Only a few firms have abandoned American makes of battery ignition but at the same time some European battery and generator systems have come to the front. Talbot-Darracq, one of the first companies to use battery ignition on its popular 10 hp. model, has abandoned this system in favor of the magneto. There is considerable use of the new Scintilla generator and magneto combined in one unit.

There is an important display of small two-seated cars in the overflow buildings. These cars carry engines not exceeding 67 cu. in. Practically all of them are four-cylinder water cooled jobs with the exception of the four-cylinder Sara, which is air cooled. A number of big manufacturers are much interested in this diminutive car.

Renault, Peugeot, Citroen and Salmson are the chief exhibitors in the commercial vehicle section. Buses and rail cars have been given a great deal of attention. Truck business generally has been dull, however, except in the field of light delivery vehicles. Renault is showing a 19-ton gasoline locomotive for use on normal gage tracks.

New Taxicab Model Features Electric Vehicle Exhibit

Rauch & Lang electric taxicab and Kelland truck shown for first time at Electrical Exposition

A NEW electric taxicab, two new electric truck models, and a new Philadelphia storage battery, comprised the chief features of automotive interest at the New York Electrical and Industrial Exposition, Oct. 7 to Oct. 14.

Propaganda for the use of electric vehicles in general was in evidence in every exhibit. The makers of electric trucks, especially, seem to have come together very solidly behind a movement to boost the electric vehicle in general.

The vehicle displays were not extensive, nor did any special merchandising effort appear in most instances. The vehicles were simply there for anyone who cared to look at them. Active salesmanship was evident in one or two instances, but was the exception rather than the rule.

The new Rauch & Lang electric taxicab, exhibited for the first time at this show, embodies a number of interesting features. The motor is hung at about the center of the frame. The drive is through a short shaft provided with universals at each end to a worm type rear axle. The weight of the cab complete is about 3700 lbs. The wheelbase is 102 in. and the tires are 32x 4½ in. pneumatic. The springs are semi-elliptic, front and rear. Dot chassis lubrication is provided.

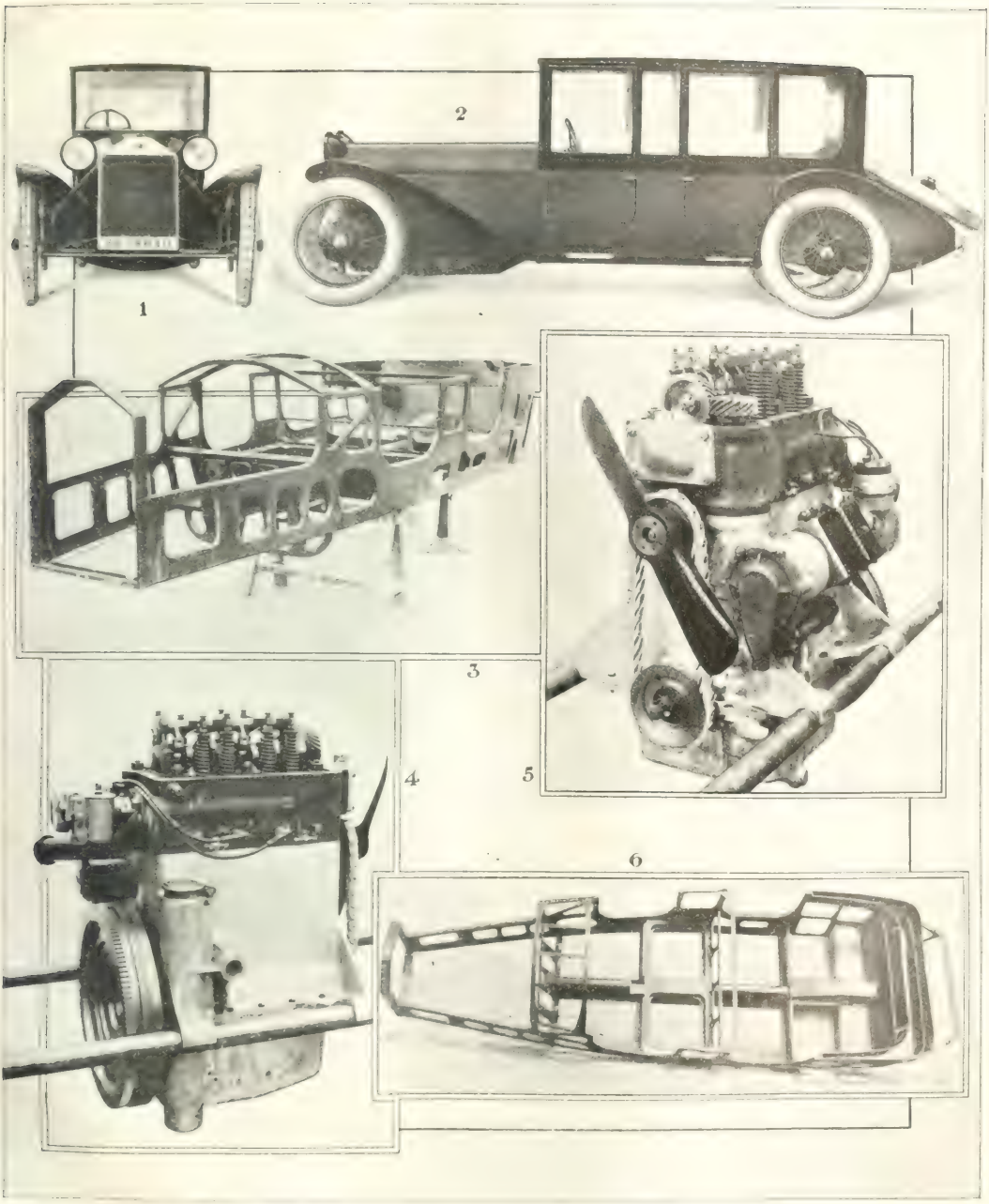
The battery is rated at 178 ampere hours capacity, and it is said that the cab will make sixty miles on one charge under ordinary conditions of city driving. The installation of the battery is such that it is easily removed. It is intended that two batteries will be used with each cab, one battery being charged while the other is in service. Two-thirds of the battery capacity is carried under the hood and one-third in a compartment over the rear axle. The latter portion is installed so that it may be removed with a jack lift truck. The front portion of the battery is reached by raising the hood.

The interior of the cab is upholstered in gray leather. Dull aluminum finishing strips are used. The large rear window drops down into a compartment in the back of the seat. Regular equipment includes front and rear bumpers, side lights, headlights, and disk wheels.

The Kelland is an electric truck appearing this year for the first time. A double reduction straight line drive is used, and the chassis is equipped with two brakes, both operating on the rear wheels. The carrying capacity of this new job is ¾-1 ton. The wheel base is 102 in. and the overall length with standard body is 13 ft. 4 in. No radical or unusual features of design have been incorporated.

Milburn is showing a new electric truck with a wheelbase of 102 in. and a width of 52 in. Special provision has been made for quick exchange of batteries. Batteries are mounted in standardized trays which roll in and out on tracks. Installation is half under hood and half under seat. Unit powerplant construction is used.

Other vehicle exhibitors included R & L passenger cars, Walker, Steinmetz, Ward and C-T trucks.



1—*Front view of new Lancia with sedan body.* 2—*Side view of sedan body showing high interior height and low overall height with good clearance.* 3—*Combined touring car body and chassis. The frame is covered with thin sheet steel.* 4—*Lancia 122 cu. in. engine. Carburetor and exhaust manifold are at rear of cylinder block. There is a small angle between the two sets of cylinders.* 5—*Left side of engine. Single line drive for water pump, electric generator and distributor. A semi-circular hanger carries engine on two steel tubes.* 6—*Touring car skeleton body showing radiator frame, engine housing, front and rear seats, well to receive top and rear locker for spare wheels*

New Frameless Lancia Feature of Paris Show

Body made from sheet metal stampings is so designed as to require no chassis frame. Novel front axle, with helical springs in steering pivots, and an exceptionally short four-cylinder V-type engine are among the new departures.

By W. F. Bradley

BY an entirely new type of design the Italian automobile manufacturer Lancia has been able to reduce the weight of a four-passenger car with phaeton body and full equipment to the unheard-of figure of 1650 lb. This is not a diminutive car or one on which metal paring methods have been employed. The Lancia has a wheelbase of 122 in., its track is 43 in., its speed ability is 70 to 75 miles an hour on the level, it is fitted with front wheel brakes; and its gasoline consumption is declared to be 21 miles to the American gallon.

Lancia has saved weight by abolishing frame members and the usual type of body construction with heavy body sills. The body of the new car is so designed that it is capable of fulfilling all the functions of a chassis frame, while being much lighter than any normal type body of equal capacity. The design brings the center of gravity very low, for with a road clearance of 7.8 in. the radiator cap is only 40 in. high and the top of the scuttle dash is but 43 in. from the ground. The low center of gravity gives exceptional stability at high speeds.

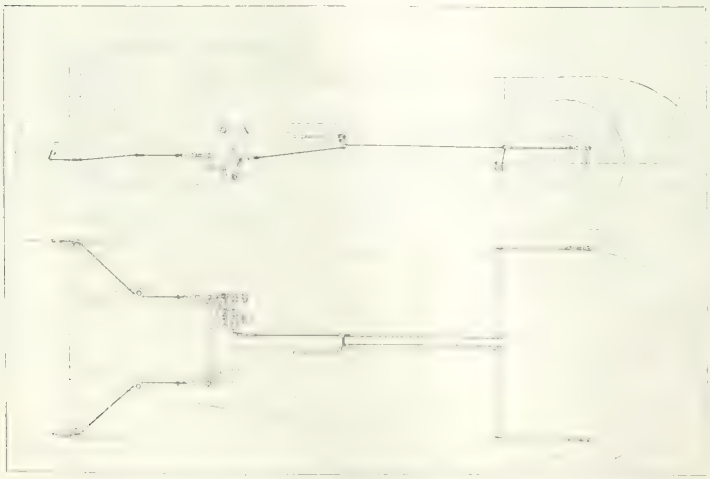
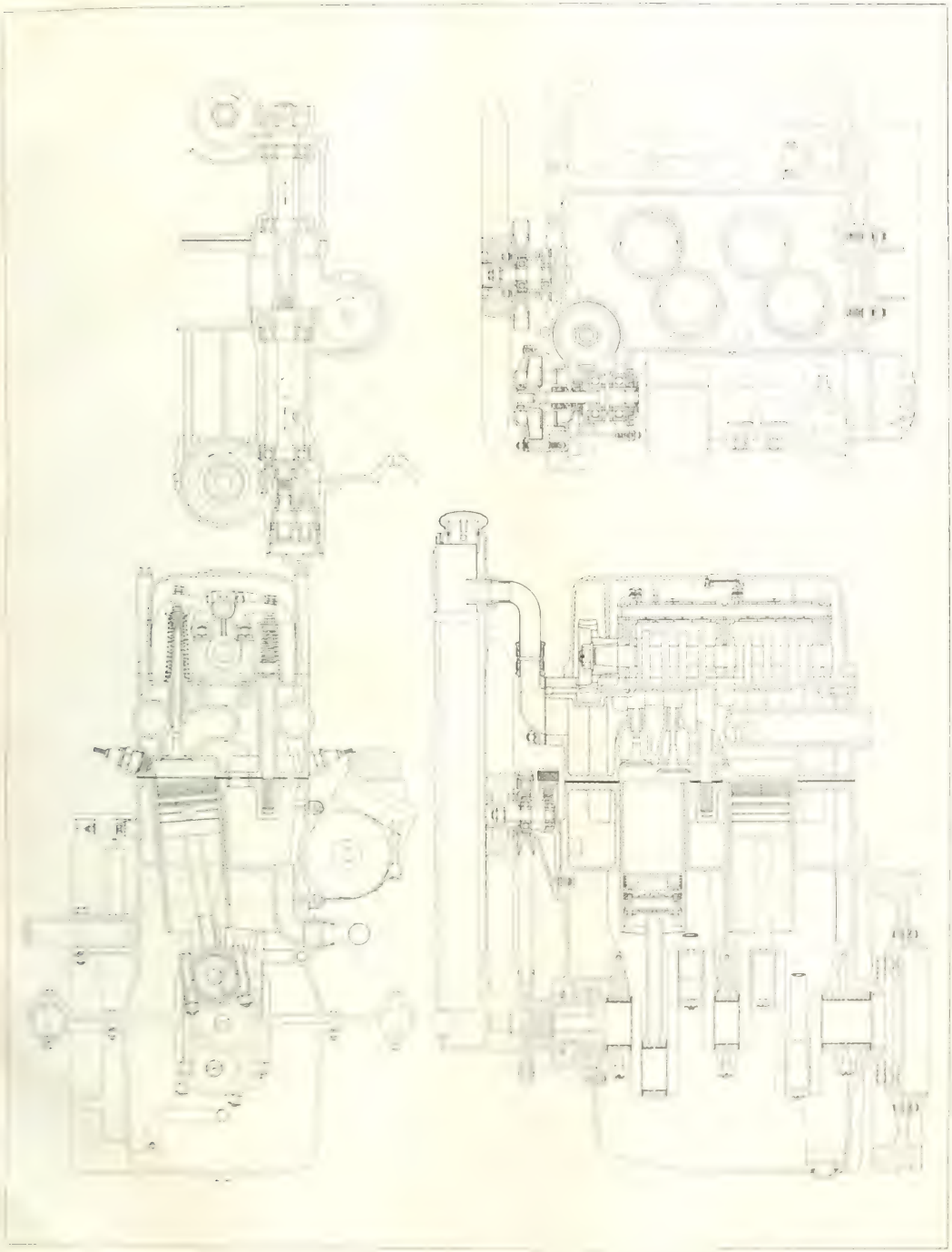


Diagram showing brake control on the new Lancia. Front wheel brakes operate in conjunction with the rear wheel brakes

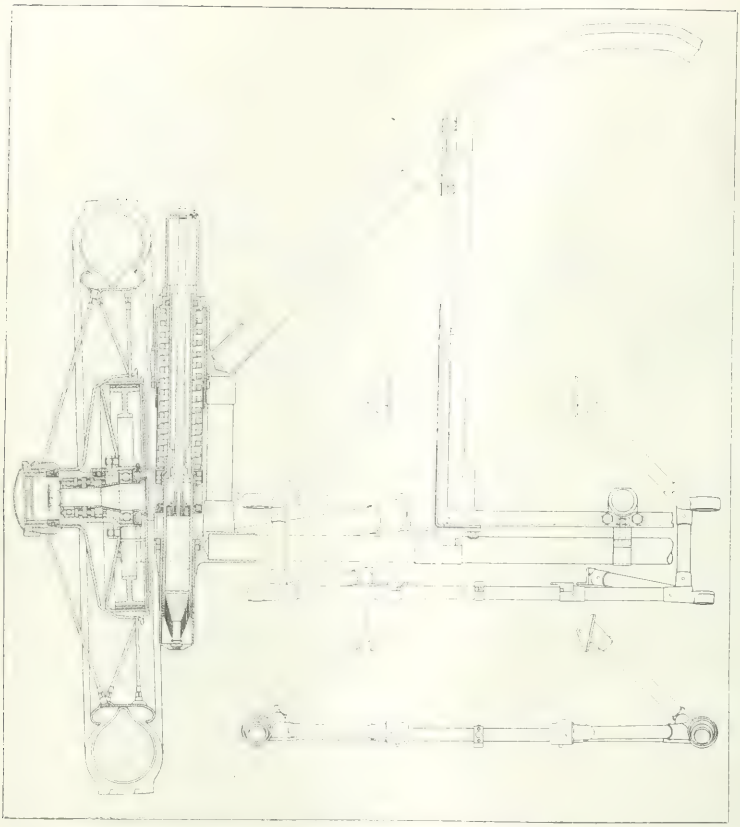
Other features are the use of a 122 cu. in. four-cylinder V-engine developing 50 hp. The engine has a crankshaft with three main bearings and it has a separate bearing for each connecting rod, and an overall length, including flywheel and fan, of only 22 in. The cylinder block measures only 16½ in. long. All the mechanism—engine and gearbox—is carried under the hood, and can be lifted out when the hood is removed. Consequently there is no mechanism under the floor boards, radically different from general practice.

The Lancia body, which is shown in the illustrations, is built up of two main pressed steel side members having a thickness of 2 mm. These members are united by a series of cross members formed into the following units: radiator housing, toe board and scuttle dash, frame and back rest of front seat, frame and back rest of rear seat, frame work of rear locker for gasoline tank, baggage and spare wheels. From the toe board to the rear seat back rest there is a longitudinal tunnel which receives the propeller shaft. The top of the tunnel is cut away just ahead of the front seat for the brake and change speed levers to be passed through. Two photographs of the skeleton body are reproduced in the accompanying cuts. In one is shown the body completely paneled with with thin sheet steel, ready to receive the detachable upholstery. These illustrations do not show the carriers for the engine and gearbox, which are two parallel steel tubes secured by means of flanges to the toe-board frame and to the front cross member forming the bottom of the radiator housing.

When the necessary dies and presses have been installed, Lancia claims that this type of construction is very much cheaper than normal body building with its attendant chassis frame. The workmanship throughout follows the usual high-class Lancia standard, but the new car can be put on the market cheaper than other European cars of normal design and equal finish and ca-



Sectional drawings of the Lancia 122 cu. in., four-cylinder overhead valve V-type engine. In addition to forming a V of 20 deg. the cylinders are staggered, thus avoiding use of forked connecting rods and giving a separate bearing for each rod. The overall length of the engine including flywheel and fan is only 22 in.



Lancia triangular steel tube construction in place of usual front axle. Enclosed coil springs and hydraulic shock absorbers serve for front suspension

pacity. It is intended to build this car in America under license, negotiations for the sale of these rights being under way at the present moment.

The engine used on this new Lancia is a four-cylinder V-type with an angle of 20 deg., a 2.9 in. bore and 4.7-in. stroke. This arrangement of cylinders is covered by patents and is a type which has been in production for two years on the 8-cylinder Lancia. In addition to forming a V, the Lancia cylinders are in staggered relation. This disposition avoids the use of forked connecting rods and gives a separate bearing for each rod, as in conventional construction. The crankshaft, which has a diameter of 2.1 in., is very short and is carried in three plain bearings, the lengths being 1.29, 1.29 and 2.55 in., respectively. Circular webs are used on the crankshaft.

Cylinder barrels are of close-grained grey iron, cast separately with a flange on the head. After receiving a first machining operation the barrels are set in the mold and have the aluminum water jacket and crankcase cast around them. A detachable cast iron cylinder head is used. The vertical valves have an external diameter of 1.6 in., and are operated by an overhead camshaft and rockers. The drive is through a vertical shaft and spiral gearing, the shaft being in the forward portion of the cylinder casting. The valves are closed by pairs of concentric springs. The connecting rods are tubular with white metal split bearings held in the usual manner by two bolts. The aluminum alloy pistons have considerable metal in the head, very thin skirts, and are fitted with three steel compression rings having a depth of only 2 mm. Below the compression rings there are two scraper rings. The wrist pin is fixed in the piston and turns in the rod.

On the left side of the engine there is a neat arrangement of water pump and combined Bosch generator and distributor. Only the oil filler and breather are placed on the right-hand side of the engine. A wood airplane type propeller is driven by belt from a pulley on the crankshaft. The position of the Zenith carbureter is unusual. It is bolted up direct to the rear face of the cylinder head, between the two exhaust ports. As shown in the illustration, the exhaust manifold is swept to the left and then carried to the rear in the normal manner.

Back of the engine, but carried on the same pair of steel tubes, is a three-speed gear box. Since all the gearset is under the hood forward of the dash, the change speed selector mechanism has to be carried rearwards to the opening in the central tunnel through which passes the control lever. A normal type of rear axle with differential and Gleason spiral bevel gears is used, together with semi-elliptic springs attached to the frame body at their front end in the usual manner and shackled at the rear to a steel tube. Hotchkiss drive is employed. There is a transverse recess for the rear axle. When the car is loaded the floor boards are on the same plane as the drive shaft.

The front end of the car is quite distinctive, for instead of the usual type of forged axle Lancia has a triangular steel tube construction comprising a bottom horizontal tube uniting the radiator housing and the steering yokes, two tubes from the top of the steering yokes to the top of the radiator housing, and another pair from the bottom of the steering yokes to a point on the main frame on a line with the dash. Front suspension is by means of a system of enclosed coil springs and hydraulic shock absorbers, the cylinders for the hydraulic system serving also to house the coil springs, as shown clearly in the drawing. The front wheel brakes are operated by pedal in conjunction with those on the rear wheels. A feature of the front wheel brakes is that the drums are within the wheels, the center line of the drums almost coinciding with the center line of the tire. Aluminum drums with die cast aluminum shoes are employed.

Two body styles have been decided on, a phaeton and a sedan, the latter being a superstructure on the phaeton. For the open body there is a disappearing top. Back of this is a rear compartment within which is housed the gasoline tank and a passenger's trunk supplied with the car. On the hinged rear panel giving access to the compartment there is a carrier for two spare wheels.

Common Sense and Compromise Needed in Solving Highway Problems

Honest differences of opinion frequently arise in connection with road building and maintenance policies. Education will accomplish more than merely calling names. All highways need not be high priced. Cheaper construction better in some cases.

By James Dalton

HIGHWAY legislation has "as many sides as a circle," but there is one spoke in the wheel to which representatives of the automotive industry can cling with reasonable assurance that it won't snap. That spoke is labelled "Common Sense." In this case common sense means a spirit of fair play and compromise. Motor interests have been buffeted about in legislative halls until they feel badly battered and they will gain nothing by making a noise like a worm. Neither will their gain by arming themselves with bludgeons and trying to beat up their opponents.

Legislative controversies in which diametrically opposite views are presented must be settled by compromise if the breach is to be bridged. There must be a spirit of accommodation in all human relations if differences are to be adjusted amicably.

There probably is no phase of legislation concerning which there are more honest differences of opinion than that relating to highways. The impression has been given far too often that representatives of the automotive industry seek only to serve selfish interests in their advocacy of good roads. Not enough emphasis and clarity has been given to the fact that society as a whole and taxpayers in general profit equally with motor vehicle drivers from every mile of improved highway.

It must not be forgotten that there has been an insidious, insistent and plausible propaganda designed to convince the public that taxpayers are the goats and motor vehicle operators the sole beneficiaries from good roads. It is not necessary to refer to the authors of this propaganda. A good many of them are interested in another form of transportation.

Sound economics and deep study have resulted in the evolution of the theory that the original expense of highway construction should be met by bond issues and that motor vehicle fees should be used to pay maintenance costs but this proposal needs a lot of selling before it will be accepted universally. In the meantime automotive interests must demonstrate that they are perfectly willing to pay fair fees for the use they make of the highways.

The highway problem is fundamental so far as motor vehicles are concerned and it must be solved in whatever way will be most beneficial to the greatest number of people. It should not be considered exclusively from the viewpoint of the automobile owner or the railroad owner.

Motor vehicle users should not object to the payment of a reasonable sum for the use of the roads and the vast majority of them don't. When excessive imposts are proposed, the chance of holding them within fair limits will be better if the problem is attacked in a spirit of compromise. Gun toting and blackjack brandishing are spectacular but they seldom bring as satisfactory results in the end as a give and take argument based on a common-sense acceptance of the old adage that there always are two sides to a story.

It is far more profitable and pacific to meet the other fellow's arguments than it is to yield to the temptation to call him a bone head. It's time enough to fight when it is found that there is a stubborn determination to swat the motorist. When this has been demonstrated the time has come to fight and fight hard with any weapon recognized in civilized legislative warfare.

When it comes to the question of highway building and who shall pay the bill, one of the keenest students of the subject within the industry has said:

"The most important problem before those who are interested in highways is the question of finance.

"The roads will be paid for by the taxpayer, but if the public, who is both taxpayer and user, realizing the advantages of highway transport, decides to build highways that are open to all users, it is, in effect, really building roads for its own use.

"If we are to ask the public for money to build roads to promote highway transport, we shall make a big mistake if we do not build properly.

"Obviously the road must justify itself as to cost. It is as big a mistake to build too well where the traffic does not justify, as not to build well enough. If such mistakes are made, money will be thrown away and the public, who may not analyze the problem thoroughly, will say: 'This highway thing is no good. We have spent a lot of money for roads that have been ruined and what's the use?' If such a state of mind is created, it would take years to overcome the prejudice.

"The railroads in their early days built cheaply, without regard to the requirements of traffic and with-

out regard to the future, with the results that the roads had to be rebuilt. We cannot afford to make the same mistake with highways and highway transport. The public will willingly furnish money to build roads that are justified by the traffic, whether for motor truck, motor bus or passenger car, and they should not be asked for more. When I say the public, I mean the taxpayers.

"As a rule, when one speaks of improved highways, the average man thinks of a very heavy concrete road built at a tremendous expense. Such roads are not needed everywhere. It is highly important that we have a system of primary roads which will carry the heavy traffic in congested districts, but they should be built only after careful analysis has been made to determine whether the traffic will justify the expenditure.

"We also need a system of secondary roads that will be hard surfaced, but not particularly heavy, in order to meet the needs of local traffic conditions. There is, of course, a tremendous volume of traffis on these secondary roads, but the unit is light and the distance short. If the highway problem is approached in this way we can develop a satisfactory and completely efficient system of highways.

"I believe that the construction cost of primary roads should be borne by the Federal and State governments and that the funds contributed by the States should be provided by bond issues.

"If the taxpayers approve of bond issues with which to build roads, they have a perfect right to insist that these roads shall for all time be properly maintained. They will not approve future bond issues if, because of lack of maintenance, the roads are destroyed long before the first bonds are destroyed.

"The State should expend the fees assessed against motor vehicles for maintenance purposes and the money should be fairly apportioned to maintain primary, secondary and all other roads, but no part of it should be spent for new construction. My definition of maintenance is to do such repair work as may be necessary to keep the road always in as good condition as when it was built."

Here is a sound, sane, logical and economic theory for highway construction and maintenance. If the automotive industry can educate the taxpayers of the United States to an understanding of the fact that the term "good road" does not always mean concrete or something equally expensive but may mean sand or gravel, it will have done a great service to itself and the public generally.

Legislators need as much education, generally speaking, as do other taxpayers. If all state law-making bodies could be given a clear conception of this highway program, which has been accepted as sound by the leading advocates of good roads, it is probable there would be much less opposition to bond issues.

The principles laid down may have to be modified somewhat to meet local or state conditions, but they can be accepted as fundamentally sound.

Reports Show Bus Transportation Gaining the World Over

BUS passenger transportation in the Damascus region (Syria) has increased very much in importance during the past six months. The Beirut-Damascus railroad, was up to a short time ago charging three Syrian pounds ($5) for a third-class railway ticket to Beirut (86 miles by rail), and as the same trip could be made in about half the time in an auto bus for $3.30, the business of the railway company fell off alarmingly and did not improve when the price of a third-class ticket was decreased to $3.45. As a result the railway company inaugurated a motor bus service of its own, the price of a ticket on which is $2.05.

Reports from London, Ont., state that the fares charged by the street railways there until the spring of 1922 were regarded the lowest in Canada and in the United States. Last spring the fares were raised, but this increase did not result in any profit to the street railway companies because of the operations of motor buses, which began at about that time.

The bus rates are somewhat lower than those of the street railways although the former are obliged to pay the city a license fee of $100 for each bus. They furthermore are compelled to take out a liability insurance to cover payment of damages for injuries to persons or property.

Consul Haskall reports that Geneva is the first Swiss city to carry extensive plans for the adoption of auto buses. A company has been formed for the purpose of operating three lines, the concession for which, it is anticipated, will be granted shortly. The cars for the new bus lines will be similar to those in use in Paris, only somewhat smaller, with a total capacity, including that of the rear platform, of thirty-five passengers. The buses, which will be equipped with pneumatic tires, will be furnished by the Sauer Company of Arbon.

The introduction of bus lines is apparently not so much in response to a need for more extensive transportation facilities, but rather a venture in underselling the trolley lines, fifteen of which constitute the present system, embracing a length of 119 kilometers. The rates announced by the bus company are appreciably lower than those of the trolleys.

The conversion of taxicabs into buses in Aden, Arabia, is an unusual development caused by a ruling recently passed compelling taxi drivers to assemble their cars in certain prescribed taxi stations, and to wait there for passengers, leaving in order of priority instead of running up and down the streets soliciting business as has been their custom heretofore. To make matters worse for taxi drivers there were several automobile trucks following a more or less fixed schedule and route to which the above ruling does not apply. These buses carry three to four times as many passengers at about one-half the rate of the taxis and are very popular.

After an unsuccessful appeal to the authorities taxicab drivers started about one month ago to change their cars into buses, of which there are now six in running order and several more in the course of construction. The bodies to fit the buses are made locally and at a comparatively low price.

Owing to the congested condition of traffic in the central sections of the city of Melbourne, Australia, it has been proposed that motor buses, similar to those used in London, be put in service at the earliest possible moment.

New Electric Transmission Provides for Direct Drive

Sperry transmission has five speeds forward, two in reverse and electric braking. Direct drive obtained by automatic, electrically operated friction clutch. Generator fields receive momentary excitation from battery to avoid lag in operation.

AN electric transmission, which provides direct drive in fourth speed, has been developed by Elmer A. Sperry, president of the Sperry Gyroscope Co. It gives five speeds forward, two in reverse and electric braking. It consists essentially of a series generator, a series motor, a drum controller and an automatic, electrically actuated friction and ignition clutch. It replaces the flywheel, clutch, gearset, starting motor and lighting generator as used on the gear-driven car.

Fourth speed is the normal driving position. In this speed the drive is straight through from engine to rear axle. In all other speeds the transmission operates as generator and motor, the engine driving the generator to produce current which in turn drives the motor. Speed variations are obtained by varying the amount of resistance shunted across the field windings. Reverse speeds are obtained by reversing the connections to the motor armature.

The fields of both motor and generator are carried on the same field frame. This frame is bolted to the bell housing on the engine. The forward end of the generator shaft is rigidly connected to the engine crankshaft and the rear end of the motor shaft is attached to the propeller shaft. Direct drive is obtained by means of a clutch which connects the rear end of the generator shaft and the forward end of the motor shaft automatically. This clutch operates only when the controller handle is in fourth speed position. It engages automatically when the speeds of the two shafts are identical. Both generator and motor are of commutating pole type.

Speed changes are made by moving the controller handle which is mounted on top of the steering column. The controller is of the drum type and is divided into two sections—the main drum and the braking drum. The complete connections of the transmissions and controller are shown diagrammatically in Fig. 1.

Fig. 3 shows diagrammatically the connections for each position of the controller handle.

The generator is used as a motor to crank the engine. Putting the controller on the starting position throws the battery across the generator which then operates as a series motor and cranks the engine. The commutating pole field windings are not in circuit in this position.

In first, second, third and fifth speeds, and in both reverse speeds, there are two stages. The first stage might be called a period of preliminary excitation and the second the normal running condition for the particular speed.

The preliminary excitation of the generator field is an important feature of the Sperry equipment and it undoubtedly contributes much to the smoothness of operation. An ordinary series generator builds its voltage up from the residual magnetism in its field poles. When this residual magnetism is augmented by a small field current (.1 amp.) the building up time is but a fraction of a second. However, when the field winding is shunted by a speed control resistance, the time taken to build up the voltage is quite appreciable. This lag in the generator voltage would cause a noticeable lag in the operation of the car. To avoid this lag and insure a quick "get away" the generator field winding has its speed control resistance disconnected and is momentarily excited by a small current from the battery.

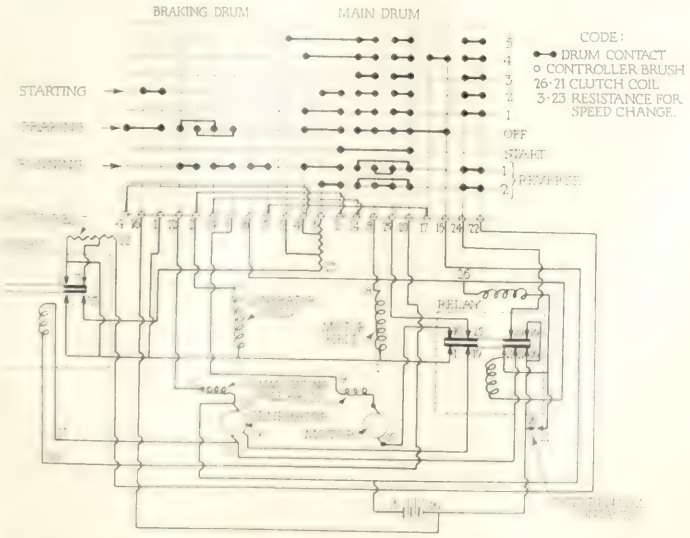


Fig. 1—Diagrammatic connections of Sperry transmission and controller

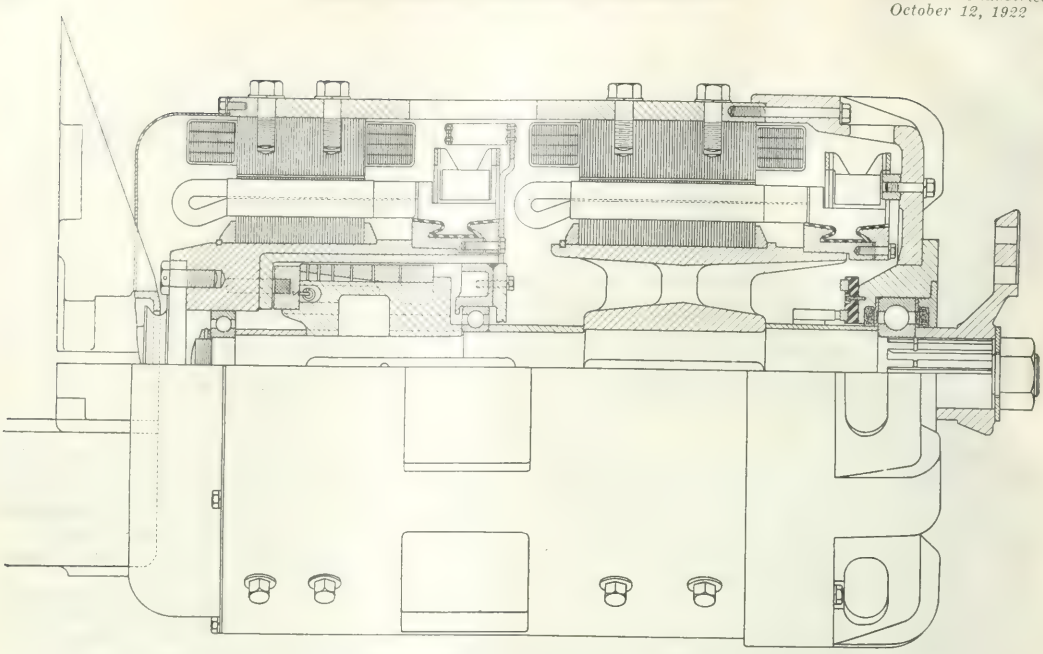


Fig. 2—Section through the new Sperry electric transmission. The field frame is bolted to the engine bell housing. The coil clutch is shown inside the generator armature which is the left unit

This excitation lasts until the output of the generator has risen to a predetermined value at which time a relay operates to connect the speed control resistance and reduce the battery excitation. Of course, if the generator output does not fall below this predetermined value as a result of a speed change, there is no need for outside excitation and the battery does not supply field current under this condition.

The exterior exciting circuit consists of the battery. Two resistances and the generator field, all connected in series. One of the resistances is in the neighborhood of 600 ohms. During the time that the generator field is being excited by the battery, this resistance is short circuited. The purpose of the second resistance is merely to limit the current flow as otherwise there would be nothing but the resistance of the series field winding to oppose the battery voltage. When the current produced by the generator reaches a predetermined value, which in the case of the experimental transmission is 35 amperes, a relay operates to remove the short circuit from the high resistance. The introduction of this resistance into the circuit cuts the current to less than .01 amperes. The length of time during which the field receives the excitation from the battery is so short that it cannot be measured with a stop watch. The purpose of this preliminary excitation is simply to supply a strong field as soon as the controller handle is moved to a new position. This enables the generator to produce the current required to drive the car without waiting for the voltage to build up from the residual magnetism.

The second stage commences as soon as the relay removes the short circuit from the high resistance. The generator then operates as a normal series generator to produce current to drive the motor. In all positions, except third speed, resistance is shunted across either the generator or motor field as soon as the period of preliminary excitation is ended.

In fourth speed there are four stages. The first two are the same as in other speeds. The third and fourth stages take place simultaneously. The third stage is the operation of the friction clutch connecting the generator and motor shafts. This takes place when the speed of the generator and motor shaft are the same. The clutch is operated automatically by an electromagnet, the current supply of which is controlled by a relay. The power consumption of the relay and electromagnet is about 20 watts. This relay is designed so that when the speed of the generator shaft (that is, the crankshaft) is the same as the speed of the motor shaft (that is, the propeller shaft) the contacts close, thus energizing the electromagnet and causing the clutch to take hold.

The clutch employed is identical in principal to a scotch coil clutch. It consists of a helical spring of oblong section one end of which is locked to the driven or motor shaft. The free end of the spring can be locked to the driving or generator shaft by magnetic attraction. This occurs when the electro magnet referred to above is energized. The spring is then caused to expand in the driving shell due to the unwinding action, the pressure being so great that the frictional contact on the hardened shell is ample to prevent slipping. Since the shafts which are thus locked together are turning at the same speed at the moment of engagement, there is no slipping on this account.

The clutch used in this case is located inside the armature of the generator and is concentric therewith. It expands in a steel shell which is fastened inside of the generator armature. The clutch operates in a closed compartment which is kept filled with oil. The construction employed is shown by the sectional drawing, Fig. 3.

At the same time the clutch takes hold the electrical connections between the generator and motor are opened, the generator is connected to the battery and, during the time the car is in direct drive, the generator charges the battery as a third brush machine. This is the fourth stage.

The automatic clutch takes hold smoothly and easily. In fact, during a ride in the experimental car, it was impossible to tell when it did take hold except by watching the needle on the ammeter in the generator motor circuit. Inasmuch as this circuit is opened when the clutch operates, the needle drops back from a reading of 100 or more amperes to the 12 or 15 required to charge the battery.

The electric connections in the various speed positions are as follows:

First Speed: a—Generator and motor in series, generator field being excited by the battery.
b—Generator and motor in series, resistance shunted across the generator field.

Second Speed: a—Generator and motor in series, generator field being excited by battery.
b—Generator and motor in series, resistance shunted across generator field. The shunt resistance is greater in this case than in first speed. Consequently the generator field carries a larger portion of the total current.

Third Speed: a—Generator and motor in series, generator field being excited by battery.
b—Generator and motor in series.

Fourth Speed: a—Generator and motor in series, generator field being excited by battery.
b—Generator and motor in series, resistance shunted across motor field.
c—Generator and motor shaft running at same speed, relay operates to supply current to clutch operating electromagnet and clutch engages. Engine now driving car direct. Motor carrying no current. Generator only producing current to recharge the battery.

Fifth Speed: a—Generator and motor in series, generator field being excited by battery.
b—Generator and motor in series, resistance shunted across motor field. This resistance is smaller than in fourth speed, b. Consequently the motor field is carrying a smaller portion of the current and the weakened field results in higher motor speed. This speed corresponds to an over gear in a gear-driven car.

Reverse Speeds: a—Connections are the same for reverse speeds as for first and second speeds forward, except that the leads to the motor armature are reversed.

The experimental model was designed to operate with a six-volt battery. Under ordinary driving conditions the current in the motor and generator armatures does not exceed 250 amperes. The battery used in the experimental car is rated at approximately 125 ampere-hours. The motor develops 175 lb. ft. torque at 250 amperes with full fields, that is when there is no resistance shunted across the motor fields.

In a gear-driven car, multiplication of torque is obtained by means of gear reductions. In the electric transmission, this multiplication is secured in two ways. The inductors on the motor armatures are approximately 11 per cent longer than those on the generator armature. Furthermore, the relative strength of the field in both motor and generator are varied by means of shunt resistances. The torque required to drive a generator, or the torque developed by a motor is proportional to the strength of the field and the current carried by the armature. In the first-speed position we have a weak generator field, inasmuch as most of the current in the generator armature passes through the shunt resistance. The generator torque is consequently small in proportion to the motor torque inasmuch as the motor field carries the full current. In addition, the motor has the advantage of longer armature inductors. In the second speed position, the difference between motor and generator torque is not so great inasmuch as the resistance shunted across the generator field is larger and consequently this field winding carries a larger portion of the current. In third speed, the torques of the generator and motor are proportional to the length of the armature inductor. In other words, the motor torque is 11 per cent more than the generator torque. In fourth and fifth speeds, resistance is shunted across the motor field, which weakens them and tends to further decrease the ratio of motor torque to generator torque.

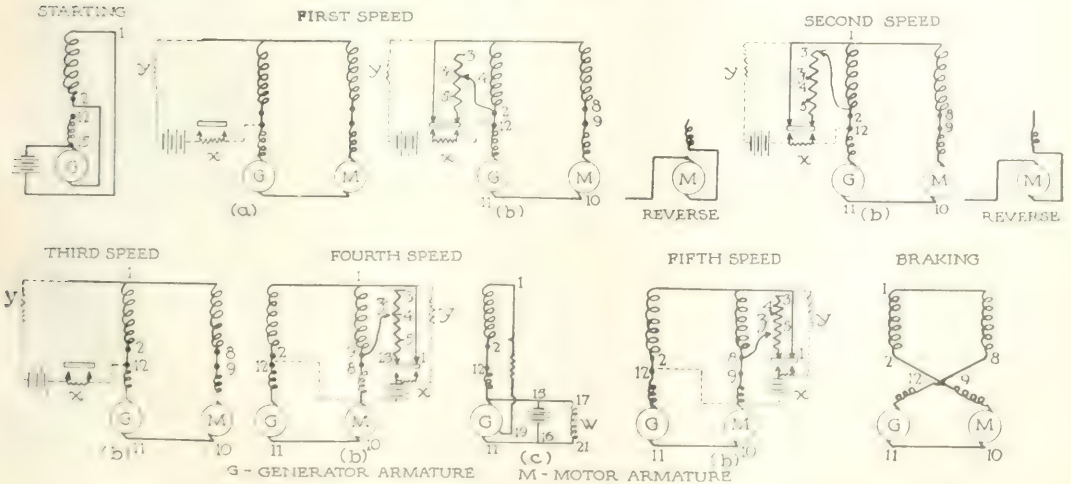


Fig. 3—Simplified connections in different speed positions. The numbers refer to the controller connections as shown in Fig. 2. The letters in parentheses under the diagrams refer to table of connections at various speed positions on this page. X is the high resistance in the battery exciting circuit and y is the low resistance. Z is the speed control resistance. W is the coil of the clutch operating electro-magnet

The efficiency of the transmission when operating as a generator motor has a maximum value of about 80 per cent. Inasmuch as a first, second and third speed are only used for accelerating and for hill climbing, the efficiency in generator motor speeds is not usually important. The normal driving position is fourth speed with direct drive, and in this condition there are no electrical losses except the small amount of power required for the clutch operating electromagnet.

The electric brake simply reverses the direction of energy transmission. Under driving conditions the engine provides the energy which the electric transmission carries through the rear wheels to drive the car. When braking, the energy made available at the rear wheels through the deceleration of the car is transmitted forward to the engine and absorbed by engine friction and electrical losses. In braking, the motor acts as a generator to produce current which drives the generator as a motor. The energy developed by the motor is used up in overcoming the friction of the engine.

The electric brake is controlled by a foot pedal and can be applied with the controller handle in any position. The application of the electric brake simply reverses the generator and motor field connections. The higher the speed position of the controller handle, however, the less severe is the braking. In other words, the electric brake is least powerful in fifth speed and most powerful in first speed. In cases of emergency requiring a quick stop, the controller handle can be pulled down from any higher speed to a lower speed at the same time the electric braking pedal is depressed. In fourth speed the operation of the electric brake causes the clutch connecting the generator and motor shafts to disengage.

In driving forward, the ratio of motor torque to generator torque is progressively decreased by first increasing the strength of the generator field as in the first and second speed positions and then decreasing the motor field as in fourth and fifth speed positions. The same results are obtained in braking only in the reverse order. The ratio of the strength of the motor field, which acts as a



Fig. 4—The inductors on the motor armature are longer than those on the generator armature in the Sperry transmission

generator in braking, to the strength of the generator field, which acts as a motor, is progressively increased as the controller handle is moved from higher to lower speed positions. In other words, the torque required to drive the motor as a generator, which is the braking force, increases as the controller is moved from any position to the next lower position. The torque required to drive the motor as a generator is least in fifth position because the field is weakest because of the low resistance shunted across it. In fourth position the field is stronger and the torque required to drive is consequently larger. In third position there is no resistance across the motor field, hence the torque required to drive it as a generator is further increased. In second and first speed positions the generator field, which acts as a motor during braking, is weakened by having resistance shunted across it. This means that the current consumption of this unit is larger. This larger current is, of course, carried by the motor armature which results in a further increase in torque required to drive the motor as a generator.

On the experimental car a friction brake is also fitted to supplement the electric brake. This car has been thoroughly tested in mountainous country and in city traffic. In neither of these conditions has the temperature of

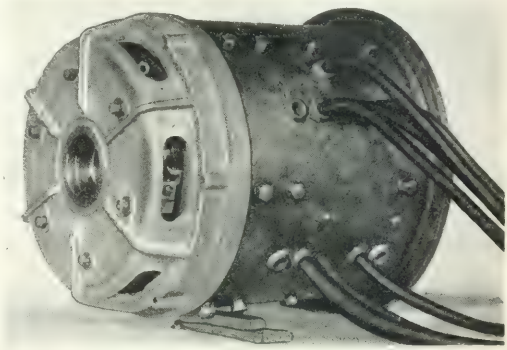


Fig. 5—The Sperry generator motor unit. It is 17 in. long and 14¾ in. in diameter

either of the units approached the danger point. A Sirocco type fan is fitted to the rear of the generator shaft to assist in cooling the transmission. There is, of course, no heating in direct drive on fourth speed.

The experimental car is very easy to drive even for one accustomed to the gear-driven car. To change from one speed to another either up or down, the controller handle is moved to the desired speed position. A spring stop is provided so that the handle cannot be pushed in reverse position accidently. The car accelerates smoothly and the lag in acceleration, noticeable in the gear-driven car when the clutch is thrown out to shift gears, is, of course, entirely absent. To coast, it is only necessary to drop the engine speed to idling.

The experimental transmission weighs quite a bit more than the parts it displaces. However, in designing and building this unit no particular effort was made to reduce the weight. It is claimed that a unit designed for manufacture on a production basis will closely approximate the weight of the parts it displaces.

A GROUP of British motorcycle engine and accessory manufacturers have formed themselves into a research association constituted on lines which entitle them to a measure of financial assistance by the British Government.

The work done by this association bears upon basic principles of design and construction, and full details of every research, when completed are, of course, made available to each member of the group.

F. W. Lanchester has taken out a British patent on a magneto drive through a universal joint in which the irregularity in the transmission of motion by such a joint is taken advantage of to increase the speed of the magneto armature at the moment the circuit is about to be broken and the spark produced.

A New Means for Comparing Maximum Pressures in Engine Cylinders

Thin diaphragm inserted in cylinder head ultimately fails due to repeated application of high pressure. Time required for failure of disks of equal thickness is used for comparison. Effect of detonations are indicated by this means.

By Stanwood W. Sparrow and Stephen M. Lee*

A SIMPLE method of comparing maximum cylinder pressures has recently been found to give satisfactory results in connection with the internal combustion engine research at the Bureau of Standards. Thin metal diaphragms are used to indicate when various sets of engine conditions result in the same pressure. For a numerical measure of that pressure, a more complicated apparatus is, of course, necessary.

As shown in Fig. 1, the diaphragm is mounted in a spark plug shell between two metal washers. The metal disk which serves as the diaphragm is selected of a thickness such that, when subjected to the explosion pressure of the engine, the exposed portion will be sheared from the rim in a comparatively short time. If this is to take place, two requirements must be satisfied. First, the pressure must be high enough to produce shear. Secondly, the pressure must endure long enough or be repeated often enough to effect the complete shearing of the center from the rim. It is evident from this second requirement that the time required for a disk to fail as well as its thickness should be considered when comparing pressures by this method.

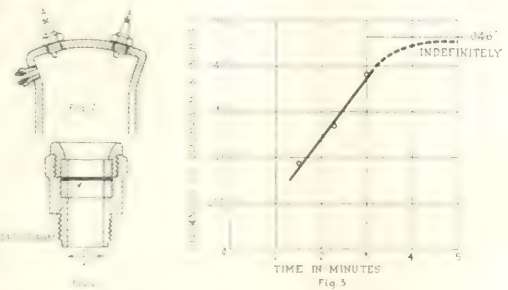


Diagram showing type of diaphragm plug and its location in relation to the spark plugs in a Liberty engine cylinder. The curve shows that the time required for failure of the diaphragm is, up to a certain point, directly proportional to the thickness of the diaphragm

Fig. 3 shows the time of failure for aluminum diaphragms of three thicknesses. A fourth diaphragm .046 inch thick had not failed at the end of 11 minutes. There is little need for any further explanation of the method of using this device. With the engine operating under a definite set of conditions the time required to shear a certain thickness of diaphragm is noted. Changes are then made to produce the conditions under which a comparison is desired and again the time required to shear a disk of the same thickness is noted. An alternative method of comparison is to substitute successively disks** of various thicknesses until one is found which fails in the same length of time as under the original engine conditions.

This device has been used on several occasions to demonstrate a fact frequently mentioned with reference to detonation, namely, that under certain conditions higher pressures result when firing from one spark plug than when firing from two. For these demonstrations the disk assembly was located as shown in Fig. 2 in an extra spark plug hole in the side of an otherwise standard Liberty cylinder. A thickness of diaphragm was selected which, with the engine operating with a fairly early spark would withstand the explosion pressures for over five minutes, provided the engine was fired from both plugs. If, however, after one minute of operation the ignition wire was removed from plug A and the engine fired from plug B alone the diaphragm would fail almost instantly. The experiment merely constitutes a rather striking illustration of how the failure of one spark plug may result in a disastrous increase of explosion pressure.

From the experiments made at the bureau it appears that so long as diaphragms are made of the same material, check results can be obtained under the same engine conditions within rather close limits. In any event, the simplicity of the device commends its use for qualitative comparisons of a similar nature to that described above.

THE Trade Commissioner's office in Shanghai estimates that from 75 to 85 per cent of 3265 passenger cars and 270 motor trucks in use in Shanghai are of American origin, but since the conclusion of the world war and more especially since the beginning of 1922 the number of German-made cars has increased. However, based on value of the cars imported into China the United States supplied 47 per cent of the cars in 1918, 59 per cent in 1919 and 58 per cent in 1920.

*Technical Note No. 101, issued by the National Advisory Committee for Aeronautics. The authors are engineers engaged in research work at the Bureau of Standards.

**The material of which all the disks are made should be the same and should have received the same treatment.

What Makes for Easier Steering in Passenger Cars?

According to the belief of steering gear makers, inaccuracies in manufacture, careless assembly, incorrect design and lack of lubrication are chief causes of hard steering. 9 to 1 reductions considered adequate.

By J. Edward Schipper

HARD steering is a fault frequently causing criticism on the part of users of present day cars. The steering gear maker is sometimes inclined to attribute the trouble to faults in portions of the steering system outside the gear proper. Undoubtedly there is often good ground for such complaints. In any case this view of the subject is here expressed.

We intend to publish in an early issue the views of car manufacturers. Engineers qualified by experience to discuss the subject are invited to express their views in letters intended for publication in the Forum.

RECENT demands on the part of automobile manufacturers for steering gears with reductions of 12 to 1 have left steering gear makers and engineers generally somewhat puzzled as to the trend of design. With the growing increase in city traffic and the difficulty of driving through congested centers, anything which makes control more difficult is seemingly a step in the wrong direction. The aim in designing is to reduce to a minimum the length of time between the perception of the driver and his ability to make the vehicle act as he desires. Steering gears with big reductions, such as 12 to 1, lengthen the time interval appreciably because of the greater motion required on the steering wheel to accomplish a given result on the front wheel.

What is the cause for the demand for such a large reduction? One conclusion is that, in some instances, it is due to the desire to overcome by main force resistances to steering gear action which should not be encountered. In other words, careful study indicates that by properly designing the gear, reductions as low as 6 to 1 and certainly 9 to 1 may be used with perfect safety and without great difficulty in operating the car. The argument advanced that gear reductions of 12 to 1 are necessary because of the large number of women driving cars carries some weight, of course, but, at the same time, many steering gear manufacturers and engineers who are experts in this particular field claim that with a 9 to 1 reduction it is perfectly possible properly to design the steering gear so that the car will steer readily enough to give no trouble to any normal woman.

We are, of course, starting with the assumption that the steering gear is a free, easily operating gear when it is delivered to the car assembler or manufacturer. Given this premise, a great many factors may be introduced into the chassis assembly which will either make or break the reputation acquired by the steering gear maker. The first mistake in steering layout can be made by using a pitman arm which is so long or so short that it will not properly function. A rule used by Kenneth Dean, who is road engineer for the Lavine steering gear, is that the length of the pitman arm should be such that a line through the front spring bolt passing through the center of the ball on the steering arm should also pass through the center of the ball on the pitman arm with the car under load.

A number of companies have been consulted by AUTOMOTIVE INDUSTRIES on this problem of steering and the following miscellaneous notes are the result of discussions of this subject with engineers in plants of leading car manufacturers, as well as some of the axle manufacturers and steering gear makers.

Several manufacturers say that anti-friction bearings should be used on the pivot pins if the price of the car at all justifies the cost. If plain bearings are employed, a ball thrust should be used to take the weight of the car otherwise the shoulder which carries the weight is likely to pound out the lubricating film to such an extent that considerable friction exists at this point, due to metal to metal contact. This is one of the points at which friction is apt to develop. It is obvious that with one or two of these binding points in the gear, an otherwise good design is rendered unsatisfactory. Elimination of these points of friction throughout the steering gear assembly will make it unnecessary to use such reductions as 12 to 1.

There has been a tendency lately to use a polished ball end instead of the plain turned end. This is considered desirable as a turned ball end has high spots which can cut through the lubricating film and tend to bind on the cup. This is one of the points in which more careful manufacturing will give better results as far as easy steering is concerned. There are several other instances in which manufacture is directly responsible for the results obtained in steering. A good example of this is in the alignment of the king pins. If these are

not in the same plane, within very close limits, a twist is set up in the steering linkage. In recent installations at front axle manufacturing plants, the entire front axle is placed in a jig and both of the king pins are drilled simultaneously. With the alignment thus established, little or no trouble should develop at the king pins.

On the other hand, when one king pin hole is drilled, the axle reversed and the hole drilled for the king pin on the other end, an error is apt to creep in unless very careful provisions for location are made. On some of the latest tools for front axle manufacture, not only are the two king pins drilled simultaneously but the spring pads for the front springs are milled at the same time. This gives an axle on which proper king pin alignment is practically assured.

When the steering arms are not parallel, another point of misalignment appears which causes considerable trouble in steering. Under this condition a twist is put in the tie-rod every time the front wheels are turned, the effect being similar to that which occurs with misaligned king pins. This causes binding and resistance to operation of the steering linkage. Too much spring in the steering arm is another feature which causes binding.

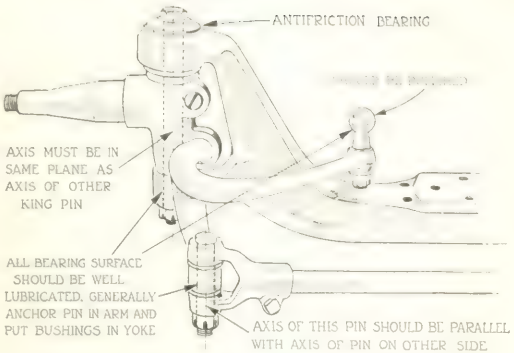
Even with well aligned and properly manufactured parts resistance is set up if lubrication is inadequate. Grease is employed frequently for lubricating the king pins. Since grease will not flow like oil, if it is to be used, it must be put in under pressure. When this pressure is not properly exerted on the grease to force it down the entire pin, it often happens that the top of the pin will be lubricated and the bottom will be dry, with the result that it binds and, naturally, results in hard steering.

Perhaps the greatest cause of binding steering gears, however, is the forcible assembly of steering gears which are not properly fitted to the chassis. Many instances have been found in which the car assembler has sprung the steering column cross-wise to make the bolt holes meet. Naturally, with a column sprung in this manner, it is useless to expect easy steering. Assemblers should shim the bracket on the frame, if necessary, or set the bodies so that the steering column bracket bolts would fit properly. By so doing a great many complaints of hard steering would be eliminated.

STEERING gears should be hooked up before the bodies are bolted down. If this is not done, there is a temptation to spring the steering column into place.

Elimination of points to which the owner must give attention is helpful. A good example of this is the bearing under the steering wheel at the upper part of the column. It has been the practice generally to put a small oil hole here to take care of the babbitt bearing which is sometimes employed at the top of the column. When the car is new, owners will put a few drops of oil at this point and be troubled perhaps with the oil running down the column and soiling gloves or clothing. They either will stop oiling this bearing for this reason or because they simply forget it. This makes it advisable to use a self-lubricating or graphited bearing. Experience has shown that it is possible to use these with success at this point and as a result an element of chance is eliminated and another point of bind removed.

One of the biggest problems in connection with easy steering is to get the proper caster in the front wheels. Steering gear manufacturers recommend not over 1½ to 3 deg. caster and, in connection with the normal caster, the front springs should be so designed that when deflected a negative caster is not put on the front wheels.



Some items to be borne in mind when designing parts of the steering system with a view to making steering easier

This is generally taken care of by designers who offset the front spring 1 to 1½ in., thus eliminating any chance of the deflection of the springs having such an effect on casters.

A similar problem arises in connection with the inclined pivot which gives hard steering at slow speeds. Easier steering and a minimum of road shocks are given, according to general experience, when the pivot axis is in line with the inner edge of the road contact surface area of the tires. This effect is secured by the proper angle of the steering knuckle and is an important factor in steering, particularly at slow speeds. There is not absolute agreement on what is the best practice in this respect. There is a tendency among European manufacturers, particularly those using front wheel brakes, to bring the pivot center directly in the central plane of the tire area, but American manufacturers as a whole are inclined to have the pivot center intersect the ground at the inner surface area of the tire contact.

These scattered notes are indicative of a few of the points which steering gear manufacturers encounter in gears after they are installed. The angle of the car manufacturer on this point is interesting and AUTOMOTIVE INDUSTRIES soon will publish a number of comments from car manufacturers on this important problem. The opinions and comments of engineers are invited and a discussion of this subject should produce some interesting comments for the Forum.

A NEW plywood has been placed on the British market under the name "Consuta." It has been designed with the idea of avoiding the danger of the wood layers splitting apart under exceptional conditions of weather or climate.

In this plywood the layers of wood, after being cemented together, are sewn through with rows of parallel stitching. It is made in thicknesses from 1/16 to ⅝ in. and up to 60 ft. long and 8 ft. wide, the number and thickness of the laminæ being varied to fit the exact purpose for which the wood is required. The direction of the grain can be varied, as for example, in the cover of an airplane wing the grain is laid in reverse diagonals, giving a girder type of construction.

Until recently the material was hand sewn, which made it very expensive, but machinery is now used for that operation. Each stitch has a strong independent hold so that the material may be cut anywhere.

Originally this plywood was intended for racing boat hulls, but it has since been used for construction of light motor vehicle bodies as well as in aircraft work.

Tubing vs. Solid Stock as Material for Piston Pins

Comparison of manufacturing costs difficult. Experience shows solid stock cheaper in small pins. No difference in quality, when same grade of steel is used. Tubing pins of inferior material likely to create unjustified prejudice against type.

By C. B. Fraser
Production Engineer, King Sewing Machine Co.

IN the manufacture of any standard article where there is a choice of materials, the question as to which one to use depends on four main factors:

1. Initial cost of the material in question.
2. Cost of manufacturing the article from that material.
3. Quality of final product.
4. Ease with which the product, made from that material, can be sold.

That material will be used which has the lowest initial and manufacturing cost, consistent with the desired quality of the final product.

The manufacturer of piston pins finds two kinds of raw material offered him—solid steel and steel tubing.

For the purpose of the present discussion, the exact kind of steel is immaterial. The writer has in mind exclusively SAE 1020 and SAE 3120. The latter costs between two and three times as much as the former, but any statements about the one holds good for the other with this price difference always in mind.

Tubing usually costs about four times as much as an equal weight of solid stock, but it makes from 30 to 45 per cent more pins. This statement is far from accurate, however, since a fair comparison between tubing and solid stock, as to actual material cost per 100 pins, is very difficult to make. Equal weights of stock of the same outside diameter cannot be taken as a basis because many more pins can always be made from the tubing than from the solid stock, since the former weighs so much less per lineal foot.

The actual percentage increase varies with the wall thickness. For instance, if twenty different pins can be made from 1 1/16 in. solid stock, and a given weight of 11/16 diameter tubing will make 40 per cent more of one of the pins than the same weight of solid stock, it does not follow that comparing the price of 100 lb. of solid stock with that of 100 lb. of tubing and allowing 40 per cent increase will give a reliable figure on the relative material costs for the other 19 pins. At least three different kinds of 1 1/16-in. tubing would be needed for the 20 pins, and the percentage of increase in pins obtainable from a given weight of tubing would be different for each kind.

A given pin made from tubing, moreover, requires a larger diameter stock than the same pin from solid stock because of the drawing scale on the outside which must be cut through. Nor can equal lengths of the same or corresponding diameters of stock be used as the basis of comparison because the price of tubing varies not only with the outside diameter but also with the thickness of the wall even where the diameter remains constant, and this is a factor which does not exist in the case of solid stock. For instance, suppose that 20 different pins can be made from 1 1/16-in. diameter solid stock and that 1⅛-in. diameter tubing would cover these 20 pins so far as outside diameter goes, it does not follow that comparing the price of 1 ft. of the solid stock with that of 1 ft. of the tubing would convey any accurate idea of the relative material costs. At least three different kinds of 1⅛-in. tubing would be needed for the 20 pins, probably more, and the cost would be different from each size.

It is this extra factor of wall thickness which prevents even any general comparison between costs.

Wall Thickness

As the diameter decreases it cannot be said that tubing either decreases or increases; it does both, depending on wall thickness. The only way to compare the two is to take a representative group of the pins to be manufactured, at least twenty different ones, including all sizes from the smallest to the largest. Compute the cost per 100 pieces on each pin, first from the solid stock, then from tubing; compute, from solid stock and tubing, the labor and overhead involved in bringing each pin to a stage of manufacture at which remaining operations are exactly the same; add up these material and labor costs for each pin from each material and then compare results. This method involves consideration of differences in cost of manufacture, but comparison of material prices alone in the case of tubing and solid stock is of little significance.

The method of manufacturing pins from solid stock differs from that in making them from tubing only in that pins made from solid stock have to be drilled as well as cut off, while pins made from tubing have only to be out of oil. Subsequent operations are identical.

In pins with holes less than ⅝ in. in diameter cutting and drilling is done on automatic screw machines in two operations, costing from 36c. to 48c. per 100 pieces. In pins with holes ⅝ in. in diameter or over, it is done in one operation, costing from 65c. to $1.65 per 100 pieces. The cost varies with the length, the diameter of the hole and the machine used. In the case of pins

made from tubing, the cutting off is one operation, costing from 15c. to 28c. per 100 pieces, depending on the outside diameter, the wall thickness and the machine used. It will thus be seen that tubing pins cost from 18c. to $1.33 per 100 pieces less than solid stock pins in labor alone and overhead will usually at least double that. Our experience, however, is that the initial material cost more than makes up for this.

In the smaller pins there is no comparison at all. The initial tubing cost tends to be at least as high per 100 pieces as in the larger, though less steel is used, and the difference between cutting off as compared with drilling and cutting off, is less than in the larger pins. The net result is a disparity so greatly in favor of the solid stock that tubing is not to be considered at all.

Solid Stock Cheaper

In the larger pins the increase in tubing cost per 100 pieces over the small sizes is not so great as in the case of the solid steel and the difference in cutting off as compared with drilling and cutting off is greater, especially where the drilled hole has to be reamed as well as it does in most of the larger pins. The result is that the costs of the blanks are much closer together.

In ten cases of large pins we found that seven of them were cheaper to make from solid stock than from tubing by an average of $1.57 per 100 pieces, while three of them were cheaper from tubing by an average of 21c. per 100 pieces. This was sufficiently in favor of the solid stock to convince us that unless a very large production was contemplated of one of the pins which happened to be cheaper from tubing, it would be far better to use solid stock exclusively and take the slight loss on the one or two pins which seemed to favor the tubing.

There is still another fact which must be noted when considering initial and manufacturing costs, though it is hard to classify it wholly under either of these heads. The use of tubing compels the carrying of a much more varied stock of steel than does solid stock since there is an extra dimension to be considered—wall thickness. A given size of solid stock can be used for all pins of approximately that outside diameter, and at a pinch for all pins up to that diameter.

Not so with tubing, for different pins of the same outside diameter vary by as much as ⅛ in. in wall thickness and each variation requires a different size of tubing, or else an expensive drilling and reaming operation, the avoidance of which is one of the chief reasons put forward for the use of tubing. At first sight it might not seem a great disability to have to carry a few more sizes of steel, especially when the total stock would quite probably be from 20 to 30 per cent less, but piston pins happen to be a product where this is a factor of very great importance. Sales of different pins fluctuate widely and without the slightest notice. To balance this a stock of a minimum number of sizes, each of maximum availability is highly desirable. The more pins one kind of steel will make the more chance of making up an unexpected drain, and the greater ease with which an adequate stock is maintained. So important have we found this to be that we have grouped pins of approximately like outside diameter and made blanks for the groups, any pin of the group being obtainable from the group blank. In this way the number of different stock sizes needed has been reduced to about 30 and of these about 11 are duplicates in SAE 3120 steel of sizes also called for in SAE 1020. These 30 sizes make over 150 different pins covering 800 or more makes of cars and trucks. If tubing were to be used the number of sizes would be at least double and even so a very large percentage of the material would have to be redrilled and rereamed.

So far, then, comparison between solid stock and tubing is decidedly in favor of the former. There remains quality of product and ease of sale as factors still to be dealt with. Of the former there is very little to say. Provided the same quality of steel is called for, the fact that it is bought in tubing or in solid form makes no difference whatever, so far as we have been able to find out, in the finished product. Exactly as good pins can be made from tubing as from solid steel. The only possible differences are that tubing is sometimes seamed which results in a higher scrap and that it appears to be more difficult to eliminate soft spots in the hardening than is the case with solid stock. But our experience with regard to both these defects in the use of tubing is not positive enough to make us feel that they are of first importance.

Consideration of ease of sale, however, reveals a very different state of affairs. Tubing lends itself to use by small manufacturers without any large equipment of automatic machinery. Tubing pins can be cut off on a hand screw machine nearly as cheaply as on an automatic screw machine. For this reason some replacement pins have been made from screw steel tubing, seamed tubing, gas pipe or any other cheap material that could be bought.

Of course, the pins failed to stand up under use. Buyers soon found that most of these worthless pins were made from tubing because of the long parallel drawing marks inside the hole, and promptly condemned all tubing pins out of hand. As a result it is almost impossible to sell tubing pins in some districts and difficult everywhere. The sales resistance is far higher than with solid stock pins. If the manufacturer eliminates the drawing marks by drilling or reaming, the cost of manufacturing the pins from tubing is brought as high or higher than those from solid stock, making the total disparity in favor of solid stock very great. Consequently the manufacturer is nearly compelled to use solid stock if he wishes to sell his product.

This situation may possibly be temporary. Some method of eliminating the tell-tale drawing marks or possibly a deliberate branding of a certain make of tubing coupled with intensive advertising of the brand, might remove what prejudice now exists.

Tractor Market in Chile

A REPORT to the Department of Commerce estimates that there are between 135 and 150 tractors in service in Chile at the present time. Most of them are of American origin. A few British Austin tractors are in use, and in addition, there are agencies for the sale of the German Lanz tractor and the French Renault and the Semua, but as yet they have found little sale. The average selling price for tractors in Chile is around 5000 to 5500 gold pesos for a 10-20 hp. machine; 6800 to 7000 gold pesos for a 15-30 hp. machine, and 13,000 gold pesos for a 20-40 hp. machine.

Although tractor agencies are in the hands of the largest and best equipped commercial houses in Chile, which have branches or connections in all the principal centers, success in the field has not been as encouraging as might have been expected, considering the number of tractor sales effected in the neighboring republic of Argentina. One of the greatest difficulties has been found to be the ignorance of the average farm hand and his utter lack of mechanical aptitude. Farm help, though inefficient, is cheap; the maintenance cost of oxen is insignificant, and the average farmer is satisfied with the results attained through the use of the facilities at hand.

Proper Kiln Drying Will Reduce Timber Losses

Sap-stain, mold and incipient decay in green wood cause severe losses to manufacturers yearly. Office of Investigations in Forest Pathology proves importance of using prophylactic measures. Kiln drying most effective method of treating green timber.

By Nathaniel O. Howard*

DETERIORATION in lumber brought about through sap-stain means the discarding of timber on a large scale yearly. Severe losses frequently occur through this cause during shipping and storage of wood by manufacturers of vehicles and vehicle parts.

In 1918 the attention of the Office of Investigations in Forest Pathology was turned to the staining and molding occurring in green raw material and resulted in a series of studies covering the entire range from the time lumber was cut until it was turned in manufacture.

Investigation showed that much of the difficulty then being experienced was due to the fact that a shortage of cars for shipment brought about careless methods, and that the factor of time prevented proper seasoning and necessitated the use of more green wood than normally. Much of the trouble still persists and the study conducted should assist in its alleviation.

To prevent checking many manufacturers demand that wood be shipped in a green state rather than take the chance of having it improperly seasoned at local plants. These manufacturers have to contend with the troubles incurred during shipment.

The term "sap stain" refers to the blue, green, brown, or red discoloration which is often found in sap wood of timber derived from several kinds of broad-leaved and coniferous trees. There are two classes of sap-stains:

(1) The chemical stain said to be produced by chemical reactions brought about through the agency of certain oxidizing enzyms present in the wood itself.
(2) Fungous stains known to be caused by several species of fungi.

The first class of chemical stains which cause discoloration, develop during air-drying, particularly under warm and humid conditions, or in the kiln. In kiln-dried lumber they can be prevented to an extent by the use of comparatively low temperatures and correspondingly low humidities. These stains do not impair the strength or durability of timber and hence cannot be considered of great economic importance.

There is another fungus group, the molds, which occurs on freshly cut green timber. The chief objection to mold lies in the discoloration due to the mycelium, which appears on green sapwood and sometimes heartwood. These growths can be sanded or planed off, often even brushed off. The presence of this mold gives an unfavorable appearance to lumber as it indicates conditions which are favorable to decay.

The development of fungi depends on four factors: air, containing the necessary oxygen; moisture; temperature and food substance. It is necessary then to watch these factors.

Since blue stain and mold fungi cause little or no dissolution of the wood fibers, they do not affect directly the durability of the timber. If properly piled and dried, stained or moldy wood stock free from decay should not deteriorate further from the action of the fungi.

The presence of an abundant growth of mold or sap-stain in green stock indicates conditions which are likely to further the growth of rot, but rot is caused by a distinct group of wood destroying fungi which develop independently.

A great many attempts have been made to devise measures for the control of sap-stain and mold in green timber. With the exception of kiln drying, none of these has proved entirely satisfactory. For the most part these measures are prophylactic rather than curative in nature. However, they will assist in reducing losses from sap-stain, mold and incipient decay in green stock.

The average automotive manufacturer does not supervise the handling of lumber in the field, and the problem of proper care does not concern him until the lumber is in the factory yard. Any prophylactic measures would have to be employed then.

The first provision is that logs, bolts and split billets should be sawed into dimension stock of planks and manufactured as soon as possible. This will do much to safeguard material by reducing the time in storage. Provided kilns are not available, the dimension stock should be seasoned from six months to a year or more, depending on the size and kind of material.

IN all cases where air seasoning is resorted to, unless great care is exercised in providing for ample circulation of air through the stock by such means as open piling, fungous and insect troubles are likely to develop. It is absolutely necessary to strip or cross pile the stock upon dry foundations. Sheds for the storage of this material should be dry and well ventilated.

*Pathologist, Office of Investigations in Forest Pathology. Digested from U. S. Department of Agriculture Bulletin No. 1037.

By far the most effective and quickest method of treating green stock, as a prophylactic measure to destroy fungi or insects and reduce shipping weight, is to subject the material to proper kiln drying. When producers are equipped with, or have access to modern kilns operated on a scientific basis and are so situated that stock can be moved rapidly, less concern need be given to fungus troubles.

Material kiln dried directly from the sap has been shown to be just as good as air seasoned stock and in many cases much better as far as strength, toughness and freedom from defects are concerned. Moreover, the time necessary for seasoning can often be reduced from one year to three weeks or from three to five years to as many months.

Kiln drying eliminates or reduces losses due to insects, or to checking rotting, staining, or molding; improves the quality of lumber; reduces the amount of yard space; and saves the tying up of capital and carrying costs.

In dry kilns, stripping or cross piling the stock and providing means to prevent stagnation of the confined air are absolutely necessary if the development of mold is to be avoided. The water spray kiln devised at the Forest Products Laboratory represents one of the latest developments in the temperature and humidity controlled type of kiln.*

During the first few weeks of kiln drying, when the humidity is high and the temperature ranges from 80 deg. to 105 deg. Fahr., an abundant growth of white mycelium occasionally forms between the courses and interferes more or less with the circulation of the air in the kiln. This is due to the presence of mold fungi, and it usually indicates stagnation in the kiln. Steaming for an hour at a temperature of 160 deg. to 180 deg. Fahr. has been found effective in destroying or at least checking the growth of this mold.

Steaming certain kinds of stock is sometimes resorted to as a means of reducing shipping weight by hastening drying or to even up the color and reveal defects in the wood.

In the steaming of green gum lumber a large steel tank, or preparator, is employed. The lumber loaded upon trucks is run into this preparator and steamed for perhaps 15 to 30 minutes at pressures of 20 to 30 lb. Provided this lumber is then carefully open piled, it remains clean. When close piled or when exposed to adverse weather conditions, however, it may mold almost as readily as untreated green lumber.

Many attempts have been made to find some chemical compound or mixture that, when applied as a dip, will control sap-stain and mold in green timber. A great many substances have been tried but none has proved entirely satisfactory. Under conditions not particularly favorable to the growth of fungi several have met with considerable success. On the other hand, if the conditions were stimulating to fungous growth, the same substances often failed.

SOME treatments depend for their efficiency upon the neutralization of the acids in the wood, and at the same time the establishment of alkaline conditions. To this group belong sodium carbonate, sodium bicarbonate, sodium hydroxide, lime and borax. Others are intended to poison the food of the fungi, and comprise such compounds and mixtures as mercuric chlorid, copper sulphate, sodium fluorid, creosote and many other substances.

It is evident that the prevention of sap-stain, mold, and incipient decay in green material and in vehicle stock in particular, lies in a combination of remedial factors, no one of them in itself a sovereign remedy.

*Complete description in Bulletin No. 509, U. S. Department of Agriculture.

The New White De Luxe Bus for Long Distance Touring



A new reflection of the rapid development that is taking place in the motor coach and motor bus field is found in the appearance of a foreign type of de luxe coach, known as "voiture de grand tourisme," meaning a car for extensive touring. This type, which has just been brought out with Rubay coach work on a White Model 50 chassis, is a faithful copy of the motor coaches which are operating between Paris and Monte Carlo

Glider Results Point Way to Sport Plane Development

Wing weight per sq. ft. cut in half as result of soaring flight experiments. Two horsepower engine would maintain winning German machine in level flight in still air, allowing for propulsive efficiency of 70 per cent. Lessons for low-powered airplane design.

By Edward P. Warner

WHEN Hentzen started his series of record-breaking gliding flights last August, culminating in the three-hour cruise of August 24, he created a world-wide interest which led to a perfect torrent of press comment on the meaning of such performances to the future of aviation. The general tendency has been to be very generous in estimating the extent to which soaring can be expected to enter into and form a part of ordinary flying.

It is obvious that the glider's contribution will be different, in nature and in extent, in respect of different types of airplanes. As far as the pursuit airplane, loaded ten or twelve pounds per square foot, or the very large commercial or bombing machine is concerned not much can be expected in the direct application of structural methods, although it may be possible to profit in design by the experience gained with the ingenious controlling devices fitted to some of the gliders in place of or as supplements to the ordinary run of airplane controls seen on conventional machines.

EDWARD P. WARNER, the writer of this article, is Professor of Aeronautical Engineering at the Massachusetts Institute of Technology. He has recently returned from France and Germany, where he attended the glider trials which have caused so much comment in this country.

In this special article for Automotive Industries, he discusses the possible applications to commercial practice of the lessons learned from the glider trials.

With small machines, however, and particularly with those of very light loading, the outlook is more favorable. The next few years may see a great development of the sport-plane, which must be cheap to build, easy to fly, endowed with a very low landing speed, and exceedingly economical of power. Such airplanes have a great deal in common with the glider, which furnishes a means for the study of engineering features later to be incorporated in the powered machine. The closeness of the connection between glider and sport-plane was exemplified especially well at the French competition this summer, where several of the most successful flights were made by gliders which were merely small airplanes with the engines removed, with some of the structural parts lightened, and with the pilot's seat moved forward as much as necessary to restore balance after the removal of the power plant.

The successful sporting machine must be lightly loaded, and unit structural weights, such as the weight of the wings per unit of surface, must therefore be low; lower than has ever been found necessary in airplane practice in the past. Only in the glider has experience been secured in the construction of wings which run far below the conventionally accepted airplane wing weight of one pound per square foot, together with fuselages and tail surfaces proportionally light. Striking illustrations of what can be done are afforded by the Fokker and Coupet gliders, the total loading of which with the pilot on board was only about one pound per square foot, while the weight of the wings themselves contributed less than a third of that total in each case.

The building of wings so light requires constructional practice quite distinct from that usual in airplanes, where it has always been assumed that there was both a relative and an absolute minimum of unit weight attainable, the absolute minimum being imposed by considerations of the rigidity of the structure. It has been accepted, for example, that the weight of a wing truss should be about 13 per cent of the total weight carried by the airplane unless the loading was very light, but that the percentage increased rapidly as the loading decreased beyond a certain point, wing weight approaching an absolute minimum in the neighborhood of .4 lb. per sq. ft., a figure which could not be bettered no matter how light the loading of the wing might be.

The cutting of this minimum to nearly half its former value, which has taken place in some of the recent gliders, has been accomplished only by such radical departures as the construction of spars of I-form with plywood webs containing generous lightening holes and by the introduction of new covering materials and protective coatings.

A whole new scheme of doping, for example, has been evolved by some of the German experimenters, as the weight of the doped and painted fabric alone as now used on American seaplanes is substantially the same as the entire weight of the glider wing structure.

It is, of course, possible that the sport-plane will ultimately reach the stage where it will be produced in quantity entirely of metal. When that time comes, the methods of manufacture will stand as a problem apart from everything else and glider experience will be of little use. The arrival of quantity production is far away, however, and so long as sporting machines continue to be built of wood and fabric their builders will be able to profit by the work of those working with motorless aircraft.

Glider Experiments Fruitful

A study of the results obtained with gliders during the past year appears at first sight to give ground for optimism regarding the possibilities of the low-powered airplane. The most efficient gliders seem to be capable of traveling normally without dependence on rising currents with a rate of fall not in excess of two feet a second.

Since the Hanover machine, proven the most efficient of all, weighs about 400 lb. including the pilot, the power necessary for the maintenance of level flight in still air would be 800 ft. lb. per second, or a little less than one and a half horsepower, delivered at the propeller. Allowing for a propulsive efficiency of seventy per cent the engine would have to develop two horsepower. The installation of an engine, however, even of power so moderate as that, requires strengthening the structure to carry added stresses and also increases the load that is supported by the weight of the power plant itself.

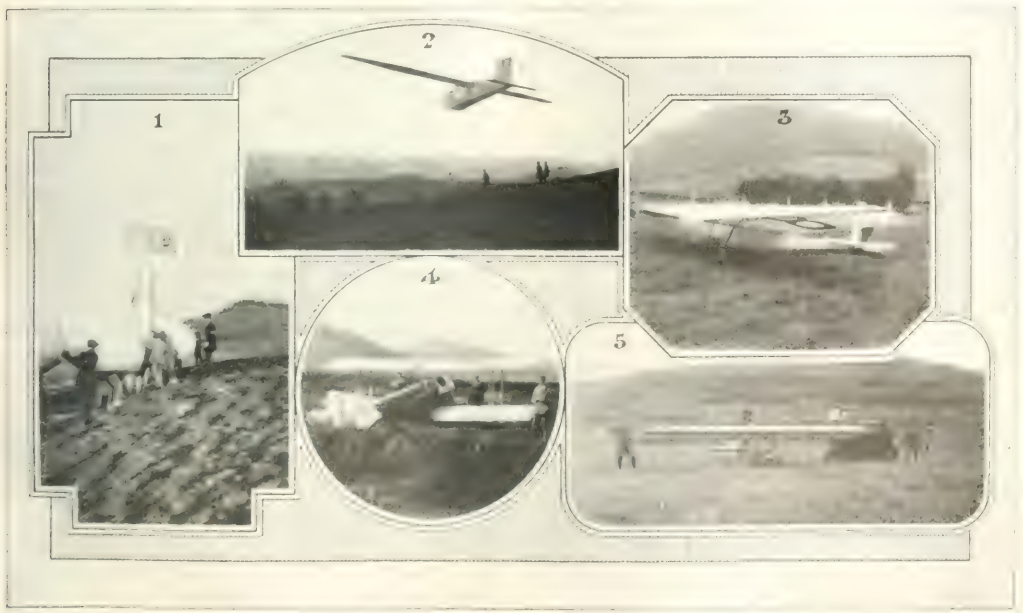
The power just calculated, too, allows no reserve but requires that the machine always fly just "tangent," barely able to support itself, and this is a condition in which flight can be maintained only by a highly skilled pilot and under favorable conditions. The power must be increased a little for safety and to allow for the increased weight, but it should still be possible to build a single-seater sport-plane on glider lines which will be safe and satisfactory for cross-country flying under reasonably good conditions and which will use much less power than has been supposed necessary up to the present time.

The production of such a machine based on glider practice has been under discussion in Germany for two years now, and Klemperer, holder of the glider duration record in 1920 and the first part of 1921, is planning to build and put on the market sport-planes with engines of only ten horsepower.

Low-Powered Planes Coming

The attempt to use the work done with gliders as the basis of the sport-plane of low power is likely to prove far more fruitful than effort directed toward the development of the aviette, or man-powered airplane. Even if it were possible to make real flights with the amount of power which an exceptionally athletic individual can furnish—and in the present state of the art of airplane design it is not—the building of an aviette would be little more than a futile stunt. Cross-country travel by bicycle long ago fell into disuse because it was so much easier to let an engine do the work than to do it for one's self, and the operation of an aviette would be a far more exhausting task than pedalling a bicycle along a road.

The aim should be not to eliminate the engine but to decrease its size and running costs. The glider helps to point the way.



1—Righting the Dewortine glider after a minor mishap. This machine, characterized by very light wings, now holds the French record with 21 minutes. 2—Darmstadt glider in flight. This machine made a record of 1 hr. 46 min. 3—Coupet's monoplane, a fine example of light construction. 4—Potez sport-plane reconstructed as a glider. 5—The American glider just before a flight

Electric Railways Begin to Favor Bus Transportation

Change of attitude toward motor bus feature of American Electric Railway Association Convention. Special committee drafting "Uniform Motor Vehicle Law" suggests heavy taxation and State control of public utility motor vehicles. Bus exhibits prove popular.

By Clyde Jennings
Managing Editor, Motor Age

CHICAGO, Oct. 5.

AN almost complete reversal of sentiment toward the motor bus marked the discussion on the report of the committee on Trackless Transportation of the American Electric Railway Association at its fourth annual convention at the Municipal Pier here to-day.

While the report of the Committee on Trackless Transportation is deemed a great advantage over any previous report on trackless transportation offered by this association, and was very satisfactory to the representatives of the automotive industry present, the next order on the program, a report of the Committee on Uniform Motor Vehicle Law, brought out a different viewpoint. While one committee of the association was welcoming the motor buses as allies in municipal transportation, another committee was preparing a report that would tax public utility motor vehicles off the road and force them to build highways of their own.

The report of the Committee on Trackless Transportation is quite friendly, as may be noted by the following conclusions:

1. The electric car on rails is, with minor exceptions, the most reliable and economical method now known for handling local passenger travel, especially mass transportation.

2. The automotive industry has developed a vehicle suitable for passenger transportation.

> **"IT is the duty of the electric railway companies, as public servants charged with the responsibility for conducting the highway transportation in our respective communities, to study and consider the availability of every feasible unit or method for furnishing this service."**

3. The operating cost per passenger is higher with buses than with electric cars, but in spite of this handicap the bus is, in some cases, more economical for handling light traffic.

4. The public interest requires that the electric railways should be the sole passenger transportation agency in their respective communities; this makes for the cheapest transportation for the public; it also involves the duty of studying all available transportation methods.

5. Development of railless transportation by electric railways, if intelligently carried out, should not adversely affect the railways financially.

6. While a demand for a more expensive service for certain parts of the larger cities may be filled by the use of buses, their principal function is, and will be, as adjuncts to electric railway service.

7. Believing that railless transportation contains interesting possibilities for the electric railway industry, the further study of the subject by a committee of your association is recommended.

The discussion of this report was not very general. Zenas W. Carter of the White Company spoke at considerable length and was listened to very attentively by a large audience. Carter dealt especially on the demand of the public to be able to "ride on rubber." He said that this demand was the outgrowth of the use of the private motor vehicle and that now many persons had been forced to acknowledge that traffic conditions were too intense to permit them to operate their vehicles with the pleasure they would like to have and they still wanted to have the advantage of rubber tires. He said that to meet this demand the Deluxe bus had been built and that the Pennsylvania and Ohio and the Milwaukee Electric Transportation Companies had adopted these buses for traffic in certain districts. He said than on Sept. 30 six of these buses had operated at 100 per cent load factor between Youngstown and Warren, Ohio.

In his reference to different classes of buses Carter said: "I want you to visualize a new passenger traffic opportunity to the public, which offers a suitable service to the motor car owner who does not want to take his car down town, or to the wife of a motor car owner who does not care to drive a car in the dense traffic and who still wants comfort in her travels about the city. I want to predict here that within a year there will be 1000 of this type bus in use."

Carter spoke at length on the increase in traffic that had resulted from the use of motor buses as feeders for electric lines. He said that in many cases, especially on interurban lines, there had been as much as 40 per cent increase, especially was this notable in the holiday traffic. He, also, told the members of the association that within the last few days the U. S. Bus Transport Company had been incorporated in New York State and that behind this company was untold wealth of the steam traffic and amusement people. He said that one reason for the organizing

of this company was that the present public utility companies had not devised a means of bringing people to places of amusement under suitable conditions and that these men believe that the bus service would bring a much larger patronage to the down town stations and show houses in comfort and thus promote travel and at the same time make a profit.

The further discussions of this subject were chiefly in the form of questions directed to Carter and brief statements from some of the companies that operated buses.

The report of the special committee for drafting a "Uniform Motor Vehicle Law" was offered by C. D. Cass of Waterloo, Iowa. This report came in the form of a bill that was suggested to be offered to the various legislatures. Most of the bill is harmless enough and the real objection will come in the suggestion of taxes to be charged against motor vehicles operating as passenger and freight carriers. The plan is to place all public utility motor vehicles under the control of the State Railroad Commission or similar authority.

Cass spoke of these lines as "subsidized" in that they did not pay a sufficient tax to repair the destruction of the highways. He said that the committee had employed an engineer who had taken up the question of fees to be charged with a number of highway superintendents and that as a result they recommended the following:

Motor vehicles having pneumatic tires—one cent per ton mile of travel over and along the public highways.

Motor vehicles having hard rubber or solid tires—one and one-half cent per ton mile of travel over and along the public highways.

In figuring the ton miles of passenger travel, the maximum seating capacity of each passenger carrying motor vehicle unit (trailers to be included) at 150 pounds per passenger seat, plus the weight of the vehicle, multiplied by the number of miles operated (all divided by 2000), shall determine the ton miles of passenger travel per month.

In figuring the ton miles of freight travel, the maximum freight carrying capacity of each freight carrying truck or vehicle unit (trailers to be included), plus the weight of the vehicle, multiplied by the number of miles operated (all divided by 2000), shall determine the ton miles of freight travel per month.

He said that these figures were partially supported by recent investigations reported in the June issue of the Western Highway Building.

Bill Not Wholly Satisfactory

Some of the further conditions of the bill will be more or less unsatisfactory to promoters of motor vehicle transportation and the fact that the electric lines are inclined to write the detailed requirements for these operations will not find a very hardy support. Some of the things included in this bill, it would seem, might be left to persons more familiar with motor vehicle operations.

This report brought a very sharp though short discussion. One of the electric line men who operates six buses on a 15-mile road on a one-half hour schedule, said that the tax required in his business would be in excess of $25,000 a year and this alone would more than pay the entire maintenance charge on this highway.

Another electrical man in speaking against the amount of the proposed tax said that the electric railway men should not lose their heads in the "fear, surprise, or wonder" at what these new vehicles were doing.

The more radical speaker advocated that there should be an addition to this road deterioration tax and there should be a tax on gross receipts to pay for the monopoly enjoyed by the company. The severity of these suggestions did not seem to be popular with the larger part of the audience and it was not until one member moved that the report of this committee be adopted as an expression of the trend of the opinion of the association, that the discussion seemed near an end. This speaker said that to his mind he believed the figures suggested as a tax were not important. That the important part of the report was the basis on which a tax was to be levied and the precautions taken to make the cost of such transportation fair to the tax paying public as well as to the passengers and the owners of the line. It was after this sort of an explanation that the report was adopted as read.

THE special committee of the Association based its taxation proposal on the following:

"Inadequate taxation for the use of public highways by motor vehicle common carriers results in a public subsidy for such carriers. The problem of taxation represents the assessing of common carriers with such special tax as will compensate the public for the additional burden."

In commenting on this report after the adjournment of the session the automotive men and those electric railway men who are experienced in motor bus operation, said that at this rate of taxation the automotive transportation lines in many sections of the country could well afford to build their own highways. They, also, commented on the fact that this tax was computed on the full capacity of the vehicle on every trip.

Another interesting discussion of the motor vehicle as a competitor or an ally of the electric railway was in the paper read by Carl D. Jackson, of the Wisconsin Railway Commission, Madison, Wis., who was introduced as the leading economist on the electric railway situation. Jackson's subject was "The Real Interest of the Car Rider."

After a considerable discussion of unfair taxation on electric street railways, Jackson took up the matter of competition by motor vehicles. He said that the public had welcomed the "Jitney" and would-be bus, but had later learned that this competition had merely added to their own burden and he believes now the public sentiment had turned against competitive service. He saw, however, a very great future for the motor bus as an ally to the established public service transportation line and he thought that in most cases this automotive transportation should be under control of the electric lines, so that they might serve as a feeder in districts where transportation was poor, or that it might be placed at points where de luxe service was really required.

The men in charge of the automotive exhibits expressed considerable surprise at the interest shown in their transportation vehicles. It was notable that all of the buses on exhibition were of the single deck, one man operated, type. The exhibitors said that there was little inquiry concerning the double deck bus, or the bus that was necessary to have two men run it. The buses shown by the North Shore & Milwaukee line, which are used to maintain traffic to the main line from outlying points, and those built by the Chicago Elevated lines as feeders in certain parts of the city, attracted much attention and were examples of the progress being made by the motor bus in this particular direction.

In addition to the buses exhibited by Republic, Selden, Fageol, Ace, White and Garford, there was on exhibition a Mack gasoline track car. All of these attracted much attention and were among the busiest exhibition booths.

Heat Treating in Automotive Production

Convention of American Society for Steel Treating and American Drop Forge Institute discusses failure of airplane parts, heat treating in lead and other timely topics of automotive interest.

REASONS for the failure of airplane and engine parts, heat treating in lead, and the tendency to use the hardness test to indicate physical qualities of metals, were the chief topics of automotive interest discussed at the combined convention of the American Society for Steel Treating and the American Drop Forge Institute, held in Detroit, Oct. 2-7. The increased use of forgings and alloy steel by the automotive industry was reflected by the large number of automotive manufacturing men who attended these sessions.

The discussion of failures of airplane and engine parts brought out the fact that the greatest number of failures are probably due to improper heat treatment. J. B. Johnson and Samuel Daniels of the Material Section, Engineering Division, Air Service, pointed out in their paper on this subject that failures due to improper heat treatment "are caused by disregard for the laws commonly adhered to in scientific metallurgical control and neglect to accurately follow the specifications given." They pointed out, for example, that microscopic examination of a train of gears, which failed before the completion of the 50-hr. dynamometer run, disclosed a banded structure. This banded structure has been frequently observed in failed gears of this analysis (carbon 0.35, manganese 0.58, silicon 0.042, phosphorus 0.006). A micro-section taken of a broken propeller hub cap showed a coarse grained structure which was a very ready indication of improper heat treatment.

Causes of Failure

An important conclusion drawn from this discussion was the necessity for ample fillets in parts to lessen the danger of hardening cracks and the localization of the fatigue stresses.

Failures other than those due to heat treatment were discussed under two heads:

1. Failures traceable to raw material.
2. Failures traceable to poor machining or design.

Failures due to raw material are attributed to improper selection of material or to defective steel which generally results from improper procedure in melting, casting, cropping, chipping or other mill operations. Poor manufacturing practice leaves its trace commonly in the form of segregations, pipes, and seams which are transmitted from the ingot or billet to the fabricated sheet, bar or wire. Such defects decrease the available area of the stressed parts and act as starting points for cracks in quenching, or determine at least in part the direction of the path of cracks, especially in the part subjected to vibration.

A good example of the weakening influence of heavily segregated manganese sulphide is shown in a tachometer drive connection whose screw driver end was broken off in service. The steel contained 0.15 per cent carbon and 0.114 per cent of sulphur, corresponding in composition to the S.A.E. screw stock specification No. 1114. Examination of the sample indicated that the cracks followed the boundaries of manganese sulphide inclusions, and that when these particles were in the path of the progressing crack, they became more or less completely dislodged, with resultant widening of the breach. The stress which caused the failure was mainly torsional.

Experimental Results

Another interesting failure described was that of a drop forged propeller blade. This showed the dangerous condition which results from the presence of a pipe in a forging billet. The propeller broke in a whirling test, although the stresses were not excessive. Another very interesting failure described is that of a valve which has been hand forged from S.A.E. W-60a (high tungsten) steel. The stem of this valve was snapped off in service at the neck of the tulip, revealing a very spongy core somewhat off-center. Two longitudinal sections were prepared so that the one included most of the spongy area and the other the sound portion. Upon microscopic investigation inclusions of undissolved carbides were located which furnished a clue to the cause of this fracture. The pipes practically closed up by the forging operation were also found in a stainless (S.A.E. 51230) high chrome steel valve. This valve was very unsound and snapped off abruptly at the neck while in service. The Air Service has also had considerable trouble with seams in chrome-vanadium steel wire used for valve springs. A transverse section of one of these wires revealed a seam whose width was one-third the diameter of the wire. A partial analysis of this material showed a carbon content of 0.48 per cent, chromium 1.02 per cent, vanadium 0.15 per cent.

Mechanical imperfections in the finished part such as tool marks, nicks and sharp corners, may also be the starting points of hardening cracks or fatigue failures. The finest grade of crucible steel may reach the scrap pile by way of poor methods of machining.

The discussion of heat treating in lead centered about the paper read by R. B. Schenck, metallurgical engineer of the Buick Motor Car Co. Basing his comments on specific automotive experience, Schenck made the point that lower costs result from the use of the lead pot in tempering work, but that for hardening work, the oven furnace is the cheaper. The greatest reason for using the lead pot, however, is the high quality of treated product resulting from uniform and accurate temperatures.

Schenck said in part:

"The lead pot furnace has, in recent years, been applied to volume production in steel treating with considerable success. While molten lead is far from being an ideal heating medium, it is the only metal which can be successfully employed for this purpose, and in comparison with the salts in commercial use as bath materials, it has the advantage of a much wider range of working temperature and a much higher heat conductivity. These two properties permit the use of lead in units of very large capacity for temperatures of 650 to 1700 deg. Fahr., thus covering

the hardening and tempering ranges of nearly all commercial steels.

"The selection of pot materials, the design of the pots and the brickwork and the method of firing are points of prime importance and must receive considerable attention if efficient operation is to be obtained. The unit should be built for the job it is intended to handle, bearing in mind at the same time the desirability of standardization.

"While some parts cannot be treated efficiently in lead, there are many which can be handled very successfully. Axle shafts, transmission gears and many smaller parts are now being hardened from lead pots, and a greater number are being tempered in lead. The lead furnace has its greatest range of usefulness for tempering operations, and many parts can be tempered in lead which cannot be efficiently quenched from this type of furnace.

"Comparing the lead pot with the oven furnace from the standpoint of operation cost, a great deal depends on the nature of the work handled, but in general, it can be stated that for hardening, the oven furnace is the cheapest of the two, and for tempering, the costs are slightly in favor of the lead pot.

"Taking everything into consideration, the greatest argument for the lead pot furnace is the high quality of the treated product resulting from uniform and accurate temperatures. It is very difficult, if not impossible, with an oven furnace to obtain the degree of uniformity which exists throughout a lead pot. Experience covering a period of years has proven, at least to the author's satisfaction, that where conditions permit of its use, the lead pot can produce consistently better work than any other form of heating unit."

A symposium on metallurgical education and hardness testing was held in connection with the convention to promote the possibilities of conference and co-operation between metallurgical engineers and teachers of metallurgy. The discussion brought out the fact that there is need for revision in many of the courses now given if the students individually, and industry as a whole, are to reap the maximum benefit from the training given.

Chevrolet Has Many Body and Chassis Changes

A NEW model Chevrolet Superior made its first appearance on Oct. 8, and at the same time notice was given of the discontinuation of the FB line. While the car in general is much the same as before there are a great many refinements in design of both the body and chassis. Prices remain unchanged.

The most noticeable changes are in the design of the bodies, hood and fenders. The radiator has been made 4⅜ in. higher and 1¾ in. narrower, and its capacity has been increased. The radiator shell has been changed so that the top corners are more square. The hood is higher and the curve has been taken out of the cowl, giving practically a straight line from the radiator to the windshield.

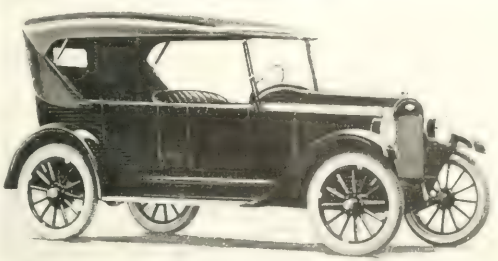
The fenders are of the crowned panel type and the shape has been changed to conform to the new body lines. The metal in both fenders and bodies is being made of heavier gage and the entire redesign has been carried out with the idea of eliminating vibration and rattle that might result from weak parts.

Headlamps are of the drum type and are now fastened directly to the fenders. The windshield has been given a greater angle and the lower glass on the open models pivots at a point more nearly at the center of the glass than in the previous models, which pivoted near the top. Sun visors of black metal are fitted on all closed models.

The instrument board is now finished in enamel instead of the dull finish previously used. The wood backing to the instrument board has been eliminated. Appearance of the car from the rear is considerably altered. The two small oval windows used in the open models have been changed to a single oblong plate glass window. The change from gravity to vacuum fuel feed system has placed the gasoline tank at the rear on all models. Previously only the sedan was so arranged.

The upholstery is now made of Fabrikoid of a finer texture than used before.

A number of important changes have been made throughout the chassis. The frame is made much stronger to prevent weaving. The channels are of heavier section and the cross braces are also heavier. Both front and rear springs have been entirely redesigned, the method of fastening to the chassis being by means of a pocket anchor. The springs are still quarter elliptic but are now single curved downward instead of double curved, necessitating more clearance between body and axle, which has been provided for by raising the rear of the car. This change of curve permits taking road shocks more nearly in the center line of the spring. The number of spring leaves has been increased and the leaves themselves are larger.



New Chevrolet Superior touring car

Wheel hubs have been increased slightly in size for greater strength and better appearance. The steering gear is now of the worm and screw type, instead of the planetary type used on the older models.

The gearset has been changed slightly, especially in the gear shifting mechanism to prevent rattles. The position of the emergency brake lever has been changed from the side to the back of the gearshift lever, the latter having been moved forward 6 in. and bent so that the driver's hand will not touch the dash. The latch on the emergency brake lever is now of the spring and handle type instead of the button type.

A CG vacuum fuel feed is used on all Superior models except the sedan, which retains the Stewart vacuum system. The Holley carburetor will be used on part of the line, Zenith, which was used before, being used on the balance. This is done to provide two sources of supply for increased production. The same practice has been followed with the ignition, which is either Remy or Auto Lite.

The only change that is made in the engine itself is the increase in weight of the flywheel, to make a smoother running engine.

Business Books an Aid to Supervision of Men and Material

Recent publications deal with psychological as well as analytical study of business procedure. Growth in use of charts gives rise to two works on subject. Study of factory stores keeping appears.

MANY interesting books on subjects pertaining to business have appeared recently and cannot fail to give material of value to those who dip into them. It is our intention to tell you where some of this material lies and talk a bit about them.

A few weeks ago we said that we weren't at all sure that "Our Unconscious Mind" had anything in it of value to automobile executives. We have recently reassured ourselves on that point, however, by the simple process of reading the book. It is worth while for anybody who has to live his own life and come into contact with others. So there aren't many excluded. . . . The diagrams of our mental actions and the ominous looking captions attached are not fairly representative of the text matter. . . .

We got so interested one time we turned back to the cover to make sure we weren't reading a Craig Kennedy story. . . . The book covers so wide a range that we can't describe its contents very well in brief. The best thing to do is to read it. . . . The first part of the volume is more interesting and fundamentally more useful than the latter part, although the last chapters deal with the new psychology in advertising and salesmanship and speak directly about automobiles. . . .

This study gives one a somewhat new conception of the reasons for the actions of certain people of business or personal acquaintance; to make one better able to understand those with whom he works; and consequently more capable of handling them effectively and intelligently. . . . The book also tells you how to raise your children. . . .

The chapter on advertising has one specially interesting example taken from the automobile field. . . . "Many a campaign is handicapped at the outset," Pierce says, "by a name which arouses unguessed resistances. I have been able to conduct extensive association experiments along this line, and the results are sufficiently conclusive to indicate that thousands of manufacturers are unwittingly encountering tremendous buying resistance through unfortunate associations with the trade-mark names of their featured products. . . .

"The name of a certain automobile. Among the many associations which came up, three out of eight people thought of a notorious and revolting criminal case. Two others thought at once of a slang word, sounding much like the name of the car, which is a common term of belittlement and contempt. The car, though splendidly made, has never become widely popular." . . . Wonder what the car was? What do you think? . . . Anyhow, as Bill Shakespeare said, "What's in a name?" Quite a bit in some cases, it would seem.

* * *

WE think it's safe to say that if you want to know anything about pneumatic tires you can find it in the very large volume, "Pneumatic Tires," written by Henry C. Pearson, the editor of the *India Rubber World*, and published by the India Rubber Publishing Co., New York. If you don't find all the information you seek you will at least find a reference which will probably suffice.

The tire business has grown to such enormous size, with its concomitant numberless inventions and processes, that it is a feat to get such a vast amount of information into one volume without obvious cutting and all intensely readable.

Different processes of manufacture, and that means from the mixing of the crude rubber to the finished, wrapped product, are described and illustrated with obvious care.

As a source book; work of general information; as a text book for specific information or reading matter for anyone interested in any phase of the rubber tire industry, this volume is recommended. It's size is forbidding, and, to be honest, we hesitated to pick it up, but we also hesitated to set it down.

* * *

ONE difficulty facing those whose duty it is to supervise the work in the factory and who are responsible for the operations in connection with diversified machinery in departments, is the matter of proper records showing the work done, the time lost, the reasons for the difficulties and the efficiency of the individual operation, as well as the departmental conditions. Many systems of records are used in the endeavor to simplify them and, at the same time, permit the exhibition of the true condition so that it may be seen readily and easily.

"The Gantt Chart," by Wallace Clark, deals with the use of the Gantt Chart for these various purposes; its uses

MANY publications of great value to the automotive executive appear from time to time. As close studies of problems in the sub-divisions of industry they offer material which cannot hope to be thoroughly acquired by an executive in the course of every-day business routine.

It takes valued time to keep in touch with all the new books, hence we aim to lay before you a brief talk on those works which seem to us to be most applicable to the needs of the automotive executive, whatever his particular work may be.

are explained very simply—the method of preparation and adoption for different purposes are stated very clearly and concisely, so that no great amount of technical knowledge is necessary to an understanding of their value and applicability. The charts themselves are capable of expressing a great many factors very clearly and very simply, so that they may be read without difficulty.

Those benefits numbering from 7 to 13 which are claimed for these charts can be qualified by the statement that the benefits arising out of intelligent, fair and just management can be amplified and made more easily visible by the use of simple systems of charts which are easily understood, as the Gantt Charts are.

The book should be of great value to those who are engaged in handling operations and in supervising the work of a number of individuals, whether this work is in the shop or the office. Its publisher is the Ronald Press Co., New York.

The clarity of the writing and the diversity of the applications used as illustrations in the book make the work of much wider value than the usual discussion on engineering analysis, and suggest the possibilities of the application of the method to any of the activities of business supervision.

* * *

ALMOST every concern of any size uses graphic charts to a greater or less degree, and if the charts have been drawn with forethought they have probably proved very valuable. Once charts have shown their value the use of them grows and the ability to get the best out of them grows alike.

Sales executives are prone to use charts to show volume of sales, and all business executives can find them of great assistance in telling them what they want to know with the least possible expenditure of time and with the least mental effort. Not only do graphic charts convey facts with rapidity, but they have the power of conveying these facts so that they stick.

"Graphic Charts in Business," by Allan C. Haskell, shows how to make and use them. As there are several kinds of charts that may be used, each being particularly well suited for a specific purpose, much valuable information can be obtained from this work, which ably explains the "Hows" and the "Whys," which arise in everyday business procedure.

Mathematics has been avoided and explanations are clarified by actual illustrations, so that it is easy to obtain necessary information without "wading." This immediately puts it in the readable class of books.

While there are no hard and fast rules about the making of graphic charts, there are certain things of prime importance that must be followed if the chart is to portray correctly the facts that it is supposed to show, and these instructions and cautions against pitfalls are concisely given.

The busy executive who wishes to have the progress of his organization at all times at his finger tips will probably use charts and thereby prolong the span of his life. We think that it will add a few more years if he knows that those same charts are accurate and knows how to interpret them. We believe that this little volume will greatly aid in its achievement. The Codex Book Co., New York, is the publisher.

* * *

"FACTORY STORESKEEPING" would appear from the title to be a work that would appeal to the factory executive and it will, we think, prove so. Mr. Farquhar bases his book on the idea that one of the most important factors in manufacturing is that of handling material and he goes into the question thoroughly, giving a very complete analysis of the entire field. McGraw-Hill Book Co., New York, is the publisher.

"The tendency in the best plans to-day is to look upon the control of material as a production function and to govern the replenishment of materials in accordance with the requirements of production during a reasonable future period." Farquhar shows how this should be done and illustrates the system to be employed.

Emphasis is laid on two topics which the author believes do not receive merely the attention which is due them, but which are none the less of vital importance. These two topics are: Determination of Quantity, or the question of ascertaining and regulating how much and when to buy various materials under different conditions, and Methods of Administrative Control, or the measures by which the whole material cycle is brought under systematic operation.

Incidentally we think the above paragraph shows in a measure the scope of the work and the worth-while nature of the material to any factory executive.

Foreign Commerce Handbook of Value to Exporters

FOREIGN COMMERCE HANDBOOK is the title of a booklet just published by the foreign trade department of the Chamber of Commerce of the United States, which should serve as a reference of value to the exporters of automotive equipment. It is not a compendium, as so many publications of its kind seek to be, but a reference work telling exporters where they may obtain information on a great variety of subjects pertaining to overseas selling.

A few typical reference headings are Letters of Credit, Documents in Foreign Trade, Legal Assistance, Ocean Shipping, Trade Marks, Harbor Charges, etc. The Chamber of Commerce, through its foreign trade section, is doing much to foster the American effort to develop overseas markets but it is to be regretted that automotive equipment is not considered by the Chamber in a more detailed manner.

Although automobiles and the attendant equipment furnish one of the most important branches of American industry in the great markets of the world, the Chamber has not named on its foreign trade committee even one representative of the industry.

Motorcycle Market Around Vigo, Spain

THERE is a moderately good market for motorcycles in the Vigo district. There are hardly more than 20 machines in the district at the present time, as the market has never been developed. A good market will be found all through Spain and with distributors at Barcelona, Madrid, Seville and Bilbao, a moderate demand would be developed after allowing a year or so for the purpose of introducing individual makes.—(Vice-Consul C. Austin Castle, Vigo, Aug. 7.) Trade letter to Martin C. Van der Wal, New York City.



The FORUM



Effect of Cylinder Pressure on Oil Pumping

Editor, AUTOMOTIVE INDUSTRIES:

A. Ludlow Clayden, in the Forum of AUTOMOTIVE INDUSTRIES, issue of August 17, apparently assumes with Ricardo, that the pressure in the cylinder over a range from a considerable plus to a considerable minus *has* no effect at all on the quantity of oil consumed. Whether or not the depression in the cylinder affects the oil consumption is entirely dependent on the condition of cylinder, piston and rings. Having these elements nicely, and by that I mean accurately, matched, vacuum will have no effect on the quantity of oil consumed. Atmospheric air tends to maintain a uniform pressure in all directions; therefore, if we have a given depression in the cylinder we will have a corresponding pressure at the throttle and at the rings; oil trapped between the cylinder and piston walls will be forced toward the point of depression in proportion to the size of the passage through the rings, the quantity of oil supplied and the degree of cylinder depression. Many an engine when idling will throw out a fog of oil smoke but when pulling hard will not smoke at all, these conditions represent the maximum extremes.

Much ingenuity has been expended in developing rings to overcome this condition. It being recognized that if a ring capable of forming a perfect seal could be devised the problem would be solved. Given a ring that would exert a uniform circumferential pressure, and a constant lateral pressure in the groove, with a joint closed both vertically and horizontally, the difficulty would be solved. Rings, though, are subject to rapid wear which increases with piston speed, so a ring not having a wide range of expansion, would be no better than the conventional type.

I had occasion two years ago to remove the block of a six which had been fitted with rings of two piece construction. Of the eighteen rings installed, I could find enough whole segments to assemble three rings. This, together with other experiences with multiple piece rings, leads me to believe that such rings are too delicate to be used with the usual groove widths.

Mr. Clayden's statement that the oil is mostly burnt up when the engine is pulling hard is questionable, for by that I suppose he means that just as much oil is drawn up into the combustion chamber when pulling as when idling. If it were so, an engine would smoke as much when pulling as when idling, which they do not do. Assuming that he is right, the quantity of oil reaching the firing chamber would increase with the speed of the engine, with the consequent fouling of the plugs at the higher speeds, whereas a characteristic oil pumper is most troublesome at the lower speeds.

Mr. Bull, in his summer meeting paper, mentions an engine remarkable for its economy at low speeds, apparent economy would be the better wording, as oil used was compensated for by dilution, the excessive consumption at high speeds was no doubt due to high crankcase pressure caused by the rapidity of the flow-by and the inability of the breather facilities to care for it. The effect being similar to that caused by depression in an idling engine.

Oil pumping is common with all systems of lubrication, it simply being a case of over-oiling. On fairly level roads or slight grades some engines will give no trouble at all, but, in hilly regions, after descending grades the forward plug will foul and occasionally the second. In these engines no provision has been made to prevent oil surging in the crankcase, resulting in the first cylinder being flooded with oil when descending grades and the rear when ascending. On examining the carbon deposit, that on the rear piston will be different not at all from that on the center ones, while that on the first will be decidedly oily. Therefore, if cylinder depression has no effect on oil consumption how does it happen that the forward cylinder so often pumps oil, and granting that oil reaching the rear cylinder is burnt up, due to the higher heat when pulling, why is it the carbon deposit is no oilier than the center cylinders?

ARTHUR LA FOUNTAIN.

Distributing Cars to Sweden Through Copenhagen

Editor, AUTOMOTIVE INDUSTRIES:

In receipt of your AUTOMOTIVE INDUSTRIES of August 10, and I am very much surprised over Mr. E. C. Petrie's article stating that Copenhagen is supposed to be the distributing center for Sweden for automobiles, as it is perfectly misleading. This is easily shown in your statistical Export of Passenger Cars and Trucks. American export firms never will do any business in Sweden if they are looking upon Copenhagen as the headpoint.

Yours very truly,
SVEN GRUNDIN,
Ex-Automobile Salesman in Sweden.

Editor, AUTOMOTIVE INDUSTRIES:

Replying to Mr. Sven Grundin's criticism of my Denmark article, I regret that he took my statement that Copenhagen was the distribution center for Scandinavian and Baltic countries in an absolute automotive sense. Such was not my intention, and a re-perusal of the paragraph will reveal this. As Mr. Grundin suggests, it is absurd to declare that the whole of the motor vehicles passing into, not only Sweden, but all the other countries enumerated, do so through Copenhagen. The very magnitude of the figures, pursued so far, defeats this contention.

Nevertheless, a large number of American cars did enter Sweden from Denmark in 1921. According to your Statistical Number, 920 passenger cars and 64 trucks entered Sweden last year direct from the United States. According to the Swedish "Kommerciella Meddelanden," 4637 passenger cars and 1109 trucks were imported into that country in 1921. As the great disparity in these figures cannot be accounted for by the imports from other manufacturing countries, whence came they? The answer is to be found in a recent report issued by Mr. H. Kershaw, the British Commercial Secretary at Stockholm, in which he states that large quantities of American cars were re-exported from Denmark in 1921, chiefly to be distributed among the farmers in South Sweden.

I certainly agree with Mr. Grundin that a country absorbing thousands of motor vehicles yearly should have direct representation from American exporters, but I still insist that a central distributing point established for Northern Europe would provide a marketing advantage, whether it be in Christiania, Stockholm, Gothenburg, or Copenhagen. I am supported by no less an authority than Commercial Attache N. L. Anderson when I suggest that the Danish capital, as the principal commercial center of Scandinavian and Baltic countries, is best suited to be the main service station for this area.

E. C. PETRIE.

Methods of Fractional Distillation

Editor, AUTOMOTIVE INDUSTRIES:

It would require too much space to discuss Mr. Tice's interesting article on fractional distillation in detail, but I would like to make the following observations:

Mr. Tice's discussion of the theory of distillation and the mechanism of fractionation is, on the whole, very good, although he does not call attention to the importance of regulating the ratio between the amount of reflux down the tower and the amount of vapor coming up, which is really the most important factor in determining the efficiency of fractionation in a given tower. This can be controlled fairly well by accurate control of still head temperatures, or by several other methods. The greater the ratio returned the closer the fractionation, but the lower the capacity of the tower.

Throughout the article, however, Mr. Tice loses no opportunity to discredit the present standard distillation test and to recommend the adoption, even for routine tests, of a much more complicated method which he has developed. In this recommendation I certainly cannot concur. For certain research purposes it may indeed be desirable to know just exactly what constituents are present in a fuel, but the purpose for which we need the standard routine test is to measure the *effective volatility* of a given fuel, regardless of the precise compounds present—in other words, we need to *integrate*, rather than *differentiate*, the present distillation curve, which gives too many points. In reality only *two* figures are needed—one as a measure of the effective volatility from the standpoint of complete vaporization and distribution in the manifold, and one as a measure of the effective starting volatility. Our laboratory has already shown how to determine the first point'* and has outlined a possible method of determining the second.** Our work has also indicated that both these two figures can be approximated by taking two points from the ordinary Engler distillation curve (85 and 30 per cent points, respectively), but it would be hopeless to get such data from the fractionated runs made by Mr. Tice.

In other words, for routine testing purposes, it is a matter of no concern whether the initial point is within a hundred degrees of the true initial, providing it gives two figures which are proportional to the effective volatility of the fuel from the two above mentioned standpoints. It *is* important, however, that the apparatus be simple and not too expensive, that the manipulation and precautions to be observed be not so complicated but that the average routine laboratory men can get reproducible results. The contrast between the excessive cost and complication of Mr. Tice's apparatus and method of recording data and the simple Engler set-up is too obvious to require comment, to say nothing of the question as to what use can possibly be made of all the detailed data after they have been obtained, except for very special research work.

Mr. Tice's statement that two men using identical apparatus cannot consistently check each other by the present standard distillation test depends, of course, on what is defined as a "check," but it is certainly not true as far as entirely satisfactory agreement between different men or different laboratories is concerned, as evidenced by the results obtained by Committee D-2 of the American Society for Testing Materials and a large number of different oil laboratories. The initial point may not check within several degrees, but the deviation over the important portion of the curve is negligibly small.

Mr. Tice's conclusion that a reasonably exact knowledge of initial points and percentages over below 40 deg. C. is of great importance in comparing gasolines for winter use, is incorrect as shown in the paper previously cited.**

Mr. Tice appears to be seriously concerned because the initial point in the distillation test does not represent the true boiling point of the constituents present, and yet it appears that even in his special apparatus for accurate fractionation, the butane comes over between 10 deg. and 14 deg. C., whereas it actually boils at 1 deg. C. A large correction must be made in any case, in order to calculate the temperatures of partial or complete vaporization when mixed with large volumes of air, so that it matters little what precise temperatures are obtained by a testing method, so long as they are *reproducible*, and *proportional* to the effective volatility of the fuel.

ROBERT E. WILSON, Director,
Research Laboratory of Applied Chemistry, Massachusetts Institute of Technology.

*Robert E. Wilson and Daniel P. Barnard 4th, S. A. E. Journal, November 1921, vol. IX, No. 5, p. 313.
**Robert E. Wilson, S. A. E. Journal, January 1922, vol. X, No. 1, p. 6.

All-Purpose Farm Body Popular with Farmers

THIRTY-three per cent of the farmers interviewed in a recent questionnaire sent out by the Republic Truck Co. expressed their preference for the all-purpose farm body type of truck, as the one best suited for their general needs on the farm.

Twenty-five per cent expressed a preference for the box type of body, 22 per cent for the express type and 20 per cent for the rack type of body.

Use of Statistics Entails Knowledge of Their Source

Widespread use of motor vehicle registration figures requires that manufacturers guard against inaccuracies. Divergence of licensing methods permits fatal errors when dealing with small number of units. Subdivided figures from totals often misinform.

By Harry Tipper

THE use of statistics in the laying out of market plans has become general and this method represents a considerable advance over the guess method previously employed. The widespread use of the general statistics brings up the question of how these can be used without misleading the individual manufacturer in his calculations, because of the differences in their methods of collection and their compilation.

The larger mass of individual units contained in general tabulations, provides a curve or chart in which the probable error becomes smaller and of less consequence. Subdivisions from this general calculation present possibilities of error much larger than the original tabulation itself. Where the method of arriving at the subdivisions must be by subtraction or sampling and estimate arranged in percentage of the totals, the error is likely to be larger and of more consequence.

This can be applied to the automotive field in connection with the use of the general and State registration figures as the basis for other calculations. These registration statistics are not entirely accurate in themselves. The methods of registration employed by the different States do not agree in all particulars. They agree in many more particulars than they did in past years. Each year has seen the development of a greater degree of similarity in the methods used in the different areas. Even to-day, however, the differences are not completely wiped out and they have their effect on the accuracy with which the tabulations can be effectively analyzed.

Some years ago a number of the States had no regular method of State license, registration was by county and there was no regular method of registration in many of these counties. When the more important States began to separate commercial vehicles from passenger car registrations the methods of determining a commercial vehicle varied very greatly. Only gradually did the States accumulate statistics separating these two. A number of them still present statistics in which there is no differentiation between the one and the other type of vehicle.

The methods of determining to which class a vehicle belongs, still vary sufficiently to have some effect on the totals secured. It is not possible to get figures from State registration which can be regarded as thoroughly accurate in the subdivision of commercial and passenger vehicles. When an attempt is made to again subdivide the commercial vehicles so as to secure some idea of the number of light delivery trucks and trucks of larger sizes, the difficulty of securing accurate facts becomes greater.

In view of the arrangements by which the registrations are tabulated in the various State offices, statistics have been secured by the examination and tabulation of the individual particulars of each registration. Again, however, the methods of securing information, which will permit the issue of a license, vary in the different parts of the country, so that the information secured is not the same and cannot be tabulated with any ease or without a probable error.

These probable errors are of no great importance so long as the statistics are concerned only with the general totals for the country or the general groupings for the country. A probable error of five hundred thousand vehicles registered in 1921 would mean only an error of 5 per cent—which is not important in considering either tendencies or immediate futures in total volume.

This total error has been decreasing each year, as the methods of registration became more uniform. If anything, this error would tend to show the curve of registration as rising a little more rapidly than the actual condition of use, because the totals from the registration figures will more nearly represent the total ownership of vehicles as the methods become standardized and the enforcement more regular. Any such error, however, is negligible in the general calculations, because the large number of units dealt with tends to reduce the difference so that it has no effect upon the curve.

It is possible to project these calculations into the future for some years using the predicted volumes, without any great speculation. A slight percentage of decreasing error will not affect the results sufficiently to put the predictions in the category of speculation.

The curve of registration growth used in the Nov. 17 issue of Automotive Industries, 1921, can be used by any manufacturer for his general basis, because of this condition. It is not safe to assume, however, that because these general figures can be safely used, the subdivided figures can be used without further critical analysis and a much more limited prediction as to the future.

Readers of AUTOMOTIVE INDUSTRIES will have noticed that the articles dealing with the price groups and their

past development were limited to the immediate future and were not developed to the extent undertaken in the consideration of the general registration. The only way in which the price groupings can be successfully determined is through the statistics of production. The probable error in the production curve is less than the probable error in the registration curve and as a consequence it has been possible to arrange the growth of various price groups with considerable accuracy.

Changes can occur in prices, which would affect these groupings so that a curve projected beyond a limited future would be misleading, particularly in a period of more or less rapid fundamental price alterations. For the limited period of one to three years these calculations are sufficiently accurate to enable the manufacturer to proceed on the basis of the figures, assuming that he possess sufficient experience to determine his own relative position with other units in his price market.

The greatest difficulty in working from the general statistics is shown in the attempt to coordinate the commercial vehicle registration, the production figures on trucks and the production figures on passenger cars.

It is obvious that an error in registration figures of five per cent, or approximately five hundred thousand vehicles, while it would be of little bearing on a total of ten million or more, would be of very considerable importance in the estimated registration of one million, two hundred thousand trucks; if the error was found to be more or less directly affected by the difference in the commercial vehicle registration methods. In that case the truck figures would be altered by the total of almost fifty per cent and any calculations based upon the accepted figures from registrations would be entirely misleading.

That there is a considerable error in the commercial vehicle figures is evidenced by differences established in some years by using two methods of arriving at them. For instance, in several years the passenger car registration figures, the commercial vehicle registration for that year, and the total statistics for the year, do not agree. The accumulated production figures do not agree with the totals of use, even with every allowance for the junk pile. These differences are small and unimportant in respect of the total registrations or passenger car registrations, but they are too big to be omitted from any analysis of the commercial vehicle situation and must affect any calculations which are to be used as bases for marketing plans by the manufacturer of commercial vehicles.

It is obvious that the commercial figures for many of the States a few years ago were too low and the passenger car figures too high, because these States did not make any thorough differentiation between the two. It is obvious that figures to be obtained to-day are indicative rather than accurate, as there are still a number of States that do not make any difference in registration and some of the others do so on a solid and pneumatic tire basis and not on the actual use.

In an attempt to analyze the commercial vehicle situation through the available statistics, use was made of various sources, to deal with the number of sizes and types of such vehicles in use, in various States and industries. Here again the discrepancies between the subdivided figures and the totals present grave difficulties and make it impossible to suggest the use of any of these subdivided statistics in any way other than as a probable indication of the relative position of the market and not as an accurate conception of the size of the market.

For the passenger car manufacturer statistics of a reliable kind, showing the growth of use in the various states, the growth and position in the price classes and careful analysis of present and immediate future conditions in the various territories, comprise a basis for marketing plans almost without any further detail; except those pertaining to his own business and his own experience. In the commercial vehicle business, however, the requirements are more severe.

To secure a proper basis for future policy in this field the manufacturer should know the growth in the use of commercial vehicles. The relative growth of vehicles on passenger chassis and those designed especially for freight purposes, the relative use in various sizes and in various industries, or distinct portions of the market.

All these matters represent at present slim possibilities of analysis in view of the error in the total statistics, the discrepancies in the subdivisions and the impossibility of harmonizing the differences.

Most statistics are presented without a sufficient explanation of the sources or the methods of compilation. This makes it difficult for the manufacturer to determine the value of the figures presented or to check them from his own experience.

The use of statistics and statistical analysis as a basis for marketing and production plans is a very great advance. The most important step is in the analysis of the statistics secured; so that their accuracy, value and applicability are understood.

It is unwise for the manufacturer to accept statistics without question, unless the sources are thoroughly known and the methods of determination are explained. Particularly is this the case with the subdivided figures relating to the various small groupings within the field; in which the probable error may be of great consequence.

New Rustproofing Process

CADMIUM salts are being employed in a new rustproofing process which is being recommended particularly for automotive parts. It is claimed that with this process, which consists of electro-plating iron or steel articles with a thin coating of cadmium, the rustproofing coat will vary from .0001 in. to .001 in. in thickness. It is also claimed that with this process articles such as precision screws can be processed without destroying the accuracy of their fit when the tolerance is over .0002 in. The process is that of electroplating and requires from 1 to 10 min. for the operation, according to the Udylite Process Co. of Kokomo, Ind.

The article is then baked from 2 to 3 hr. in a temperature of 300 to 400 deg. Fahr., which is said to cause the cadmium to penetrate the iron and form an alloy to be unusually resistant to atmospheric corrosion. Samples have been tested by the Bureau of Standards, according to the owners of the process, and it is claimed that results superior to the hot or cold galvanizing methods are secured. In appearance, the deposit is a flat white, although, if desired, a bright deposit may be secured. The color is very nearly that of silver and is said to be readily brought out. Articles which have been Udylited may be refinished by depositing copper, nickel, silver, gold, etc., over the coating. An estimate of the cost of the process made by the Udylite Co. indicates that the figure should not be in excess of 2½ cents per lb. It is claimed that 1 lb. of cadmium salts will cover 134 sq. ft. of surface to a thickness of .0002 in. The cost of the 200 gal. solution is about $250.

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Make It Plain

MISUNDERSTANDING is often generated in business relationships simply through inaccuracy of statement.

Nearly every day some cases arise in one phase or another of the automotive industry, where a hasty, inaccurate statement results in the giving of a wrong impression, a consequent growth of misunderstanding and lowering of business efficiency. We got a letter the other day, for example, the first sentence of which read something like this:

"We are entirely out of sympathy with an article which recently appeared in your magazine."

The following sentence then stated that the article had some very good statements concerning certain features of the subject involved. A close analysis of the letter indicated that the writer of the letter was about 40 per cent in sympathy with the writer of the article and about 60 per cent out of sympathy with him. The letter writer in his first sentence had made a misstatement of his own opinion.

Accuracy of expression in business writing and talking is essential to efficient operation. The employer communicating with his employees, the seller communicating with his prospective buyers, the manufacturer communicating with his dealers and distributors all run the risk of giving the other fellow an inaccurate impression of what is really in the writer's mind. Giving such wrong impressions is the cause of more business difficulties and friction than is commonly realized. Writing is more subject to such misinterpretations than talking because of the comparative lack of personality in the former. In both forms of business communication a definite effort to "say what you mean" is well worth while.

Conditions Which Cause Wheel Wobble

THE question raised in our recent editorial "What Makes 'Em Shimmy?" appears to have found a satisfactory answer in the instructive article on "Wheel Wobble and Other Steering System Faults," which appeared in AUTOMOTIVE INDUSTRIES of Oct. 5. The answer can be briefly summarized as follows:

When steering knuckle pivots are inclined either in a fore and aft or in a transverse, vertical plane motion of the wheels out of the straight ahead position tends to raise one side and lower the other side of the chassis and thus deflect the front springs. Conversely, deflecting the front springs of the same car in a similar manner tends to move the wheel spindles and thus move the wheels.

If, then, the car passes over a wavy road surface which alternately deflects the two front springs the wheels are deflected with alternate right and left impulses which causes them to wobble and the car to "shimmy." The action is cumulative and becomes violent at a certain frequency of impulse corresponding to the natural period of the springs and the parts connected to them.

That this conclusion is correct or at least exceedingly plausible is indicated by the fact that wobble has, in every case brought to our notice, been stopped either by changing the inclination of the knuckle pivots or by increasing in some way the friction at steering system joints. In the latter case the friction tends to damp out the oscillation, while in the former the wheel spindle motion due to the kind of spring action which produces wobble is reduced until it becomes zero, when the axis of the steering knuckle becomes truly vertical.

The other points raised and the fallacies referred to in the article in question should serve to point the way in overcoming certain faults which are all too prevalent in the steering systems of the average car and truck of to-day.

International Automotive Conferences

WE have received from our British correspondent the following suggestion which, we believe, merits the careful consideration of the entire automotive industry. International conferences, even in the automotive field, are not a new thing. Engineers on both sides of the Atlantic recall with great satisfaction their highly profitable visits across the pond before the war. There appears to be no reason to question the value which would accrue from similar conferences of executives as well. Annual conferences of the kind proposed may not be feasible at present, but the idea is sound and worth thinking about.

IT is probably safe to assert that every year there is a greater passing to and fro across the Atlantic of representatives from both the engineering and merchandising sides of European and American automotive plants. The object of these trips in most cases is to study the current conditions on the other continent; to visit plants and observe directly and personally the trend of development and tendencies in design, manufacturing methods and sales prospects. At the show period each year in London we cannot fail to note large numbers of visitors from the States, and we know that many members of the British industry arrange for representatives to visit the New York show or else send them or go themselves on tours of inspection in the United States at other times of the year.

But all these international visits are private and unofficial in character; there is nothing in the way of conferences between representative bodies of the two continents. As a result there must be waste of energy and a lack of mutual advantage which might follow were the conditions otherwise. It has therefore been suggested privately in England that the Society of Automotive Engineers and the British Institution of Automobile Engineers should be brought together or come together and organize, say, annual conferences, alternately in America and in England. Possibly French, Italian and German representatives might be brought in. Although the language question would cause difficulties and complications they would not be insuperable. The S. A. E. and the I. A. E. might work in conjunction with the National Automobile Chamber of Commerce on the one side and the Society of Motor Manufacturers and Traders on the other side.

The principal items of the program of such organized visits would be (1) the reading of papers, with discussions, covering both technical and merchandising matters and dealing sectionally with specialized subjects pertaining to passenger cars, trucks, motor cycles, tractors, aircraft, fuel, legislation, etc., (2) collective and individual visits to automotive and accessory plants and (3) visits to the national shows.

THE interchange of views and experiences thus rendered possible in organized form would surely be of benefit to the industries on both sides of the Atlantic. Surely neither the Americans nor the British concerned will claim the sole prerogative of brains and ideas; each side must have something to learn from the other in different spheres perhaps. Co-operation in an endeavor to further the interests of the automotive movement in general would certainly do no harm; even if it were carried no further than discussions on the all-important question of suitable fuels and the best way of utilizing them, it would be of great advantage.

There is, of course, a precedent for such collective visits in the one made by some members of the I. A. E. to the States before the war, and in a similar visit of members of the S. A. E. to England and the continent. These were isolated efforts, whereas the suggestion now is that an elaboration of the idea should be a generally recognized procedure year by year.

September Sets High Mark in Production

Surpassed Same Month of Other Years—Total Output Estimated at 206,000

NEW YORK, Oct. 9—For the fifth consecutive time this year, monthly production records have been broken, September coming through with an estimated output of cars and trucks slightly in excess of 206,000. This sets the month apart as the best September in the production history of the industry, with the previous high mark of 185,000 in 1919 surpassed by a substantial margin. Compared with a year ago, production increased 31 per cent.

The showing is all the more remarkable taken in conjunction with the temporary closing of the Ford plants midway of the month. Ford's final figures are not expected to be more than 90,000, or 35 per cent less than August.

Ford Closing Affected Total

As was expected there was a falling off from the August total, due not so much to a seasonal decline in sales, although that element entered somewhat, as to the halt in Ford production and the fact that September, in addition to being a short month, was marked by a holiday. All of these factors were looked upon to bring the total down from the 272,000 level established in August.

The policy of manufacturers in shifting selling efforts from a section of the country where there appears to be a decline to a center where the demand holds strong is having the effect of keeping up sales in surprising volume. There is no indication now that the larger manufacturers are curtailing their schedules. In some instances they are opening the month on programs exceeding those of September.

Difficulty with Steel

The industry, however, is beginning to feel more acutely the results of the recent rail strike and is experiencing greater difficulty in getting through steel shipments from producing centers. Unless this situation improves materially it will have an adverse effect on automotive production for October and subsequent months of the year. This will prove of far greater detriment to sustained output than would any decline of sales that might come between now and the closing of the year.

Regardless of what may happen in the last quarter, however, 1922 will see a production of more than 2,000,000 cars and trucks. For the first nine months of the year a total of 1,873,000 has been reached.

Truck business continues to show steady improvement, a larger market developing for the heavy duty vehicles.

Parts Business Good

Parts business shows no signs of a let up, car makers continuing to order far ahead. Collections, in keeping with the general good condition in this branch of the industry, remain good.

Business in Brief

NEW YORK, Oct. 11—Trade and industry are feeling the lack of transportation, but despite this conditions are generally favorable. California is complaining of the lack of cars which imperils its grape crop. Lumber shipments west and south are delayed. The movement of coal is hampered. On the whole, however, there are not as many complaints over transportation congestion as might be expected.

Car loadings for the week were the largest reported in any week since Oct. 29, 1920. Soft coal production is estimated at 9,927,000 tons as against 9,702,000 the preceding week; anthracite is placed at 1,786,000 tons as against 1,856,000 the week before.

In textiles upward price tendencies and a steadily increasing volume of new business have been encouraging news. Raw wool seems to be improving in demand and the decline predicted following the passage of the tariff bill has not materialized.

Estimates on the corn crop are 2,769,000 to 2,805,000 bu.; spring wheat, 277,000,000 to 288,000,000; and oats, 1,255,000,000 to 1,265,000,000. Movement of grains is restricted by car shortages.

Prices have recovered in stocks and the volume of trading has increased. Trading in oil stocks has been unusually heavy. Money has been steady and bonds firmer.

Bank clearings aggregated $7,781,864,000, a gain of 19.8 per cent over last week and of 15.2 per cent over this week last year.

August's preliminary report of revenues and expenses of 139 Class 1 railroads representing a total mileage of 176,953, shows gross operating revenues of $382,711,637 against $408,186,665 in the same month last year. Total operating expenses were $316,356,411 against $309,614,824. Net operating income totaled $39,104,119 against $70,027,867.

May Employ Trucks for Steel Delivery

Manufacturers Begin to Feel Effects of Diversion of Railroad Facilities

DETROIT, Oct. 9—Under the rush of coal shipping to lake ports before the closing of navigation on the lakes and the diversion of rail equipment to the transportation of farm products from western states, service to automobile manufacturing companies in the Detroit district is approaching a point where it may be necessary to employ motor trucks for hauling material to keep factories operating.

The use of trucks up to this time has been limited to the hauling of material around congested transportation centers to points where it may be loaded for delivery either by rail or boat to Detroit. Steel is being hauled out of Pittsburgh by truck to railroad yards, where freight cars are available to avoid the delays experienced in getting cars in and out of the immediate Pittsburgh districts.

Rail shipments direct from Pittsburgh are requiring 10 days and upwards to make the normal three-day trip to Detroit. Steel at the mills in Pittsburgh is being held for days at a time, awaiting cars for loading. Steel from Ohio districts is being shipped by truck to lake ports for boat transportation to Detroit.

Delays Now Temporary

Embargoes by railroads in the eastern districts and in some sections of the Middle West and South are interfering with both deliveries and shipments to and from automobile factories. For the most part, however, these are intermittent and occasion only temporary delays. It has been necessary at several points to resort to trucks to haul material to points where rail service was still open, but factories are avoiding the additional truck costs by waiting wherever possible.

Production schedules are being interfered with somewhat by difficulty in obtaining material, and departments in some plants have been compelled to close for short periods, owing to holdups. There has been no cessation of operations in any plant, however, due to material shortages, and factories will go to any limits necessary to maintain production at a point required by sales.

Traffic and purchasing departments do not look for any relief from the rail difficulties until the coal requirements of the Northwest and other regions served by lake shipping are met. This is expected to require a month or more.

JORDAN GAIN 100 PER CENT

CLEVELAND, Oct. 9—The Jordan Motor Car Co.'s production figures for the first nine months of 1922 show an increase of considerably more than 100 per cent against the first nine months of 1921.

Willys May Take On Wilson's Old Duties

General Manager of Overland Resigns Though Continuing a Factor in Its Affairs

TOLEDO, Oct. 9—The resignation of Charles B. Wilson as vice-president and general manager of the Willys-Overland Co., presumably to make way for President John N. Willys to take over those duties, has been accepted at a meeting of the board of directors.

While discontinuing his active association with the affairs of the company at a time when plans are being laid for a new fiscal year, Wilson will continue a factor in the Willys-Overland affairs, remaining a director in the Willys-Overland Co., president and director of the Willys-Morrow Co. of Elmira, N. Y., director of Willys-Overland, Inc., and president and director of the Wilson Foundry & Machine Co., Pontiac, Mich. The following statement was obtained from Wilson:—

Wilson's Statement

I had insisted upon the acceptance of my resignation as vice president and general manager of the Willys-Overland Co. for several reasons. In 1920 when I was urged by the management to assume the larger responsibility at Toledo it was with the dominating thought that I would ask to be relieved after the company had been re-established on a sound and satisfactory earning basis. I accepted, feeling that I had a great debt of gratitude to discharge to Mr. Willys personally and that the Wilson foundry had a great obligation on account of its relationship with Overland. Toledo is a fine city with wonderful possibilities but the early return to my home in Pontiac is of extreme importance to me as there are many things there to which my time should be devoted.

Overland has been re-established and has come through a period of gratifying earnings, $4,283,000 net for June, July and August, thanks to a good organization and a product that is eminently satisfactory. My deep interest remains with Willys-Overland. There is no reason why the company should not continue a dominant factor in the automobile industry.

This is not the first time that Wilson has stepped into a breach in order to assist Willys. During the war Wilson left the Wilson Foundry & Machine Co. in order to take over the management of the Curtiss Aeroplane & Motor Corp. of Buffalo, which was one of Willys' properties. He remained there a year.

At the meeting at which the resignation was accepted, H. L. Thompson was elected chairman of the board and chairman of the executive committee.

GARDNER EXPORT AGENTS

ST. LOUIS, Oct. 9—Gardner Motors Co. announces the rounding out of its export organization by the following appointments: Consolidated Motors, Ltd., Winnipeg, Ont.; National Auto Import Co., Mexico City; Robertson & Malcolm, Ltd., London; Sociedad Hispano American Gastonoyge, Madrid; Rudolph Schmidt, Copenhagen; W. H. Carpenter, Sydney, Australia, and John Burns, Ltd., Christ Church, New Zealand.

Improved Truck Business That Will Come in 1923 Will Not Be Over-night Development

By O. D. COPPOCK

Sales Manager, Commerce Motor Truck Co.

Detroit, Oct. 9.

SALES of trucks aside from those in light delivery service and for bus work have been disappointing to those who looked for a late summer and fall boom, and as a result, the best the truck maker can anticipate with any surety is that a revival in general business in the spring will bring about a renewed need for trucks and new demand.

There has been fair business all year throughout the East and in the industrial sections of the Middle West, and this market should continue to absorb a sufficient number of trucks to keep factories operating on a basis that will permit them to break better than even.

Investigations in the farm districts indicate that the farmer will not do much better than clear up his old debts as a result of this year's crop. His buying of trucks will not do much more than absorb the stocks which have been hanging over in dealers' sales rooms and in storage for the past two years. With these cleared out the truck makers should be able to re-enter this market on a sizable scale in 1923.

Truck dealers as a general rule have become quite discouraged in the past two years and for the most part have given over their entire attention to the sale of cars. Until general business has begun to come into the market, dealers will be slow to stock up on trucks. The absence of stocks will present a problem which the factory must anticipate as truck-buyers are insistent upon immediate deliveries.

Dealers in larger cities who are handling trucks exclusively are doing practically all of the business at this time. Dealers handling cars and trucks together, as is the case in most cities of the country, are following the lines of least resistance and giving practically all of their attention to car sales. It is difficult to combat this situation until dealers find themselves warranted in placing men exclusively in truck sales work.

The ideal merchandising plan for the truck maker is to have an exclusive dealer and next to this a dealer who is handling several lines of trucks exclusively. Except in the larger cities, however, the exclusive truck dealer has not been successful and it has been necessary to combine the sale of the commercial vehicle with passenger car trading. Undoubtedly this system of merchandising will continue to be the general one and in normal times should be entirely successful from the factory viewpoint.

There is every reason to look forward to a good truck business in 1923 but it will not be an over-night development, and will only develop as general business throughout the country resumes its normal stride. The truck business has never approximated its possibilities and unlike the passenger car end, its period of greatest growth is still before it.

Ford Now Producing New Four Door Sedan

DETROIT, Oct. 9—The Ford Motor Co. is now in limited production of a four-door sedan which will sell at $725 f.o.b. factory. The model is more commodious than the two-door sedan and is designed to meet a particular demand that Ford dealers have been experiencing. The two-door sedan will be continued as the large production vehicle of this type.

IOWA CONDITIONS BETTER

DES MOINES, IOWA, Oct. 7—Considerable improvement in the sale of motor vehicles and equipment in Iowa, as compared with a year ago, is apparent. The farmers, however, are coming back rather slowly, and livestock is the principal source of surplus money.

Col. Havens Appointed Trustee for Locomobile

BRIDGEPORT, CONN., Oct. 7—Col. Elmer H. Havens of this city, who, with Edmund S. Wolfe, local banker, has been acting as temporary receiver for the Locomobile Co. of America, the appointment being made by Judge Edwin S. Thomas in the United States District Court, was selected as trustee of the corporation, at the first meeting of the creditors here before Referee in Bankruptcy John Keogh. Bonds were fixed at $100,000 and furnished.

Following his election as trustee, Col. Havens filed a petition with the referee for authority to sell the assets of the corporation, at a private sale, to the Durant interests. A hearing on the petition was scheduled for 10 o'clock the morning of the 16th before Referee Keogh. No objection to the petition is expected.

At the hearing Charles S. Canfield, Walter C. North and Gonner K. Birdseye, all of this city, were named as appraisers.

Templar Proceeding Under Receivership

President Bramley Says Appointment Is Constructive Step in Reorganization

CLEVELAND, Oct. 10—The Templar Motor Co. is now being operated under a receiver appointed by Federal Judge D. C. Westenhaver.

T. L. Hausman of this city, formerly an assistant of President M. F. Bramley, is the receiver under a $50,000 bond.

The appointment was made on the application of the United States Axle Co. of Pottstown, Pa., which set forth in its statement that it has a claim of $12,500 which is overdue.

The receiver, after being appointed, filed an application to borrow funds in the sum of $5,000 to meet immediate needs, such as an accrued pay roll, etc. In the same application a request is made for authority to borrow an additional $25,000 to be used as working capital in making up extra parts for dealers and Templar service stations and in finishing automobiles that are in process of manufacture. The receiver also has authority to carry on the Templar business.

Templar Company Agrees

In the suit the petitioner asks that the rights of creditors and the company be ascertained; that the court administer the property in the interest of both; that the receiver be authorized not only to carry on the manufacturing business but that he have the power to demand, sue and collect accounts and be given such other powers as are necessary.

The Templar company joined with the petitioner in the request for the appointment of a receiver. Bramley says that the receivership is a constructive step, which insures the court's protection while plans for the reorganization are being made.

The Standard Parts Co. of this city, which was harassed by the conflicts of opposing forces of stockholders in 1920, sought the appointment of a receiver and since then it has been doing well under the court's protection. That is what the Templar company wanted, judging from allegations in the bill of complaint filed by the axle company and the company's answer.

Assets Double Liabilities

Templar assets are placed at $3,000,000 and the liabilities $1,400,000. There are bills and notes long past due and the corporation has not on hand nor is able to secure sufficient funds at present to meet them, according to the petition.

If the assets of the company are preserved and properly handled, it is said, there will be more than sufficient to pay creditors and something will be realized by stockholders.

The Templar Motor Co. was organized in 1916. It has more than 22,000 stockholders and a plant here which has an annual capacity of more than 5000 cars. A complete line of four cylinder cars is made.

For a long time the officers in charge of the management of the company have been engaged in a controversy with a group of stockholders. Efforts have been made before in the State courts to have a receiver appointed, but without avail.

Some time ago it was announced that $750,000 had been deposited in a local bank to meet claims of creditors.

Barnum Succeeds Smith as President of Mercer

TRENTON, N. J., Oct. 7—A change in the personnel of the Mercer Motors Co. was made at a directors' meeting yesterday, by which R. W. Barnum was elected president, succeeding George P. Smith, who becomes chairman of the board. W. A. Smith, elected acting vice-president at a previous meeting, becomes the permanent vice-president and will continue as general sales manager. D. F. Fogg, formerly assistant secretary, has been elected secretary-treasurer. R. W. Barnum and W. A. Smith also have been elected directors.

Under the new order Barnum will look after production and finance, and W. A. Smith will handle sales. Barnum, for several years, has been at the head of the Mercer's body plant at New Haven, while Smith has been in the Mercer service for the past 12 years.

Interstate Chemical Acquires 5 Companies

NEW YORK, Oct. 11—A merger of chemical concerns has been perfected whereby the Miller Oil Products Corp. of Newark, manufacturer of all kinds of automobile dressing specialties, body dressing and lubricating oil; the Columbus Paint & Varnish Co., Norfolk Chemical Co., Lynn Ink Co., and the Boston Leather Dressing Co., have been taken over by the Interstate Chemical interests and will form the leather dressing division of the corporation. F. Alden Miller, of Miller Oil Products Corp., is general manager of this division.

The merger involved the transfer of stock of the Interstate to the amount of $2,500,000 to the companies, taken over, in exchange for their stock.

Ford Des Moines Plant Opens at Full Capacity

DES MOINES, Oct. 6—The Ford Motor Co. of Des Moines was operating at full capacity yesterday, after approximately three weeks of idleness, forced upon it by orders from the main offices at Detroit.

The normal payroll of the plant is 1360 men, being divided as follows: Enclosed body department 700 men, model "T" department 400, and maintenance of building 260.

The daily output of the closed body department now is 125 sedans and 75 coupes.

Premier to Be Sold As Part of New Plan

Action Will Clear Property Title Preparatory to Reorganization of Company

INDIANAPOLIS, Oct. 7—The assets of the Premier Motor Corp. will be offered at private sale Nov. 14 or at public auction at the courthouse here at any date to be announced thereafter, according to a decree issued here by Judge Linn D. Hay in Superior Court.

As a result of a friendly receivership suit brought in June the Fletcher Savings & Trust Co. was appointed receiver July 1. The suit was brought on behalf of the American Foundry Co. At the time of the suit and the appointment of the receiver there was announced to the creditors a plan for re-organization that has been drawn up by a committee.

It was one purpose of this plan to have the assets of the concern offered at a judicial sale to clear the property title preparatory to re-organization and operation on a new basis.

Judge Hay's order was approved by the attorneys for the company and for the receiver. Bids on the property will be received until 3 o'clock in the afternoon of November 7. In the event of this private sale being unsuccessful the property will be offered later at public auction. Prior to the appointment of a receiver efforts to reorganize the company had been under way for several months.

State Insurance Move Fought by Companies

PHILADELPHIA, Oct. 10—At a meeting of the Underwriters Association of the Middle Department attended by nearly 200 representative insurance men and executives, a movement was launched to combat proposed legislation which would create a compulsory state automobile insurance fund and force all motor vehicle owners to purchase their insurance from the state.

While the movement is as yet local it is thought that it may spread to other states, as made evident by John T. Hutchinson, secretary of the Insurance Federation of America, coming here from Detroit to throw the weight of the national organization against the proposed legislation.

Hutchinson stated that it was a very serious matter for the insurance companies and declared that if this piece of legislation went through it would be the forerunner of others which would be the taking over of lines by the State.

U. P. C. OFFICE CHANGED

NEW YORK, Oct. 10—The Washington, D. C., office of the United Publishers Corp. has been moved to 26 Jackson Place, N. W. The former address was 816 15th Street.

Test Case Planned to Equalize Tariff

N. A. C. C. Will Endeavor to Remove Discrimination, As Provided by New Law

WASHINGTON, Oct. 7—The first step in the elimination of discrimination by foreign countries against the American made automobile and truck was taken to-day when representatives of the industry met in conference with the United States Tariff Commission, placing before that body facts and figures showing what countries are discriminating against the American made passenger car and truck and the extent of this discrimination.

Under the provisions of the new tariff measure, the President, or the Tariff Commission, is given authority to retaliate against any country discriminating against American made products.

Finland at Fault

One of the cases cited before the commission concerns Finland's position. All automobiles imported from the United States are taxed 40 per cent ad valorem by that country, compared to a tax of 10 per cent if imported from France.

In cases of this kind the Tariff Commission is given authority to place a similar discriminatory tax on some commodity that is largely imported into America from that country. In the case of Finland, if the discrimination was not lowered to equal that of the French 10 per cent duty, or either the French raised to equal the 40 per cent duty on American automobiles, the commission would place a tax of 40 per cent on Finland's exports of lumber (this being her largest commodity exported to America).

Case Against Czechoslovakia

The powers of the commission, under the law, might be extended even further, as in the case of Czechoslovakia, which has placed an embargo against American made automobiles, while exempting entrance, without taxation, automobiles imported from Italy. In a case of this kind, the automobile industry will ask the Tariff Commission to place an embargo against some commodity that is exported to the United States from Czechoslovakia, which embargo would remain in effect until the discrimination against American made automobiles is eliminated.

A compilation of the existing tariff regulations shows that at the present time the following countries are discriminating against the American made automobile: France, with a duty of 45 per cent; United Kingdom, (passenger cars) duty of 33 1/3 per cent, trucks free; Italy, passenger cars and trucks, 35 per cent, plus 60 to 120 lires per 100 kilos; Canada, passenger cars and trucks, 35 per cent if from the United States, 30 per cent if from France, Belgium or Holland, and 20 per cent if from Britain; Finland, 40 per cent if from the United States, 10 per cent if from France; Poland, 50 per cent; Esthonia, 20 per cent, Czechoslovakia, complete embargo, Italy free; Germany and Austria, complete embargo from all countries.

As a result of the conference with the tariff commissioners, it was suggested that in order to make a test case officials of the automotive industry file with the commission a concrete case, on which the commission would open up negotiations, through the State Department, with the country involved.

G. F. Bauer, secretary of the Foreign Trade Committee of the National Automobile Chamber of Commerce, who, with J. Walter Drake, chairman, represented the N. A. C. C. at the hearing, said:

Will Be Slow Process

Because of the fact that the whole situation must be worked out by the State Department, through diplomatic channels, we cannot, of course, accomplish results as quickly as we might like. Under the existing law, as embodied in the tariff law, just passed, the automobile industry is given ample protection, in the matter of being discriminated against, and it is the expectation of the Foreign Trade Committee of the chamber to press the matter as much as possible, in order that American automobile manufacturers may have a world-wide open market without discrimination.

All the American automobile manufacturer seeks is a fair field and no favors. He is entitled to receive a fair field, however, and it is the opinion of the majority members of the commission, I feel safe in saying, that discriminatory taxes as levied by some foreign countries are unfair and unjust to the automobile industry.

The Foreign Trade Committee will file its complaint for a test case as soon as it can be worked up, Bauer said, which will be probably within the next two weeks, in order that the machinery of the State Department may be set in motion toward the elimination of the discrimination. In all probability, the concrete case will be that of Czechoslovakia.

It is the plan to follow this case up, as soon as it is decided, with probably complaints against all other countries, filed with the commission at the same time.

Factory Service Heads to Convene in Chicago

NEW YORK, Oct. 10—The N. A. C. C. has practically completed arrangements for the semi-annual convention of factory service managers. Tentative dates of Nov. 24 and 25 have been set, and the place selected is Chicago.

The first day of the convention will be given over to discussions and papers concerning factory service problems. The second day will be devoted entirely to the subject of service associations, a phase of service in which the Chamber has taken much interest. An invitation has been extended to all service and trade associations to send delegates. The detailed program will be completed in a week or two.

Process Gear Plant May Get Higher Bid

Court Delays Decision Allowing Further Offers for Factory Until Oct. 23

SYRACUSE, Oct. 11—Federal Judge Cooper will receive additional bids for the New Process Gear Co. plant in this city at Albany, Oct. 23. When the sale of the property for $1,904,000 to T. W. Warner of Toledo, vice-president of Durant Motors, Inc., came before Judge Cooper at Auburn for confirmation, two bidders who were not present at the sale here Sept. 6 posted bonds to make them eligible to bid.

At the special masters' sale the price offered by Warner was considered very low, but he was the only qualified bidder. Since that time confirmation of the sale has been twice delayed.

At Auburn, S. S. Mencken, an attorney of New York, posted a bond of $50,000 and raised the bid price to $1,905,000. It is believed he represented Charles A. Dana of New York, who is a controlling factor in the Spicer Manufacturing Co. of Plainfield, N. J. H. W. Williams of Baltimore also indicated a desire to bid for the assets.

Judge Cooper will announce his decision Oct. 23, but it is believed that the two bidders will be given an opportunity to raise the price before the sale is closed.

Covert Gear Suit

SYRACUSE, N. Y., Oct. 12—The Covert Gear Co. of Lockport has obtained an order from Justice Cheney in Supreme Court to set aside a judgment of $42,747 obtained by the New Process Gear Co. of this city. The Lockport company has set up a counterclaim for $40,651. Both companies are in bankruptcy, but the debt incurred by the Covert company was contracted prior to the time its finances became involved.

HART-PARR CONFERENCE

CHARLES CITY, IOWA, Oct. 7—The supervisional sales force of the Hart-Parr Co., tractor manufacturer, from all parts of the United States and Canada, has just completed its fall sales conference at the factory here. Plans were made for an extensive sales campaign.

It was stated that the sales and advertising campaign started last June had been successful and that on Oct. 1 the factory was behind with deliveries. A number of improvements are being made at the factory, the foundry and machine shop building receiving new tile fronts.

FRANKLIN SHIPMENTS GAIN

SYRACUSE, N. Y., Oct. 9—September shipments from the factory of the Franklin Automobile Co. were double those of August and set up a mark almost 50 per cent higher than that reached during September of last year.

August Tire Output Increased Over July

Gain Also Shown in Shipments—Inventories Take Drop from Previous Month

NEW YORK, Oct. 6—Figures compiled by the Rubber Association of America, Inc., for the Department of Commerce show that during August there was an increase in production of pneumatic casings, inner tubes and solid tires over July.

This follows a decline in casing and tube production in July over June.

A comparative table of inventory production and shipments of casings, tubes and solid tires is as follows:

PNEUMATIC CASINGS

1921—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan.	45	5,319,605	703,430	965,417
Feb.	45	5,193,018	819,892	1,073,756
March	46	4,597,103	1,163,314	1,614,651
April	49	4,527,445	1,651,418	1,785,951
May	59	4,451,668	2,100,917	2,085,882
June	63	4,154,456	2,313,265	2,643,850
July	63	3,892,037	2,570,524	2,757,581
Aug.	66	3,934,853	3,043,187	2,894,442
1922—				
Jan	66	4,174,216	2,055,134	1,596,806
Feb.	66	4,691,329	2,084,308	1,562,365
March	63	5,183,286	2,645,790	2,073,963
April	65	5,464,336	2,401,187	2,086,651
May	65	5,523,095	2,721,503	2,639,273
June	64	5,042,147	2,838,890	3,133,260
July	63	4,834,106	2,476,636	2,695,095
Aug.	63	4,629,392	2,905,209	3,029,823

INNER TUBES

1921—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan.	47	5,586,163	740,824	1,042,617
Feb.	46	5,415,464	916,627	1,129,881
March	48	5,044,861	1,346,483	1,643,690
April	51	4,916,772	1,762,122	1,983,571
May	57	4,751,880	2,210,040	2,342,567
June	60	3,835,098	2,359,928	2,232,673
July	61	3,122,815	3,020,981	3,602,248
Aug.	64	3,649,319	4,430,152	3,804,060
1922—				
Jan.	66	5,246,647	2,343,393	1,889,724
Feb.	65	6,141,956	2,596,774	1,702,583
March	63	6,991,118	3,017,511	2,090,737
April	65	7,230,096	2,650,573	2,329,343
May	65	7,189,552	2,970,696	2,838,947
June	64	6,186,534	3,130,629	3,973,679
July	63	5,675,839	3,068,199	3,630,744
Aug.	63	5,207,228	3,808,224	4,220,055

SOLID TIRES

1921—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan.	12	303,753	21,220	29,116
Feb.	12	304,374	23,365	29,599
April	12	269,985	28,859	42,080
March	12	283,800	28,719	45,926
May	12	264,663	35,156	40,122
June	11	240,336	28,395	49,867
July	11	220,003	35,123	55,678
Aug.	11	216,367	55,694	66,866
1922—				
Jan.	11	181,769	40,224	33,294
Feb.	11	183,448	39,492	36,805
March	11	182,197	49,433	48,350
April	11	173,748	46,664	52,309
May	11	170,904	57,640	60,711
June	11	169,808	66,089	63,408
July	11	176,375	71,505	60,425
Aug.	11	216,367	55,694	66,866

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes completed, domestic work in factory and in transit to, or at warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

MODEL ROAD EXHIBIT FOR NEW YORK SHOW

NEW YORK, Oct. 7—In the cause of good roads the United States Government will make a display in the New York automobile show in January. This will be an art exhibit in place of last year's exhibit of different styles of roads.

There will be a landscape background, painted most artistically, while the exhibit itself will consist of miniature models of trucks and other motor transportation, road building machinery, etc. There will be a model road laid and the whole exhibit will occupy a space 21 x 17 feet.

The Government may have a motion picture display of road development.

Dayton Airplane Sued to Recover $2,308,267

DAYTON, OHIO, Oct. 9—Suit has been filed in the United States District Court by the Federal Government against the Dayton Airplane Co., formerly known as the Dayton Wright Airplane Co., seeking to recover $2,408,267 at 6 per cent interest from June 11, 1919, declared to have been fraudulently paid to the company by government officers. The government alleges that certain provisions in the contract entered into with the Dayton Airplane Co. by duly authorized officers were unlawful, fraudulent and void. During the progress of work under these contracts the Government claims it paid the company $31,463,175.

Answering the suit H. E. Talbott, Jr., president of the company, asserts the war claims are based on technicalities or forced construction of contracts.

YOUNGSTOWN PLANT OPENS

YOUNGSTOWN, OHIO, Oct. 9—The tire department of the Republic Rubber Co., idle for two years, has begun production again on a part time basis. The company is in the hands of a receiver. The mechanical goods and inner tube departments here are working at capacity, while the tire department of the Canton plant is operating full time.

HAYWARD TIRE RECEIVERS

INDIANAPOLIS, Oct. 5—As a result of an action brought by local creditors, the Hayward Tire & Equipment Co. has been thrown into the hands of Victor L. Wright as receiver. The Hayward company has been a considerable factor in the manufacture and sale of vulcanizing outfits.

America Meets Tire Competition Abroad

Firestone, on Return Home, Says Export Trade Should Increase Rapidly

AKRON, Oct. 11—The potentialities of foreign tire markets for American manufacturers are increasing and the American made tire rapidly is gaining in popularity in all foreign countries, according to Harvey Firestone, president of the Firestone Tire & Rubber Co., of Akron who has just returned from an extended survey of economic trade conditions in England, France, Belgium and Germany.

Firestone said:

American tire builders are successfully meeting the competition of European tire makers and are putting out a tire of superior quality in view of the price it is being sold for in Europe as compared to prices charged for European tires.

I look for our export tire market to increase rapidly provided American tire manufacturers take advantage of the opportunity afforded and increase the popularity of their tires in European markets.

Big Questions Need Settlement

Firestone states that his foreign survey causes him to believe that Europe never will settle down to serious work until some definite decision is reached and settlement made regarding Germany's war payments and France's international position.

He says in this connection:

However, despite the hampering effect of the social and political unrest in Europe, conditions are far better than when I was last abroad in 1920. England still is burdened with unemployment, although there is more optimism. Germany seems imbued with a desire to work and should make a speedy recovery when her leadership gets into the right hands. France's crops are going to be good this year and industrial conditions there are improving.

All Europe is very friendly toward the United States and it is a golden opportunity for American manufacturers to increase their export business by going after business in these countries.

Quick Assets of General Exceed Outstanding Stock

AKRON, OHIO, Oct. 11—After paying $121,000 in dividends and $100,000 on notes, the General Tire & Rubber Co. of Akron is able to show net quick assets in excess of the total amount of capital outstanding stock, and also to show a ratio of nearly 12 to 1 for current assets compared to current liabilities, according to the company's balance sheet for the first nine months of the current fiscal year. The balance sheet is for the nine months of the year ending Aug. 31.

Current assets are $2,315,293 and current liabilities are $215,363. Since the audit the company has paid off $100,000 of its notes.

Three Societies See Ordnance Exhibition

Much of Equipment Shown Consisted of Guns on Self-Propelled Mounts

ABERDEEN, MD., Oct. 6—The fourth annual meeting of the Army Ordnance Association held here to-day in conjunction with the Society of Automotive Engineers and the American Society of Mechanical Engineers was a great success. Several hundred engineers were in attendance, but a relatively small number of these were from the automotive industry. The bulk of the equipment exhibited consisted of guns of all sizes from 16 in. down to the smaller types of machine guns, but many of the mounts for these guns are self-propelled and are, therefore, the product of automotive manufacturers.

Varied Program Given

The program included exhibition firing of guns of all sizes, the use of rifle phosphorus grenades, bomb dropping from airplanes, and manoeuvers of airplanes, a dirigible of the non-rigid type and of various tractors, tanks and trucks employed by the Army Ordnance Department. Some of the shells fired were equipped with super-sensitive fuses arranged to detonate on contact with a single layer of airplane fabric. In several cases tracer ammunition was used to enable the observers to follow the trajectory of the shell.

A number of tractors, several of which mounted guns or howitzers, were shown in operation. The speed with which these vehicles, many of them of several tons capacity, can travel seems extraordinary and has been materially increased since the war. A majority of tractors are of the track laying type. Of these a number have the track running over wheels with dual solid rubber tires. In these cases the track can be dismounted, thus permitting the vehicle to run on the wheels. The latter are intended primarily for use on paved roads where higher speeds are desirable and where the tracks, if used, would cause considerable damage.

Interest in Italian Tractor

There was considerable interest in the Italian Pavesi tractor, a wheeled type with drive to all four wheels from a two-cylinder opposed engine. This machine has a divided frame with a sort of universal connection between the front and rear sections. The pivot for this joint is a tube which runs lengthwise from end to end of the machine. By the use of this arrangement the tractor can negotiate exceedingly rough terrain and still keep all four wheels on the ground without frame distortion.

Among the tanks exhibited was a large machine known as Mark VIII. The turret on this machine has a double cylindrical wall in which are narrow vertical slots. One wall is so mounted as to rotate about its vertical axis and is driven by an electric motor which keeps it in rotation, thus forming a stroboscope through which the operator can see in all directions. The slots are too narrow to permit the entry of machine gun bullets, so that the operator is protected, although afforded an exceptional range of vision. One of the smaller whippet tanks was equipped with a radio apparatus which permits the operator to receive instructions from a commander at a considerable distance.

Following the exhibit in the afternoon the program was completed by night firing with flashless and other forms of powder, some tracer ammunition being employed.

BUSES IN ONTARIO TO USE PNEUMATICS

TORONTO, ONT., Oct. 10—In the near future all motor buses operated in the Province of Ontario will be required to carry pneumatic tire equipment, according to Hon. F. C. Biggs, Minister of Highways. This step has been under consideration for some time.

There are two reasons for the decision. One is the government's statement that passengers are entitled to the greatest available comfort, and the other is that as the buses invariably travel at fairly high speed and frequently carry heavy loads, they should be so equipped as to permit of their operation with a minimum of damage to the roads.

Recommendations were made to the government that all commercial vehicles should be required to use pneumatic tires, but this is not considered practicable.

Quarter's Output Proved Biggest in Nash History

KENOSHA, WIS., Oct. 9—Last quarter's production of Nash automobiles was the largest of any quarter in the history of the Nash Motors Co., it was announced here by C. B. Voorhis, vice-president and director of sales. Indications are that the production this month will be the largest of any October, Voorhis said. The output is running between 192 and 200 sixes and fours daily.

Sales are continuing good, Voorhis said, with the farm districts buying in greater quantity than he had expected. The demand for closed models is increasing rapidly, and the company is doubling the capacity of its body plant in Milwaukee where the closed bodies are made.

ERIE TRUCK RECEIVERSHIP

ERIE, PA., Oct. 8—On complaint filed by an Erie bank and other creditors, W. J. Stern has been appointed temporary receiver for the Erie Motor Truck Co. The indebtedness is placed at $34,000.

Radio to Broadcast Car Buying Message

National Dealers' Association to Tell Fans on Oct. 12 How to Make Purchase

ST. LOUIS, Oct. 7—A radio broadcast from more than 100 stations throughout the United States on the night of Oct. 12 will be used by the National Automobile Dealers Association to tell radio fans who are also motorists, or prospective motorists, "How to Buy an Automobile." As this is a subject that engages the attention of 2,000,000 or so persons in this country every year, it is expected that considerable popular interest will be created in the radio world that night.

This will be the first time in the history of radio that practically every broadcasting station of any importance will carry to its listeners the same message at the same time. The public will be told in this talk just what the automobile industry is doing to make the ownership and operation of a motor car more pleasant and profitable, and what the factors are that should be borne most strongly in mind in determining the purchase of a new automobile.

Dealer Big Factor

Particular stress is laid in the address upon the importance of buying the right kind of car from the right kind of dealer. Especial attention is called to the intimate relation between dealer and owner in the matter of the proper maintenance of a vehicle and advising the public to consider carefully the time in which the dealer has been in business, his financial strength and his reputation for honesty and fair dealing with his customers and fellow dealers.

The address, which will be given by the broadcasting stations, was prepared by W. J. Brace of Kansas City, president of the N. A. D. A. and one of the oldest and most successful automobile distributors in the United States. Copies of this address were sent to more than 100 leading dealers in 100 cities after they had obtained permission from the broadcasting station for its use.

It is estimated that several hundred thousand persons, perhaps more than a million, will be reached by this method.

Chalmers Readjustment Plan Now in Operation

NEW YORK, Oct. 9—The Chalmers Motor Corp. readjustment plan has been declared operative. Note deposit certificates giving assent to the plan must be deposited with the Central Union Trust Co. on or before Nov. 9 in exchange for stock or cash to be delivered by the Maxwell Motor Corp. on or before Nov. 9. Extension of time to Nov. 6 has been given for deposit of additional notes with the New York Trust Co.

Makers Draw Space for National Shows

Seventy-six Members of N.A.C.C. Given Assignments—Seven Others to Exhibit

NEW YORK, Oct. 9—Seventy-six members of the National Automobile Chamber of Commerce were assigned space in the New York and Chicago national shows at the meeting of the manufacturers held Thursday. In addition seven other car concerns, not members of the chamber, were given the remaining spaces. These non-members consisted of Courier, Stanley, Noma, Hatfield, Rotary Six, Crawford and Climber.

As the space has been awarded, there are 79 car makers in each of the shows. Detroit electric, Sayers and Climber will not show at New York, while Noma, Hatfield and Rotary six will not be at Chicago. For the first time no foreign cars are booked for display.

The New York show will as usual be held in Grand Central Palace Jan. 6-13, while the Chicago show, Jan. 27-Feb. 3, will be held in the Coliseum, Annex and First Regiment Armory.

The following assignments of space were made:

New York Space	Car Name	Chicago Space
A-1	Velie	F-5
A-29	Chalmers	E-4
A-18	Lexington	G-1
A-28	Gardner	H-1
B-27	Moon	B-1
B-26	Earl	G-2
B-28	Cole	H-2
B-29	Stephens	E-1
B-12	Auburn	J-1
B-24	Columbia	O-2
B-25	Stearns	P-1
B-8	Mitchell	O-1
B-30	Liberty	E-3
B-23	Kissell	F-2
B-2	Lafayette	B-1-Y
B-16	Westcott	Q-1
B-17	R & V	M-1
B-1	Locomobile	B-2-Y
B-3	Rickenbacker	B-8-Y
B-4	Stutz	M-2-Y
B-18	Case	B-2-Y
B-15	Apperson	K-4-Y
B-31	Elkhart	Q-2-Y
B-11	Elgin	N-1
B-14	Templar	B-3-Y
B-7	Davis	Q-3
B-10	National	A-1-Y
B-6	King	A-3-Y
B-9	Barley	B-4-Y
A-19	Buick	C-5
A-15	Studebaker	B-2
A-11	Dodge	D-1
A-20	Chevrolet	A-6
A-14	Willys-Overland	C-3
A-16	Cadillac	D-5
A-12	Nash	C-6
A-17	Hudson	D-3
A-13	Maxwell	D-2
A-26	Hupp	C-1
A-4	Packard	A-2
A-5	Durant	A-4
A-3	Paige	B-6
A-27	Olds	D-6
A-31	Franklin	B-4
A-22	Essex	D-4
A-30	Oakland	A-1
A-23	Reo	B-5
A-21	Chandler	C-2
A-32	Lincoln	B-3
A-7	Nordyke & Marmon	F-4
A-25	Haynes	C-4
A-10	Peerless	A-3
A-8	Jordan	K-1
A-6	Wills-Sainte Clair	E-2
A-2	Dort	A-5
A-24	Cleveland	F-3
A-9	Pierce-Arrow	F-1
B-13	Handley	B-7-Y
B-22	Mercer	A-8-Y
B-21	H. C. S.	B-6-Y
B-20	McFarlan	A-6-Y
B-19	Standard Steel	D-5-Y
C-3	Anderson	A-5-Y
C-15	Saxon	E-1-Y
...	Detroit Elec.	E-5-Y
C-19	Dorris	C-1-Y
C-5	Paterson	C-4-Y
C-4	Pilot	A-7
C-6	Milburn	E-6
C-12	Rauch & Lang	E-4-Y
C18	Premier	C-2-Y
...	Sayers	C-3-Y
C-16	Yellow Cab	C-6-Y
C-20	Kline	E-2-Y
C-21	Gray Motors	D-2
D-1 to 15	Star	D-1
C-14	Courier	E-3-Y
C-13	Stanley	E-2-Y
C-7	Noma	...
C-22	Hatfield	....
C-8	Rotary Six	....
C-11	Crawford	C-5-Y
.....	Climber	Q-4

Note: In Chicago no letter after space means Coliseum or Annex; letter Y means Armory. In New York Show the A spaces are on first floor, B spaces on second, C on third and D on fourth.

AGRICULTURE HEAD NOW RIDES IN CAR

WASHINGTON, Oct. 8—Tradition, which constitutes a large part of official and commercial Washington, has broken a thirty-year record by the purchase of an automobile for the official use of the Secretary of Agriculture. Since the establishment of the department it has been an unbroken rule that the secretary and assistant secretaries shall use horse-drawn equipment.

Agriculture, it was figured, was always linked with the horse, and as a symbol of his office the Secretary of Agriculture has always ridden about Washington in a one or two horse-drawn vehicles. For years ten automobiles and one horse-drawn vehicle—all bearing the insignia of their respective federal departments — have stood about the Executive Mansion on cabinet days.

"NASH TIMES" ISSUED

KENOSHA, WIS., Oct. 9—Nash Motors Co. has commenced the publication of a monthly house organ for its dealers, known as the *Nash Times*.

Law to Stop Thefts Outlined to N.A.C.C.

Provides for Bill of Sale and Would Be Enacted in All States of Union

NEW YORK, Oct. 9—The annual members meeting of the National Automobile Chamber of Commerce held last Thursday was well attended, but the fact that few of the heads of the companies were present testified to the prosperous condition of the industry. The railroad situation seems to be the most serious problem confronting the industry.

The meeting listened to reports on production, fall business, transportation difficulties and participated in an interesting discussion on the stolen car situation and pirate parts. The Motor Vehicle Conference Commission placed before the automobile manufacturers a rough draft of a universal law which, it is thought, would aid in stopping thievery. In brief this is a plan whereby a bill of sale would accompany each car and the sale duly recorded with the secretary of state. The car thus would be placed on record and could not be resold unless a record is made of the transfer, just as in a real estate transaction.

Makers Prepare for Driveaways

Speaking for the traffic department, Chairman W. E. Metzger said reports of general operating conditions continue unfavorable. With continued heavy production driveaways undoubtedly will be necessary, and manufacturers are organizing for them. Chairman Metzger reported that James S. Marvin, representing the Chamber, had been to Washington and had secured the co-operation of the Car Service Division of the American Railway Association.

Demand for closed cars, it was reported, is exceptionally good. In some of the northern states 75 per cent of the cars sold in September were closed jobs, whereas in the South it was as low as 15. The average was about 35 per cent.

The used car situation, it was reported, is a worse menace now than it was earlier in the year. Dealers appear to have lost sight of the fact that in the fall, when sales are lighter, they cannot allow the prices they do in the spring.

Washington Hears of Plan

WASHINGTON, Oct. 8—Ways and means of discouraging the exportation of stolen automobiles were taken up today by representatives of the automotive industry, officials of the automotive division of the Department of Commerce, and treasury officials, in charge of customs.

Under the plan placed before treasury officials this traffic in stolen automobiles that are exported, can be largely minimized. The plan proposed provides for a registration of all automobiles shipped out of the country.

Men of the Industry and What They Are Doing

British Publishers Here

R. Childs Bayley, representing Iliffe, Ltd., publisher of the Autocar, Automobile Engineer, Motor Transport, Motor Cycle and other English publications, and Roland Dangerfield of Temple Press, publisher of the Motor, are in attendance at the annual meeting of the Associated Business Papers, Inc., held in New York this week.

Sir Herbert Austin Arrives

Sir Herbert Austin, president of the Austin Motor Co., Ltd., of England, has just arrived in the United States. He expects to spend about a month here, studying American production and sales methods.

Sarver Represents Star

A. H. Sarver, former president of the Scripps-Booth Corp. of Michigan, has been appointed general manager of the Star Motor Co. of Michigan, which takes over the State distribution of that car. Sarver also is a director of the Durant Motor Co., Inc.

Strickland on Engineering Staff

William R. Strickland, recently connected with the General Motors Research Laboratories, has joined the engineering organization of the Cadillac Motor Car Co. as assistant chief engineer. Strickland has been actively connected with prominent concerns for a number of years as designer, engineer and chief engineer. He has served as chairman of the Cleveland section of the Society of Automotive Engineers and vice-chairman of the S. A. E. standards committee. At present he is chairman of its sectional committee on ball bearings. Strickland was trained in the Massachusetts Institute of Technology and later served as engineer in the United States Navy, Mare Island, Hawaii.

Peter Heldt Returns Home

Peter Heldt, engineering editor of AUTOMOTIVE INDUSTRIES has returned from a three-months' trip to Central Europe, which included a visit to Germany.

Martin with Fageol

Fred L. Martin, sales manager of the Sheldon Axle & Spring Co. since 1911, has resigned, effective Dec. 31. After that date he will devote his time to the sale of the Fageol Intercity Safety Coach, made by Fageol Motors Co., Oakland, Cal. He will act as eastern representative of the company with headquarters at Wilkes-Barre, Pa. Martin started with Sheldon prior to its making the worm gear type axle which is now its standard. Since 1911 the sales of the company have increased from $20,000 a month to several hundred thousand dollars monthly, the increase being made up largely of worm gear axles. Martin's many years' experience in the parts field has brought him in contact with motor truck builders and furnished him with experience of much value in his new field.

Williams Succeeds Wilcox

Clarence F. Williams has been elected head of the Simplex Wire Wheel Co., Cadillac, Mich., in place of John P. Wilcox, who resigned on account of the pressure of other business. Wilcox will continue with the company as director.

Lord and James with Cadillac

Frank H. Lord, formerly of New York, and J. William James of Detroit have been added to the advertising department of the Cadillac Motor Car Co. Lord is a graduate of Princeton University and has a wide newspaper and automotive experience. James, who was formerly in the advertising department of Packard and who served with Detroit newspapers, is a graduate of Brown University. He joins the department as a copy writer.

Kelly Returns to Perfection

R. L. Kelly, who is well known throughout the southern states among replacement parts handlers, has made a new connection to represent the Perfection Spring Co. of Cleveland. Kelly has worked with the Perfection company previously, both in Cleveland and in the western territory, but he is better known through the South in connection with other lines. He succeeds P. A. Calkins, who has been promoted to assist the manager of the Perfection replacement spring business in its national distribution.

Bell to Sell Courier

L. A. Bell, Jr., formerly with the Lexington Motor Co. of Connersville, Ind., has joined the sales force of the Courier Motors Co. of Sandusky, and will travel in the South for Courier.

Murphy with Anderson

J. G. Murphy has been made factory manager of the Anderson Motor Co. at Rock Hill, S. C. Murphy was for some time assistant factory superintendent for the Pierce-Arrow Motor Car Co. and superintendent of Kelly Valve Co. of Chicago. He has assumed his new duties.

Findlater Taking Rest

James R. Findlater, vice-president and Pacific Coast manager of Earl Motors, has been compelled to take an indefinite leave of absence to secure a much-needed rest and regain his health, and has severed all connections with business activities.

Reinoehl in Own Business

H. K. Reinoehl has resigned as chief engineer of the Defiance Motor Truck Co. of Defiance, Ohio, remaining only as a director of that company. He has opened an engineering office under his own name, specializing in the design and development of automotive vehicles and their units.

Cadillac Appoints Lewis

William W. Lewis, after serving for five years as assistant general sales manager of an automobile manufacturing company, has been appointed central district manager for the Cadillac Motor Car Co. Previous to his work as assistant general sales manager, Lewis was identified for six years in field work, most of the time as district manager.

London Making Ready for November Exhibit

LONDON, Sept. 30 (*by mail*)—The Society of Motor Manufacturers and Traders is making plans for the 1922 motor car exhibition, to be held at the White City and Olympia, in London, Nov. 3 to 11, inclusive. Owing to the fact, it is said, that the general industrial situation of the country does not warrant a Commercial Motor Exhibition this year, manufacturers will concentrate upon the November display, and no efforts will be spared to make this exhibition the most interesting and comprehensive of any show so far held in the United Kingdom.

Prices will be lower, and in some cases will nearly approach the pre-war figures. Special attention will be given to the latest scientific developments toward eliminating weight and at the same time increasing the capacity and speed of the engine, increasing the comfort and smoothness of running, and reducing the consumption of gasoline and wear on the tires. Only those firms holding membership in the Society of Motor Manufacturers and Traders, which includes practically all representatives of American motor vehicles in the United Kingdom, are eligible to exhibit.

GARDEN FOR OVERFLOW

NEW YORK, Oct. 9—William Wellman, who has promoted several successful events in Madison Square Garden, is considering leasing the building for an overflow automobile show to be held at the same time the national show is being held in the Grand Central Palace. Wellman figures that there will be a number of manufacturers of passenger cars who cannot get space in the Palace and who will be glad of a chance to show in the Garden instead of at the various hotels. It is likely he will include trucks and tractors as well as parts and accessories.

Engineers Discuss Road Test Methods

Washington Section of S. A. E. Hears Major Carlson of Bureau of Standards

WASHINGTON, Oct. 9—At the first meeting of the Washington Section of the Society of Automotive Engineers this fall, Major R. E. Carlson of the Bureau of Standards presented a brief paper describing the road testing methods being followed in the comparative tests of fuels which the Bureau is conducting in conjunction with the Society of Automotive Engineers, the National Automobile Chamber of Commerce and the American Petroleum Institute. The method described by Carlson is the same one outlined in AUTOMOTIVE INDUSTRIES for Sept. 28, 1922.

Gasoline Basis of Test

It was pointed out in the discussion that the object of the speedway and other tests being made through co-operation of these organizations is primarily to determine which of the four grades of gasoline tested will enable the average car and truck to travel the greatest distance per barrel of crude oil refined. Other factors, such as ease of starting and dilution of lubricant by fuel, are not being overlooked, but are not being considered in the particular series of tests which Carlson described.

In reply to questions concerning the carbureter setting employed, Carlson stated that the setting used was that which had been found to enable the car to climb a given test hill in minimum time with throttle wide open, and was, therefore, a maximum power setting. It had, however, proved to be the leanest setting that could be used without missing when the throttle setting is suddenly opened wide in accelerating.

More Fuel Mileage Obtained

Although this setting had been found to correspond to a mixture of about 12 parts of air to one of gasoline (a condition which cannot give complete combustion) Carlson contended that it is about the leanest mixture which can be used in the 1920 model cars employed for the test, and still give satisfactory handling. Furthermore the mileage per gallon of fuel obtained is higher than is commonly secured with the cars in question.

Another speaker insisted that, even though the tests to date have shown with the equipment used, a better mileage performance than is common, it should not be concluded that a 12 to 1 or maximum power setting is the most economical, even though good accelerating conditions be required, particularly if a gradually opened throttle control is employed and the carbureter fitted is especially designed to handle the particular fuel in question.

In concluding the meeting a resolution to the effect that service men in and about Washington should be invited to attend future meetings of the Section was unanimously adopted.

Buffalo Meeting

BUFFALO, Oct. 5—The theoretical considerations which are fundamental in securing light engines and chassis will be presented in a paper by Laurence H. Pomeroy before the S. A. E. Buffalo Section on Oct. 19. Pomeroy has specialized in the design of engines and cars employing aluminum alloys of light weight and great strength.

He will treat the conditions determining chassis weight in general as related to bearing sizes and the supports therefor. The extent to which the bearing load in engines is a function of inertia rather than excess pressure will be discussed. The paper will include con-

(*Continued on next page*)

United States Exports, Imports and Reimports of Automotive Products for August, 1922, and for Nine Months That Preceded

EXPORTS

	Month of August				Nine Months Ending August			
	1921		1922		1921		1922	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobiles, including chassis	2,618	$2,699,380	7,409	$5,137,894	27,176	$32,740,801	49,759	$38,186,905
Electric trucks and passenger cars	....	....	4	7,456	....	....	189	276,785
Motor trucks and buses, except electric	381	434,052	....	....	5,473	8,232,959	....	....
Up to 1 ton	....	....	827	339,973	....	....	4,664	1,887,982
Over 1 and up to 2½ ton	....	....	369	335,235	....	....	1,589	2,029,343
Over 2½ ton	....	....	66	168,931	....	....	533	1,332,956
Total motor trucks and buses, except electric	381	434,052	1,262	884,139	5,473	8,232,959	6,786	5,250,281

PASSENGER CARS

Passenger cars, except electric	2,237	2,265,328	....	....	21,703	24,507,842	....	....
Value up to $800	....	....	3,931	1,902,395	....	....	27,132	13,056,349
Value over $800 and up to $2,000	....	....	2,026	1,849,226	....	....	14,280	15,461,994
Value over $2,000	....	....	186	534,678	....	....	1,372	4,141,496
Total passenger cars, except electric	2,237	2,265,328	6,133	4,286,299	21,703	24,507,842	42,784	32,659,839

PARTS, ETC.

Parts, except engines and tires / Accessories, Parts of	....	1,786,886	*11,866,136	2,678,941	....	28,555,593	*104,865,304	25,183,496
Station and warehouse motor trucks	19	23,393	12	10,766	287	278,190	116	118,872
Trailers	....	....	9	4,827	....	....	302	139,565
Airplanes	5	47,165	....	....	35	240,940	32	58,130
Parts of airplanes, except engines and tires	....	15,005	*1,758	3,238	....	128,578	*130,796	59,204

BICYCLES, ETC.

Bicycles and Tricycles	....	79,667	515	8 753	....	1,304,892	6,070	85,784
Motorcycles	215	60,146	1,011	241,676	8,613	2,859,906	10,444	2,747,049
Parts, except tires / Gas engines	41	11,603	246	31,682	774	251,052	3,373	467,149
Traction engines (steam) except agricultural	....	....	4	17,520	65	98,240	25	50,831
Automobile engines	226	60,999	2,352	237,013	6,038	1,256,919	36,327	4,010 099
Aircraft engines	....	....	5	8,200	....	....	100	62,800
Complete tractors, except agricultural	2	7,930	14	30 249	5,092	5,611,804	60	100,861
Other internal combustion engines	272	24,573	528	120,010	6,160	1,347,022	3,243	519,806

IMPORTS

Automobiles	40	57,206	33	62,944	330	601,406	243	470,156
Parts, except tires	....	57,444	....	44,895	....	739.741	....	435,820
All other	....	15,246	....	3,765	....	111,845	....	63,138

REIMPORTS

Automobile (free of duty)	294	496,573	120	199,662	2,739	4,326,171	1,032	1,756,691

*Pounds.

Navy Airplane Wins First Detroit Event

Water and Air Cooled Engines Make Practically Duplicate Performances

DETROIT, Oct. 9—Poor visibility and a slight rain caused the postponement of the first day's racing of the national airplane meet from Saturday until yesterday when the Curtiss Marine Trophy event for approximately 160 mi. was contested. This was won by Lt. A. W. Gordon in a navy TR-1 machine, equipped with a 220 hp. Lawrence J-1 engine which showed an average speed of 112.65 m.p.h. including the time passing through controls on the surface of the water. Gordon's speed in the air averaged 117 m.p.h.

Vought Second Place

Second place was awarded to the Vought VE-7H, piloted by Lt. H. A. Elliott and equipped with 220 hp. Wright E-3 engine. Lt. Elliott completed the race at an average speed of 109 m.p.h., his average air speed being 112 m.p.h.

Before the start of the race it was generally conceded that the two Curtiss 18-T triplanes, equipped with Curtiss D-12 400 hp. engines, stood the best chance of winning. The speeds made by these machines during the first few laps bore out this expectation, but Lt. L. H. Sanderson, pilot of No. 4, was forced down about a mile from the finish by lack of gasoline while Lt. R. Irvine, pilot of No. 5, was struck by a severe gust on one of the turns and forced to land. His machine was completedy wrecked in this landing but he escaped without injury. Several minor troubles also prevented others from completing the race. Out of eight starting only two machines completed all laps.

Opportunity for Comparison

From the technical viewpoint, the most important feature of this race was the opportunity which it afforded to compare the aerodynamic efficiency of water cooled and air cooled engine installations with which the Navy TS and TR types were equipped. This comparison has never been made heretofore and it has always been a point of contention among engineers. It is, therefore, interesting to note that the TS-1, equipped with a 220 hp. air cooled engine, made practically the same performance as the TS-2, a duplicate machine excepting the engine installation which consisted of a water cooled engine of over 240 hp. the propellers being identical.

That this was not entirely chance is suggested by the performance of the TR-1, equipped with a 220 hp. air cooled engine, which bettered by about two miles per hour, the performance of its twin, the TR-3, equipped with a water cooled engine of the same horsepower. While these comparisons indicate that the air cooled engine installation offers less resistance than the water cooled engine installation with conventional types of radiators, they should not be regarded as absolutely final because of the inclusion in the figured speeds of the time in turns. This latter time is very dependent upon the skill of the pilot.

SIXTEEN ARMY PLANES AND ONE CIVILIAN ENTERED IN RACE FOR PULITZER TROPHY

DETROIT, MICH., Oct. 10.—Final entries for the Pulitzer Trophy race which will be flown over Lake St. Clair Saturday include six U. S. Navy planes, 16 Army planes and one civilian aircraft. The entries are as follows:

Pilot	Plane	Motor
Lieut. D. Rittenhouse	BR-2 (Bee Line)	Wright H-3
Capt. F. P. Mulcahy	MB-7 (Thomas-Morse)	Wright H-3
Lieut. A. J. Williams, Jr.	CR-1 (Curtiss)	Curtiss CD-12
Lt. L. H. Sanderson	Navy X-1 (Wright)	Wright
Lt. S. W. Calloway (jg.)	BR-1 (Bee Line)	Wright H-3
Lt. H. J. Brow	CR-2 (Curtis)	Curtiss D-12
Lt. C. C. Moseley	Verville VCP-1 High Speed Pursuit	Packard
Lt. R. L. Maughan	Curtiss High Speed Pursuit	Curtiss CD-12
Lt. L. J. Maitland	Curtiss High Speed Pursuit	Curtiss CD-12
Lt. E. C. Whitehead	Loening High Speed Pursuit	Packard
Lt. L. D. Schulze	Loening High Speed Pursuit	Packard
Capt. F. O. D. Hunter	Thomas Morse High Speed Pursuit	Packard
Lt. C. L. Bissell	Thomas-Morse High Speed Pursuit	Packard
Lt. E. H. Barksdale	Sperry High Speed Pursuit	Wright H-2
Capt. St. Clair Streett	Sperry High Speed Pursuit	Wright H-2
Capt. Burt E. Skeel	Thomas-Morse MB-3	Wright H-2
Lt. B. K. McBride	Thomas-Morse MB-3	Wright H-2
Capt. H. M. Elmendorf	Thomas-Morse MB-3	Wright H-2
Lt. D. F. Stace	Thomas-Morse MB-3	Wright H-2
Capt. O. W. Broberg	Thomas-Morse MB-3	Wright H-2
Lt. J. D. Summers	Thomas-Morse MB-3	Wright H-2
Eddie Stinson	Dare Variable Camber Monoplane	Liberty
Lt. F. B. Johnson	Sperry High Speed	Wright H-2

Chevrolet and Fisher Start Janesville Work

JANESVILLE, WIS., Oct. 9—Following the visit of leading executives of the Chevrolet Motors Co. and the Fisher Body Corp. work has started on local plants for the two companies to cost about $400,000. Fisher will erect a building 600 x 160, containing 96,000 sq. ft. of floor space which will permit of the construction of from 100 to 150 closed bodies daily and employ 700 men. It is hoped to finish this building by Jan. 1.

The new Chevrolet building will be one story, 500 x 125 and provide 62,500 sq. ft. of floor space. The cost will be $100,000. This plant will be used for assembly of Chevrolet cars in addition to the present Samson assembly building. It will employ 500 men and 300 cars a day will be assembled.

WILSON TRACTOR ABSORBED

CHICAGO, Oct. 9—The Wilson Tractor Manufacturing Co., Ottumwa, Iowa, has been absorbed in its entirety by the Austin-Western Road Machinery Co. of Chicago. The plant at Ottumwa will continue without change in the personnel, though officials at Chicago will appoint one in charge of the factory. Sales will be handled by the Chicago firm.

Engineers Discuss Road Test Methods

(*Continued from page 744*)

sideration underlying the design of forged aluminum connecting rods.

This meeting will be held in the rooms of the Engineering Society Club at the Iroquois Hotel, starting promptly at eight o'clock.

Detroit Meeting

DETROIT, Oct. 11—Nine papers dealing with various production problems will be read at the production meeting of the S. A. E., to be held in Detroit, Oct. 26 and 27. Four papers will be read on the morning of the first day, and five papers the second. The afternoon of both days will be devoted to factory visits.

The papers are as follow: "The Group Bonus Plan and Its Application," by E. Karl Wennerlund, General Motors Corp.; "Cylinders from the Ore to Finished Part," by P. E. Haglund and I. B. Scofield, Ford River Rouge Plant; "Tool Allotment and Costs," by F. A. Mance, Studebaker Corp.; "New Methods of Processing Splined Shafts," by J. A. Ford, Studebaker Corp.; "Problems Met in the Production of Air-Cooled Engines," by William Dunk, Franklin Motor Car Co.; "Some Experiences from a Production Note Book," by H. J. Crain and J. Brodie, Packard Motor Car Co.; "Production Errors in Gears," by K. L. Herrmann, Studebaker Corp.; "Selection of Machine Tools," by A. J. Baker, Willys-Overland Co.; "Machine Tool Efficiency," by R. K. Mitchell, Maxwell Motor Car Co.

The production dinner will be held at the Hotel Statler on Thursday evening, Oct. 26. It will be informal. Pierre S. du Pont will be the speaker.

Ritchie Will Head Chicago Motor Bus

Leaves Fifth Avenue Coach to Join Yellow Cab President in New Venture

NEW YORK, Oct. 10—Following the taking over of the Chicago Motor Bus Co. by John Hertz, president of the Yellow Cab Manufacturing Co. of Chicago, and his associates, comes the announcement here of the resignation of John A. Ritchie as president of the Fifth Avenue Coach Co. of this city, to become head of the recent Hertz acquisition. Ritchie not only will direct the operation of the Chicago Motor Bus Co., but he also will be president of the American Motor Bus Co., which will manufacture the buses to be used in this service, which is to be greatly enlarged.

Ritchie will take with him another prominent official of the Fifth Avenue Coach Co.—Col. George A. Green, chief engineer, who will be vice-president of both the Chicago concerns.

Coupled with the announcement of Ritchie's change comes the additional information that Hertz has back of him in this new enterprise such prominent Chicago people as William Wrigley, Jr., Charles MacCullough, a Chicago banker, and representatives of the Armour and Swift families.

The new buses to be built will be of the general design of the Fifth Avenue coach, but of improved design and greater seating capacity. Double-decked Chicago buses seat 68 as compared with New York's 51.

Ritchie has been president of the Fifth Avenue Coach Co. since April, 1918, and his administration of the affairs of the big corporation has resulted in many improvements of the local service.

Complete Line of Durant Products Shown Together

DETROIT, Oct. 10—The first showing of Star cars in Detroit was made this week by the Star Motor Co. of Michigan, together with Durant fours and sixes, Locomobile and the Mason light truck, the event marking the first complete showing of Durant products anywhere. Notices issued by Durant officials calls attention to the record Durant has made in the assemblage of such a complete line in 18 months.

The Star headquarters in Detroit are on Grand Boulevard, two blocks west of General Motors Building and facing the Henry Ford hospital.

Plant Capacity Assured

NEW YORK, Oct. 9—Formal announcement is made by Durant Motors that capacity production for the next 15 months is assured for all Durant plants, the production schedule calling for more than 300,000 cars.

Most of this production will be Stars. Carroll Downes, president of Star Motors, Inc., stating that orders with deposits for 231,000 Stars for delivery within 15 months have been accepted. It is stated that orders for twice this number had been received.

As for the Durant car, the parent organization states that approximately 40,000 Durants, with a wholesale value of $36,500,000, were built and marketed during the year of operation ending Oct. 1. Six of the Durant plants now are in operation and the one at Elizabeth will be in production this month.

In a notice to stockholders Durant Motors states that it "enters its second year of production with a substantial cash surplus, an exceptionally small plant investment for the volume of business contracted, and an unusually good prospect for continued profit making."

Expect Early Price Revision by British

WASHINGTON, Oct. 8—An early revision of prices, with several new engine designs and an inclination of the buying public for large automobiles, is predicted in a survey of the automobile market in England by the U. S. Consul at Birmingham and just received by the automotive division of the Department of Commerce.

The survey states:

Efforts are being made to check the development of American automobile sales in England. One of the methods being employed is a gradual decrease in production costs, which has been under way for some time, with a view of shortly revising automobile prices.

New prices will be announced by English automobile manufacturers within the next six weeks. It is expected that many of them will bring out new engine designs, showing considerable improvements, which will cause the cars to be relatively cheaper in spite of the fact that the new quotations may not be much below those in force at present.

Because of financial considerations, the present year has shown a good run on light passenger cars. A reaction, however, is forecasted in favor of higher powered cars due largely to a general reduction in car prices.

Elgin Price Reductions Range from $50 to $260

ARGO, ILL., Oct. 11—The Elgin Motor Car Co. announces reductions on all Elgin six models K1-1922 series. The new list is as follows:

	Old Price	New Price
5-passenger phaeton	$1,295	$1,125
Standard scout	1,345	1,125
Special sport	1,425	1,165
Sedan	1,695	1,645

The peak list price of the standard phaeton was $1,785, the new price being a reduction of $660 from that figure. The peak price of the standard scout was $1,895, the new price representing a reduction of $770. The highest price yet quoted for the sedan was $2.795, the new price being a reduction of $1,150.

The special sport model has been produced only since April 1, 1922.

Surveying Electric Service Facilities

Association Sends Out Questionnaire to Authorized Agents of Equipment Makers

DETROIT, Oct. 10—The Automotive Electric Service Association is making a complete survey of the extent and resources of this branch of the automotive industry as part of its campaign to place electrical service before the industry in its proper perspective. Questionnaires are being sent to all authorized service agents of all electrical equipment manufacturers from the offices of D. W. Burke, secretary of the association in Detroit, which will give the information regarded as necessary to promote the best interests of this service group.

The questionnaire lists the names of the electrical manufacturers represented, number of employees in each department and names of officers, the total investment in buildings, equipment, shop tools and fixtures, stock of parts and the gross volume of business in 1920, 1921 and 1922, approximately. The information in the individual questionnaires will be held in confidence, the summary of them all being the only feature which will be laid before the manufacturers.

Will Reach Car Makers

With the aid of these data it is proposed to present to electrical equipment makers, and through them the car makers, the general capacity for service of the association and to recommend that the electrical requirements of all car dealers throughout the country can be better met through the Electrical Service Association than through the service departments of the car maker. By making use of the facilities of the association members, it will be shown that stocks of electrical parts can be greatly reduced or dispensed with in the automobile factory or the car dealer's room.

Where dealers are equipped to do electrical service work, they can obtain their supplies as they need them from the association members, and where this equipment is not available, the association members will be prepared to both furnish parts and make necessary installations and repairs. The possibilities of this service will be especially urged as effective in smaller communities and in overcoming difficulties involved where car dealerships are subject to change.

Now Has 250 Members

The Automotive Electric Service Association now includes over 250 members and is rapidly gaining in strength. Practically all of the larger service agents are now included, and it is hoped to bring in hosts of others before the annual meeting in Chicago, Jan. 29 to 31, inclusive. This will be held in the Florentine room of the Congress and is during the week of the Chicago automobile show.

Daugherty Outlines Trade Body Attitude

Position Like Hoover's—Favors Government Agency for Association Guidance

WASHINGTON, Oct. 10—There should be some Government agency for the guidance of trade associations before which the associations could submit their plans of operations and receive the Government verdict as to whether or not such proposed operations were legal or illegal under the anti-trust laws, according to a statement by Attorney General Daugherty. This expression by the attorney general is directly in line with the position of Secretary of Commerce Hoover on the subject.

More Liberal Attitude

Secretary Hoover has been of this opinion for months while Attorney General Daugherty appears to have assumed a much more liberal attitude than he maintained formerly. This is apparent from reference to the lengthy correspondence on trade associations exchanged about one year ago between these two cabinet members. At the time the attorney general's position was interpreted as being that the Government could give no definite assurances to trade associations and that the activities of the latter would be subject to investigation and prosecution at all times.

The attorney general said:

> I am in favor of some plan that will prevent business being unduly disturbed, and some plan that will enable them to come and lay down their plans on the table, and let somebody in the government say that such plans do or do not conflict with the law, so that if they do not they can be gone ahead with without fear of indictment. Such a system would stabilize the situation and do away with the necessity for a lot of investigation and litigation. It would remove uncertainty and suspicion. There would be less sidestepping under it, and the general tendency would be to make parties interested more happy.

Justice Department Should Approve

The Department of Commerce should have jurisdiction in the trade association matter, Attorney General Daugherty said. He added that the approval of the Department of Justice should also be had. Trade associations would then have some security, he said. The necessity for the Government seeking injunctions against some alleged activities of trade associations would be done away with, it was pointed out.

The attorney general believes that some benefit has been derived by industry and trade associations as a result of the exchange of correspondence between himself and Secretary Hoover, in which it was indicated, to an extent, what trade associations can do without violating the law.

Mr. Daugherty thinks, however, that there is still room for improvement. The Hardwood Lumber decision by the United States Supreme Court and other decisions have resulted in some clarification of the question as to how far a trade association can go, in the opinion of Mr. Daugherty.

Secretary Hoover is said to believe that open price associations' activities would be legal if the associations will announce prices for the benefit and information of public. Mr. Daugherty concedes that there is a possibility of co-operation between some associations and the Government in some respects, but he thinks the situation might be improved by certain additional legislation.

Federal Road Program 55 Per Cent Completed

WASHINGTON, Oct. 10—The Federal Government's seven year good road program is 55 per cent completed, according to a financial statement of the United States Bureau of Public Roads, showing the status of construction as of Aug. 31, 1922.

The figures show a total of 14,852 miles of Federal aid road completed and fully paid for; 14,670 miles more than half completed and 4456 miles completed, but not paid for in full. When the present projects are completed, which it is expected will be in 1923, the seven year program, begun in 1917, will comprise a total of 33,978 miles of entirely new highways throughout the United States.

For this net work of new roads, the Federal and State Governments will have paid $590,000,000.

OLDS PROPORTIONS OUTPUT

DETROIT, Oct. 10—The Olds Motor Works, as a result of recent price reductions, reports business to be running in excess of production, and, as a result, is compelled to distribute its output on a proportionate basis among distributors. Demands for cars is reported to be especially brisk on the west coast, where good business is expected to develop as the resort season progresses. Two trainloads of cars will be shipped to the coast as soon as officials feel that this number can be allotted to any one section.

HARROUN BANKRUPT

DETROIT, Oct. 11—The Harroun Motor Car Co. of Wayne, Mich., has been adjudged bankrupt by Judge Little in the Federal Court. Although the creditors petitioned to have the concern declared bankrupt some years ago, court proceedings have been delayed until now because the directors believed that they could put the concern on its feet if granted time.

MONMOUTH ELECTS OFFICERS

MONMOUTH, ILL., Sept. 16—Stockholders of the Brown-Lynch-Scott Corp., formerly the Monmouth Plow Co., manufacturers of farm tractors and plow machines, have re-elected directors and officers.

Highway Conference Plans Make Headway

Three Days to Be Devoted to It—Industry Represented on Program and Committees

WASHINGTON, Oct. 11—The second National Conference on Highway Engineering and Highway Transport Education will be held in this city Oct. 26, 27 and 28, the morning sessions to open at 10 o'clock, afternoon sessions at 2 and night sessions at 8.

The morning session of the first day will be devoted to three subjects: (1) "The Relation of Adequate Highway Transport Facilities to National Progress," (2) "The Relation of Adequate Highway Transport Facilities to National Defense," (3) "The Highway Engineering and Highway Transport Fields and Their Need for Trained Men." The afternoon session will be given over to committee meetings. The evening session will include addresses on (1) "Relation of Research to Highway Engineering and Highway Transportation," (2) "The Trend of Highway Engineering and Highway Transportation Education."

Second Day Sessions

The morning and afternoon sessions of the second day will be devoted entirely to committee meetings. The evening session will be devoted to a symposium of highway educational problems of the future, comprising (1) Finance, (2) Engineering and Administration, (3) The Voice of the Road User, (4) Highway Regulation, (5) Correlation of Highway, Railroad and Waterway Transport, and (6) Transportation in Congested Districts.

On the third day the morning and afternoon sessions will be devoted to hearing the reports of the ten conference committees and the evening session will be in the nature of a dinner at 7.30.

Among those in the automotive industry who will serve as committeemen and speakers are:

Alvan Macauley, president, Packard Motor Car Co.; David Beecroft, directing editor, The Class Journal Co.; Windsor T. White, chairman of the board of the White Motor Co.; A. J. Brosseau, president, Mack Trucks, Inc.; E. M. Sternberg, vice-president and consulting engineer, the Sterling Motor Truck Co.; Robert A. Salmons, vice-president, Selden Truck Corp.; M. O. Eldridge, director of roads, A. A. A.; Charles A. Ward, president, Ward Motor Vehicle Co. and Roy D. Chapin, president, Hudson Motor Car Co.

ALBERT R. COUGHLIN DIES

DETROIT, Oct. 10—Albert R. Coughlin, who has been connected with the sales department of the Durant Motor Co. of Michigan since January, died Saturday after an illness of two months. Before joining Durant he was a special representative of the General Motors Export Co. and previously was assistant sales manager of the Dort Motor Co.

Kelly-Tire 6 Months Profits $1,500,000

Expected That Earnings for Last Half Year Will Prove to Be As Good

NEW YORK, Oct. 9—Net profits for the first six months of the year for the Kelly-Springfield Tire Co. are estimated to be in excess of $1,500,000, equivalent to about $2.15 a share on the 362,085 shares of $25 par value common stock outstanding, after note interest and preferred dividend requirements for the period. It is expected that the showing of the last six months will be equally good, which will give $4.30 a share for the full 12 months.

Actual amortization of the new Cumberland plant will begin next year. This plant cost about $13,000,000 and was paid for principally through the sale of $10,000,000 10 year 8 per cent notes. The trust agreement under which the notes were issued provides for the retirement of $1,000,000 notes each year, beginning May 15, 1923, and continuing to May 15, 1931, when the remaining $2,000,000 will be paid off at 110.

Preferred stock sinking funds provide for the annual retirement of 2 per cent of the 6 per cent preferred, of which there now is outstanding $3,137,100 and 3 per cent of the 8 per cent preferred, of which there is outstanding $5,625,000. Including preferred dividend requirements and note interest, the company will have to earn next year more than $2,500,000 to show a surplus for common.

The company is producing more than 6000 casings a day. Akron is running at capacity, while Cumberland is operating full with the available force, finding it hard to get skilled tire builders. Eventually all operations will be concentrated at Cumberland.

The company's inventory position is good, no effort having been made to anticipate crude rubber or cotton requirements, the management buying at prevailing prices for current needs.

Rouge Plant Builds Most of Ford Bodies

DETROIT, Oct. 9—The Ford Motor Co. now is building all of its bodies for models on which it has the heaviest production and sale at the River Rouge plant. With the termination of contracts with the O. J. Beaudette Co., Pontiac, Mich., which formerly built roadster bodies, the Rouge plant now is building 800 of these daily. The Beaudette plant recently has been taken over by the Fisher Body Co.

Phaeton bodies and the all-steel two door sedan bodies of the conventional Ford sedan also are being built at the River Rouge, exclusively. The phaeton body production has run as high as 3015 daily and averages about 2550. Sedan body production at the Rouge plant approximates 900 daily.

Bodies for the Ford coupe and for the new Ford four-door sedan are being made by the Briggs Manufacturing Co., these being the only bodies not built by the company itself. Production of these is lower than on the other models and rounds out the daily schedule of approximately 5000 cars daily which the Ford Motor Co. has been maintaining. Included in this total is the light truck production which runs from 400 to 500 daily.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

During last week developments having a direct bearing upon the local money market were not striking. Loans on call covered a range of 4 per cent to 5 per cent, the same as in the previous week. In time money rates there was little change; sixty and ninety days' maturities being quoted at 4½ per cent to 4¾ per cent, as in the previous week, while four, five and six months' maturities were quoted at 4¾ per cent, as compared with 4¾ to 5 per cent. The prime commercial rate remained unchanged at 4¼ per cent to 4½ per cent.

Car loadings for the week ending Sept. 23 totaled 973,291, the largest number for any week since Oct. 29, 1920. This amount exceeded the previous week by 27,372 and was 99,650 cars more than recorded for the corresponding week a year ago. Coal loadings were 187,896, the heaviest total since last March, and an increase of 17,740 cars over the corresponding week a year ago. The output of bituminous coal is still slightly below 10,000,000 tons per week. The failure to reach this mark is attributed to the warm weather and the shortage of coal cars for transportation.

Pig iron output for September was reported at 2,033,720 tons, or an average of 67,791 tons per day, as compared with a total output of 1,816,170 tons, and a daily average of 58,586 tons for August. September's output was nearly 24 per cent greater than that for last January and over twice the output for September, 1921.

September's total of 1469 commercial failures furnishes one of the evidences of general business improvement. This number was 12.3 per cent less than the amount for August, 46 per cent below the peak total for January and 9.2 per cent below the total for September a year ago. The amount of liabilities also shows a marked recession.

Total liabilities for September were $31,920,466, 13 per cent less than in August, less than one-third of the liabilities for January, and 30 per cent less than those reported for September a year ago. The total amount of failures for the entire third quarter of 1922 were 4719, the smallest number for any three months since the second quarter of 1921, with liabilities of $11,926,834, the lightest quarterly liabilities since the second quarter of 1920.

FINANCIAL NOTES

Hupp Motor Car Corp. has declared the regular quarterly dividend of 2½ per cent on common stock, payable Nov. 1 to stock of record Oct. 14. At the annual meeting of the corporation stockholders approved the retirement of 4000 shares of preferred stock acquired by purchase, 1921 shares of perferred stock acquired by conversion into common shares and 130,790 shares of common held in reserve for preferred stock conversion. The corporation's total capitalization now stands at $6,100,000, consisting of 9079 shares of $100 par preferred and 519,210 shares of $10 par common.

Moon Motor Car Co. has declared a quarterly dividend of 25 cents on common stock, payable Nov. 1 to stock of record Oct. 16. It is reported that in the near future the annual dividend rate of $1 will be increased or an extra disbursement made. Earnings for September are understood to have approximated $400,000. Current earnings, after deductions for taxes and preferred dividends, are running at an annual rate of about $9 a share on the 154,213 shares of common stock. It is expected that net profits for the entire year of 1922 will be in neighborhood of $5 a share on the common.

Mack Trucks, Inc., will show net earnings for the third quarter, after charges and taxes, of $1,315,633, or $3.64 a share on the 283,198 shares of no par common stock, after preferred dividend requirements. This is not far below the second quarter's net profits. Earnings fell short of preferred dividend requirements in the first quarter. Indications are for this quarter that profits should approach $3 per share, making more than $9 a share for the year. Current production is slightly over 500 trucks a month.

Duesenberg Auto & Motors Corp. securities may now be sold in Massachusetts as the order prohibiting the sale has been revoked by the Massachusetts Department of Public Utilities. The sale of securities by the state was barred by the authorities because the company failed to file certain required information which since that time has been submitted.

Yellow Cab Manufacturing Co. shows net earnings this quarter almost equal to the entire first half of the year. Since Jan. 1 4500 cabs have been turned out. Orders are on hand for 1300 cabs for delivery in the next two months, which will necessitate increasing factory operations.

Fisher Body Corp. has declared the usual quarterly dividends of $2.50 on the common and 1¾ per cent on preferred stock, both payable Nov. 1 to stock of record Oct. 21.

Allis-Chalmers Manufacturing Co. has declared the usual quarterly dividend of 1 per cent on the common stock, payable Nov. 15 to holders of record Oct. 24.

Mullins Body Corp. has declared the regular quarterly dividend of $2 a share on the preferred stock, payable Nov. 1 to holders of record Oct. 16.

Kelsey Wheel Co. has declared the regular quarterly dividend of $1.75 a share on the preferred stock, payable Nov. 1 to holders of record Oct. 20.

Willys-Overland Co. net earnings for the months June, July and August amounted to $4,283,000.

Railroads May Use Trucks as Feeders

California Likely to Adopt Them If Individual Operation Is Unsatisfactory

LOS ANGELES, Oct. 9—W. R. Williams, examiner of the State Railroad Commission, is authority for the statement that the railroads in California are planning to augment their service with the use of motor trucks. He has said that it is the intention of the railroads to use trucks as feeders to their lines, even to the extent of curb-to-curb delivery.

He has told the motor carriers now in the business that it is up to them to provide adequate equipment and develop their service, because records are being made of complaints, and it is understood that if shippers protest against unsatisfactory service the railroads will assume it.

Motor freight and passenger carriers in California that operate between fixed termini are required to have certificates. In fact, the only difference between them and the railroads is that the railroad commission can take their certificate away from them while it cannot stop railroads from operating.

Highway Opposition Enters

Some opposition to the use of the highway by certified carriers has developed in this state recently, but is not likely to gain much headway. The claim is made that the highways have been built as an investment by the public and that it, therefore, is not conducive to public welfare when a railroad commission grants to certain parties operating rights over the highways and denies them to others.

The commission claims it functions chiefly for the protection of shippers and unless their control were exercised the public would be in the hands of irresponsible and unprincipled operators. The Supreme Court of the state has sustained the commission in its right of control.

Service Association Sees Automotive Films

NEW YORK, Oct. 10.—The October meeting of the Automotive Service Association of New York was held in the large auditorium of the Automobile Club of America with over one hundred members in attendance. It was one of the largest meetings in the history of the organization.

The Paige-Detroit dealer film and the "Shop Profits" film of the Automotive Equipment Association were shown, the latter film having the Black & Decker addition. J. Howard Pile, Technical Editor of MOTOR WORLD, gave a short talk on the subject of shop profits to introduce the film.

After the pictures were shown, short addresses were made by Alfred Reeves, general manager of the National Automobile Chamber of Commerce; G. W. Brogan of the Black & Decker Manufacturing Co., Ralph C. Rognon and J. Willard Lord.

INDUSTRIAL NOTES

Rivett Lathe & Grinder Co., Boston, has moved its Detroit sales office to 6526 Cass Avenue. The office is operated in conjunction with that of Reed-Prentice Co., Becker Milling Machine Co. and Whitcomb Blaisdell Machine Co., under the management of T. C. McDonald. The new quarters provide ample space for the exhibition of sample machines. The sales force has been augmented by the addition of E. B. Barber, formerly superintendent of the Lafayette Motor Co. plants.

Traylor Engineering & Manufacturing Co. has made an enlargement in its plant in Allentown, Pa., and will consolidate its truck and Hiflex spring business there. The truck business hereafter will be conducted under one consolidated management at Allentown, the Cornwells plant being used temporarily as a storage and supply station from which deliveries will be made. The Cornwells plant consists of 100 acres of land, with buildings, 200,000 sq. ft. in area.

United States Asbestos Co. has moved its general offices from Lancaster, Pa., to the plant at Manheim, Pa. Pending the erection of an office building, the executives are housed in temporary quarters.

Paul Rubber Co., Salisbury, N. C., has equipped a new factory to build 5000 tubes a day. This is the second new tube plant built by this company since last year.

Willys-Knight Phaeton Added; Listed at $1,435

TOLEDO, Oct. 9—Another seven passenger model has been added to the Willys-Knight line, this being a phaeton. This follows closely on the heels of the seven passenger sedan announcement. The phaeton, like the sedan, is known as Model 27, and its chassis characteristics are similar to the five passenger, but the wheelbase is 6 in. longer. The tonneau is roomy and the auxiliary seats unfold from a closed compartment in the rear of the driving seats. The price is $1,435.

Sport Roadster Added to Oldsmobile Models

LANSING, Oct. 11—A sport roadster, mounted on the light eight chassis, has been added to the 1923 Oldsmobile models. The price is $1,625. The body is finished in green with nickel trimmings and vertical nickel rails on the rear deck.

The equipment includes disk wheels, cowl lights, cowl ventilator, windshield wings, spotlight mounted under the left front headlamp, aluminum steps, stop and parking lamp, cigar lighter, bumpers, windshield visor, double tire carrier and a nickel windshield wiper. A new feature is the carrier for a golf bag which is mounted on the right step.

METAL MARKETS

Transportation difficulties serve to keep the minds of both producers and consumers on the fulfillment of old steel contracts to the exclusion of fresh transactions. Steel producers, especially sheet rollers, encounter no less trouble in keeping themselves supplied with raw material than in preventing the accumulation of finished material at their plants. A recent order of the Interstate Commerce Commission restricting the use of open-top cars to the coal movement has made it doubly hard for sheet mills to keep themselves supplied with sheet bars, which, being 30 ft. long, can not be hauled in side-door box cars.

The supply of flat cars is virtually nil. Cutting of sheet bars for hauling purposes entails considerable waste. Some of the sheet mills are having recourse to motor trucks. Automotive sheet consumers are exerting every possible pressure upon mills in order to obtain more satisfactory shipments, but consumers recognize the tough job that rollers face, and while they plead and urge they are, for all that, considerate. As the result of these obstacles to production and to the flow of sheets into consumers' plants the market situation continues oblique. Most of the sheet rollers are carrying enough old orders into the fourth quarter to keep their mills in comfortable operation until the middle or even the end of next month.

Chicago sheet producers even assert that they have nothing to sell for this year's delivery. This abundance of unfilled tonnage is in a large measure, however, the result of underproduction in September, and can in no wise be attributed to fresh demand. It is only natural that with the difficulties which sheet consumers encounter in obtaining prompt shipments of material ordered long ago premiums on early deliveries should continue with somewhat more tenacity than in most other steel products. The fact, however, remains that premiums are slowly but gradually vanishing in the entire steel market. Precious little fresh sheet business has come onto the market this month.

Pig Iron.—Automotive foundries are buying gingerly, the impression of a gradual easing off in prices being general among consumers. Embargoes have been lifted, but car shortage continues to operate against a more free movement of pig iron.

Aluminum.—The domestic producer has let it be understood that while prices average 1c. to 2c. per lb. higher than they did early in September, every inquiry and order is being judged on its own merits and prices quoted on one tonnage do not necessarily apply to another because specifications and conditions surrounding delivery, etc., may differ. In pre-war years there was always a base price which was looked upon as the nominal contract price of the domestic producer. Eventually this condition will return. For the time being reserve on the domestic producer's part with reference to price publicity is not only natural but justified. Large tonnages of imported aluminum are in the hands of semi-speculative interests who would be the real beneficiaries of "official" prices such as prevail in the lead market. There always was and probably always will be an "outside" aluminum market, and the domestic producer has always tacitly recognized this condition.

Copper.—Quiet, on a 14c. basis with no interest in deferred positions.

Calendar

SHOWS

Oct. 7-14—New York, Electrical and Industrial Exposition, Grand Central Palace.

Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8-13 — New York, Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Oct. 4-15 — Paris, Automobile Show, Grand Palais.

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 9 - 19 — Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show, British Cycle Motors, The Tower, Warwick Road, Coventry.

Dec. 15-Jan. 2 — Paris, Aeronautical Salon, Grand Palace. Chambre Syndicale des Industries Aeronautiques, 9 Rue Anatole de la Forge.

Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

May - July, 1923 — Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

CONVENTIONS

Oct. 7-14—Detroit, Second National Aero Congress and National Airplane Races.

Oct. 18-20—Chicago, National Association of Farm Equipment Manufacturers, Congress Hotel.

Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

Nov. 24 - 25 — Chicago, Semi-Annual Convention, Factory Service Managers, National Automobile Chamber of Commerce.

Jan. 29 - 31 — Chicago, Annual Meeting, Automobile Electric Association, Congress Hotel.

S. A. E. MEETINGS

Oct. 26-27 — Detroit, General Motors Building.

Jan. 9-12—New York, Annual Meeting.

Tractor Profitable, Farm Survey Shows

WASHINGTON, Oct. 7—Is the tractor more serviceable, the year around, than horse-drawn power on the farm? This question, more or less a mooted one, has been made the subject of a study by the Department of Agriculture, who to-day announced their findings, based on a survey of southern farms. In announcing the results, the department makes it clear that the survey covers conditions in the South and is not construed as applicable to the entire farming industry of the United States.

Eighty-six per cent of the farmer owners interviewed stated that their tractors were proving profitable, in comparison to horse-drawn equipment. Ninety-six per cent of them declared that they intended to use them the following season, as did also 52 per cent of those who did not believe they were profitable.

Canvass Made in 1918

The canvass, which was made in the spring of 1921, included 684 tractor owners in Alabama, Georgia, North and South Carolina and Tennessee, all of whom had bought their tractors new between March, 1918, and September, 1920.

In order that farmers may take advantage of the survey, the department has issued a Farmers' Bulletin No. 1278, entitled "Tractors on Southern Farms," showing in detail the department's findings. The experience of present owners is summarized with reference to the advantages and disadvantages in their use, the sizes now used on farms of varying acreage and the sizes they believe would be the most suitable for their condition, estimates of the probable life of their tractors, cost of operation, etc.

RIM ARTICLES FILED

BRIDGEPORT, CONN., Oct. 7—With headquarters in Hartford and with the object of promoting the interests of the automotive industry relative to tires, rims, wheels and the like, as well as providing an inspection service for manufacturers of rims, the Tire and Rim Association of America, Inc., has been incorporated.

Articles of incorporation have been filed at Hartford. Subscribers to the stock are: Frank A. Scott, receiver Standard Parts Co.; George C. Brainard, vice-president and general manager of the Hydraulic Steel Co.; and P. W. Litchfield, vice-president of the Goodyear Tire & Rubber Co.

Raybestos Co. Reports Increase in Business

BRIDGEPORT, CONN., Oct. 9—A 40 per cent increase in sales during the first part of the year over the corresponding period of last year, with prospects bright for a still greater increase, is reported by M. F. Judd, sales manager of the Raybestos Co.

The increase in sales is bringing sales closer to the business of 1919, which was the best in the company's history. Production during the period covered, according to the reports, shows a total of between 5,500,000 and 6,000,000 feet of brake lining.

Better Prospects Appear in Alabama Farm Section

BIRMINGHAM, ALA., Oct. 11—Prospects for the sale of automobiles in the country districts of Alabama are looking better every day. Farmers are paying debts that they have owed for the last three years, according to F. O. Hooten, supervisor of the bureau of markets of the state department of agriculture, who recently made a trip through the central section of the state.

This tendency to liquidate debts of long standing is noted throughout the South.

In Chattanooga the bankers are reporting that payrolls which have been way down, are now near normal.

Custom Officers Told of Reimportation Tax

WASHINGTON, Oct. 9 — Assistant Secretary of the Treasury Elliott Wadsworth has notified collectors and other officers of the customs service of a treasury decision relating to the re-importation of American automobiles and trucks sold to the American Expeditionary Forces or allied governments for war purposes. Amendment of articles 334 and 337 of the customs regulations of 1915 is in accordance with the new tariff law which contained a provision imposing a duty of 90 per cent ad valorem on re-imported trucks and other vehicles.

Reading of Amendment

The amendment relating to automobiles and trucks is as follows:

Attention is invited to the provision of paragraph 1514 of the tariff act of Sept. 21, 1922, which restricts the free entry of American goods exported and returned without having been advanced in value or improved in condition to such articles as are imported by or for the account of the exporter thereof.

Articles 334 and 337 of the customs regulations of 1915 are hereby amended so as to extend the requirements heretofore applicable only to the identification of domestic bags to merchandise of every description, claims to be free of duty under this provision of paragraph 1514. Merchandise of American manufacture or production reimported by or for the account of any person other than the exporter thereof will be assessed with duty at the same rate as though of foreign production

Must Ascertain Facts

Before permitting the release of automobiles or parts of the same which are returned by any person other than the exporter thereof, collectors should ascertain whether such shipments fall within the provisions of section 322 of the said act. If imported after having been sold to any foreign government, individual, partnership, corporation or association, shipments of the character described in this section should be assessed with duty at the rate of 90 per cent ad valorem on the basis of the American selling price as defined in section 402 (F) at the time of exportation of the merchandise from the United States.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XLVII NEW YORK—THURSDAY, OCTOBER 19, 1922 No. 16

Ford Tells What He Hopes to Do With Muscle Shoals

In exclusive interview with AUTOMOTIVE INDUSTRIES he outlines plans for great power project. Says he hasn't begun fight against opposition. Will make no additional tractor models. Does not intend to buy more factories, cars or railroads. Plans Russian plant.

By James Dalton

HENRY FORD discusses for the first time in this interview his plans for the development of the power resources of Muscle Shoals. He says he will use all the power himself, but that he does not know in just what way. He expects to employ one man for every horsepower developed and there are nearly 1,000,000 hp. in sight.

Ford says also that he "hasn't heard" of a new Ford car; that he can't make enough of the present model; that he will use no more aluminum until he makes it himself; that he will build no new tractor models; that he will take over no more automobile factories; that the one railroad he has is enough.

Ford will devote much of his attention in future to the development of water power projects in various sections of the country.

"WE'RE manufacturers. We must have power and we have never had enough. We have to work around the clock to get it by putting more men to work in the middle of the night, which is no time to work."

This is the simple explanation Henry Ford has given AUTOMOTIVE INDUSTRIES of why he wants to develop the gigantic hydro-electric resources of Muscle Shoals. It probably was the foundation upon which he based his bid to the Government for its rights in the "Niagara of the South." But since his now historic proposition was made, his plans have matured in his own mind, and he is thinking almost as much of what a great industrial development will mean to the South as of his own profits.

When Ford was asked, however, what were his plans for Muscle Shoals he pondered for a moment, then shook his head and responded:

"I don't know.

"We may use all the power to make fertilizer," he added. "We may use most of it for manufacturing or we may use it to develop natural resources and make steel or aluminum. We can't tell what we will do until we get at it, but we're going to use that power."

It is significant of Ford's determination that when he discusses Muscle Shoals, he does not say "if we get it" but "when we get it."

When asked the direct question, "What hope have you of being permitted to develop this project?" he responded:

"We haven't begun to fight for it yet. It hasn't reached the floor of Congress. All that we have done so far has been to send our Chief Engineer, Mr. Mayo, down to Washington chiefly to answer questions which may be asked about our offer. He was simply a dictionary and encyclopedia in engineering for the benefit of the committees.

"When the right time comes we'll show up the opposition. We're going to do that whether we get it or not. Up to this time we haven't tried to do anything except answer questions and explain our offer."

Source of Muscle Shoals Opposition

Ford attributes the opposition to his offer to what he terms "the international Jews." He believes these figures are responsible for the battle waged against him by the fertilizer, aluminum and power interests, including the "Chilean nitrate crowd." He has been informed by his friends in Washington that they have been amazed at the ramifications of this opposition which has brought together representatives of interests heretofore not supposed to have had anything in common.

He believes that the great banks and other powerful combinations are controlled by the same people. The names of the individuals in this group may change as the years pass, but the interests they represent always are the same, he contends. He is convinced that water power interests all over the country are in league to gobble up all possible sources of power for their own purposes.

"Sometimes they don't develop the power," Ford said, "and sometimes they use politics to sell more power to cities and villages for street lighting, for instance, than there is any sense in using. Sometimes they put it over by having two or three of their representatives elected to the common councils.

"If we haven't done anything else, we have shown what Muscle Shoals are worth and we have kept these other people from getting them for nothing. The idea of developing them was peddled around to all kinds of manufacturers and none of them would look at it."

Ford chuckled as he told of the way in which the project was first brought to his attention by General Beach of the Army engineers from whom a wire was received one day, asking if he would be interested in this great source of water power.

"When they came to me with the message," he said, "I asked them 'what are they and where are they?' I knew that Muscle Shoals were somewhere in the Tennessee River. I didn't even know in what part of Alabama but Mr. Edison tells us there are possibilities in everything and that we ought not to overlook any of them, so I told them to say that we were interested, and that's the way we came to get into it.

"I wish the Ford plant was down there now," he added rather whimsically, "for then we would not have to worry about coal." He hastened to explain, however, that Detroit is a splendid manufacturing center because it is located midway between sources of supply.

No Surplus Power

It was evident that Mr. Ford has not ceased to concern himself with the coal question because of the academic interest he displayed in the procession of loaded coal trains moving past the old tractor plant at Dearborn, which now is used chiefly as a laboratory and at which he spends most of his time.

"That one's going west," he remarked, after a puffing engine had made conversation momentarily impossible. The interview, in fact, was punctuated by coal trains.

"What will you do with the surplus power developed at Muscle Shoals?" Mr. Ford was asked.

"There won't be any surplus," he responded. "We're going to use all of it doing something useful. It will require only about 100,000 hp. to turn out the 110,000 tons of fertilizer the contract calls for every year. The total in sight figures out 890,000 hp. so that there is plenty left for work—it may be more fertilizer, it may be manufacturing. But unless you have looked into it you can't realize what a big proposition fertilizer is, and how many millions of dollars are taken out of the farmer every year. We want to do something big for the farmer. He has it coming to him."

Mr. Ford has been quoted as saying that one man should be employed for every horse power developed and he was asked if this were true.

"That's the way it figures out," he replied. "We have 50,000 hp. at Highland Park and employ 50,000 men."

"Do you mean, then, that if you get, say 200,000 hp. at Muscle Shoals you would use 200,000 men?"

"Yes, and that means five times as many people down there," was the answer.

This means that if Ford is permitted to expand all the ideas he has in the back of his head for Muscle Shoals, the vision the people of Alabama see of a great industrial city on the banks of the Tennessee, which will rival Detroit, will become a reality.

The attention of Mr. Ford was called to the real estate exploitation which already has been undertaken in the vicinity of Sheffield, Tuscumbia and Florence. He did not seem to regard it very seriously, remarking that real estate promoters usually are so far ahead of their time that they get trapped at their own game. It is evident that he expects no trouble in getting all the help he would need in Alabama and that there would be no serious housing difficulties.

Aluminum Possibilities

The section around Muscle Shoals is rich in deposits of bauxite from which aluminum is obtained, and it often has been asserted that Ford contemplates the use in the future of large quantities of aluminum in his products. He was asked if this were the case.

"We shan't use any more aluminum than we're using now until we make it ourselves," he replied. "We may do that at Muscle Shoals. We don't want to develop too fast. We've had all kinds of propositions presented to us, especially by people who have timber lands to sell."

That section of the south which borders on the Tennessee River is confident that the development of Muscle Shoals by Ford would do much to bring the waterway in which they are so much interested into equal prominence with the Ohio, and it is certain that Mr. Ford has given full consideration to the possibilities of navigation on the stream, but it is evident he expects the government to do whatever is required to promote another great waterway.

"That will work out automatically," he replied to a question about navigation on the Tennessee. "It's a matter of navigation and up to the government."

That also is his position in reference to the construction of conservation dams which will be required if the full possibilities of Muscle Shoals as a source of power are to be made available throughout the year.

All kinds of railroad projects leading to Sheffield are being staked out and surveyed in the apparent expectation that it will be possible to unload them on Ford and he was asked if he expected to become the leading railroad promoter for the south.

"We've got one railroad now, and that's all we want," was his answer. It was apparent that he had in mind recent persistent reports that he contemplated the purchase of other lines, for he added, "Why should we want to buy the Wabash?" Rumors that he will buy that line bob up periodically.

While Mr. Ford is quite willing to talk of his plans for development of the tremendous power resources of northern Alabama from a purely business standpoint, he is reluctant to discuss his ideas of what they may mean to the people of the South from a human point of view. His associates are more willing to dilate on this angle of the proposition, however. They will tell you that Mr. Ford has a deep dislike of seeming to pose as a philanthropist in this respect.

South Can Be Developed

Mr. Ford has a very deep interest in the people of the South. He doesn't believe they ever have had a real chance in a commercial way because they have lacked the capital to promote their own natural resources and have suffered from the selfish motives of promoters who have bought up lands rich in minerals or water power sites and then held them for years in expectation of unloading them at a large profit. He says himself that the South has never had a square deal.

"Southerners," he says, "are good people. They are real American citizens."

Ford believes that if he can use to the full the hydro-electric resources of Muscle Shoals he can put more joy into the lives of the people who already live in that section of the South, or those who may be attracted there by his projects, than they have ever known before. He wants them to get the full benefit of the use of electric energy in its myriad forms in their homes. He visions a time when the ordinary house will be heated by electricity and when the housewife, who is now more or less a drudge, will be doing all her cooking, baking and washing by electricity. His hopes in this respect are not confined to Muscle Shoals for he expects to acquire water power sites in other sections of the country as they become available and use them on a smaller scale to carry out the ideas he has for the South.



Henry Ford

Ford believes that the best kind of philanthropy is that which helps people to help themselves. He is honestly interested in the farmer as a human being and not entirely as a potential market for his products. That is one of the reasons he wants to go into the production of fertilizer on a large scale. He makes no bones of asserting that the prices now charged for fertilizer are little short of wicked. He realizes that the farmer cannot begin to get the best results from his land until he can replace each year, at something like a fair price, a reasonable proportion of the nitrate which is taken from the earth with every crop.

Friends of Ford in Detroit, as well as in the South, assert that he alone of the many who have considered Muscle Shoals has grasped their full possibilities from every point of view, and is confident of his ability to develop them. In this connection they give full credit to his engineers. They contend that it is not his financial resources alone which make his offer the soundest and most practical, for other interests would be overwhelmed with funds if their visions of the project were as broad as his. They assert that the international bankers, whom he abhors, always are glad to sell 4 per cent, 30-year bonds based on any sound project, and thus get a return of 120 per cent in addition to full value for their money. Ford's interests are universal in their scope but all of them are exceedingly practical. It is one of his favorite maxims that "everything should be worked out on the drawing board."

"If there is a demand for a thing there will be no trouble about merchandising it," he says. "If there isn't a real demand for it, you can't sell it for more than a little while."

Ford talked freely of Muscle Shoals which, if his offer for them is accepted, will become the greatest single source of hydro-electric energy in the United States. He was entirely honest in his assertion that he did not know exactly how he would employ their tremendous power resources. "We settle problems when we reach them," is one of his sayings. He has given much thought to the subject, but its potentialities are so gigantic that they stagger even the hardest working imagination.

If the past master of mass production, whose name is known wherever motor vehicles are operated, feels the burden of his great wealth, and he has $180,000,000 in cash, the load rests lightly upon his shoulders. It would be difficult to find a more democratic and genial individual. He did not seem to think that questions designed to elicit information about his affairs were impertinent.

There was apparent no effort at evasion, although it is true he did not elaborate in some of his replies. He usually explained, however, that he didn't know. He gave the impression that he didn't propose to commit himself too definitely on any subject with which he was not thoroughly familiar. It is an evidence of the man's simplicity that his own office, adjoining, is no more elaborate than the plain editorial sanctum of the *Dearborn Independent*, in which he was interviewed.

Interested in Water Power

Ford carries in his head a mass of information, all of which may come in handy sooner or later. The subject of Muscle Shoals brought up water power generally. There is no subject in which he is more deeply interested, or to which he will give more attention in the future.

Drifting away from the theme of Muscle Shoals, Mr. Ford was no more reticent about other subjects more directly related to the automotive industry.

He was asked, "What is the greatest thing motor manufacturers can do for their dealers?"

"Why not let the dealers do something for themselves?" was the rejoinder.

Under the circumstances it did not seem wise to press for further enlightenment as to his views on dealer helps and he was asked for his opinion on the subject of highways.

"The best way to get good roads," he avowed, "is to load trucks to their full capacity. When the roads won't stand up under these loads the people will realize they must build heavier highways to carry the traffic. One of the best ways to kill foolish opposition to spending money for better roads is for a few of the old fogies who are standing out against it to die off. This applies not only to good roads but to most forward looking projects."

As an example of high class highway construction he cited a mile of concrete in front of the Dearborn plant which stood up under the hardest possible kind of wear while some exceedingly heavy trucking was being done. Four sets of wheels on the traction engines which were used were worn out but the road did not break up, contrary to his expectation.

"Build More Roads"

Ford was asked what he expects will happen with the constant increase in the number of motor vehicles in use now that highways in some places seem to be carrying about all they'll hold.

"We'll have to build more roads," he said. "Of course there will have to be two lines, one for traffic in each direction."

Mr. Ford set at rest several frequently heard reports about projects he is said to have in mind.

"Can you tell us anything about the plans for your new car?" he was asked.

"What new car?" was the rejoinder. "I haven't heard of any. We can't build enough of the one we're making now. We're trying to get our production up to 5300 a day. We have orders for 136,000 or 156,000—or something like that—for October."

"It is reported, Mr. Ford, that you contemplate some additions to your tractor line."

"We shall make no more tractor models but will stick to the one we have," he replied. "We shall not make a larger tractor."

"Do you contemplate buying any additional plants?"

"Positively not. We've got enough to do now and are not going to buy any more cars or factories. That applies to the Wills plant and the Wills car, our purchase of which is rumored every little while. Why should we try to get any company out of the field? They all make business for us and we make business for them."

Develop Russia Later

Mr. Ford was asked what would be his next step in the foreign field.

"Maybe our next development will be in Russia," he replied. "Sooner or later we will have a plant there to make trucks, tractors and cars, but that cannot be until conditions become more settled there.

As an example of his views on the folly of pre-determining just what will be done in any plant, Mr. Ford said:

"The boys came in to me the other day with the sign for the Green Island plant which read 'Ford Motor Company—Ball and Roller Bearings.' I told them to take off the 'Ball and Roller Bearings' because we didn't know what we might make there."

To the interviewer, who frequently is harassed by the fear that he is encroaching too deeply upon the time of a busy man, Mr. Ford is a jewel. He was unhurried and serene. There was no sign of impatience. Only once in more than an hour did he look at his watch, and when I arose to go he said:

"No, no. There's no hurry. I have half an hour yet."

For many reasons a chat with Henry Ford is something to be remembered. You forget that you are talking with a man who started with nothing except an idea and has carved out a colossal fortune. He radiates good will, he has a fund of homely philosophy, a sense of humor and he inspires confidence.

Henry Ford knows what he wants. He has worked out his plans on the "drawing board."

There is a world of determination in his quietly uttered assertion in relation to Muscle Shoals:

"When the time comes we'll do our fighting, and some people will know they have been in a fight."

Research on Petroleum Products

THE American Petroleum Institute has made arrangements to conduct investigations covering, among others, the subjects listed below. In this work the Institute will be assisted by the Petroleum Section of the American Chemical Society through a committee acting in advisory capacity:

1. Preparation of more rational specifications for petroleum products, based on careful research work covering in particular items such as gasoline volatility and the oiliness of lubricants.

2. An investigation intended to determine whether certain processes now used in refining gasoline are actually necessary. These tests will seek an answer to the mooted question as to the need for removing bad smelling sulphur compounds which are supposed, but not certainly known to be, injurious to engines and other parts of the chassis.

3. A study into the fundamental causes of carbon formation in engine cylinders.

4. A research into the causes and mechanism of color changes in oils.

Among those who are to serve on an advisory committee dealing with this research program are R. E. Wilson, C. E. Waters, N. A. C. Smith and E. W. Dean.

THE new customs tariff of Ceylon which went into effect provisionally from August 25, as announced in Commerce Reports for September 4, has been adopted with certain modifications. The import duties on motor trucks remain unchanged, while the advance on automobiles and motorcycles is more moderate than had been proposed. The final rates are as follows:

Articles	Former duties Ad valorem	New duties Ad valorem
Automobiles	7½%	10%
Motorcycles	7½%	10%
Motor trucks	7½%	7½%

The duties in Ceylon apply equally to imports from all sources.

Record-Breaking Pulitzer Racers Show Advance in Plane Design

American planes break world's speed record at Detroit air meet. Winner averages 206 m.p.h. First four carry new radiator construction. Retractable type chassis prominent construction feature. Race indicates probable trends in aircraft design.

By Archibald Black

THE Pulitzer Trophy Race, held in Detroit, Mich., last Saturday, resulted in further pushing up of the world's speed records. Finishing the race at an average speed of 206 miles per hour, Lt. R. L. Maughan, U. S. Air Service, flying a special Curtiss-Army Racer, brought the speed honors to the United States. Lt. L. J. Maitland, U. S. Air Service, flying a duplicate machine, covered the course in the first lap at a speed of 216 miles per hour but lost some time in the succeeding laps, finishing slightly behind Lt. Maughan, although also breaking the former world's record. Each officer made speeds approximating 220 miles per hour on the straight stretches of the course. From the manufacturer's viewpoint, the Curtiss Company carried off all of the honors as constructors of the winning machines, the first four places in the race being taken by Curtiss airplanes.

Several of the 24 entries appearing on the official program failed to start for various reasons. It was evident early that the race was to be fought out between the Curtiss-Army, Curtiss-Navy, Booth Racer, Verville-Sperry, Navy-X, Verville-Packard and Loening. While some differences of opinion existed as to the exact order in which each would finish, it was generally thought that the Army-Curtiss would take first place, barring accident. The finish verified this opinion, the five fastest machines completing the race as shown in the accompanying table.

The outstanding features of the machines from an engineering point of view were the wing surface radiators and retractable landing gears with which several of them were equipped. The wing surface radiator has thoroughly demonstrated its worth for racing purposes, although it is of doubtful value in military and naval work because of its vulnerability.

This type of radiator, with which the first four machines to finish, as well as the Bee Line Racers, were equipped, proves use of the surface of the wings for radiation entirely practicable. While this principle is old, having been patented in France several years ago, it remained for the Curtiss Company to complete its development and put it into actual use in modern high speed machines.

The radiation is constructed by fastening together two sheets of brass, the inner one smooth and the outer one corrugated, and circulating the water between these. The brass sheets are fastened to the wings in place of the customary surfacing and water headers furnished on the leading and trailing edges. Both top and bottom surfaces of the wings are covered with the sheet radiators, while the water flows backwards on one surface and returns on the other. By the use of this system of radiation the resistance of the ordinary type of radiator is practically eliminated. Its success having been so thoroughly demonstrated in the Pulitzer race, it may be expected to become almost universal for racing purposes.

The retractable type of chassis, another novel feature used on both the Bee Line Racers and the Verville-Sperry entries, was not given a fair opportunity to settle its value. While these two types took part in the race, only one of them, a Verville-Sperry racer, made a fair showing. The others either did not start or dropped out of the race through one cause or another. The chassis of each type is somewhat similar, the wheels being drawn in towards the center of the machine and folded up into recesses in the wings.

Chassis Control Mechanism

The mechanism controlling the movement of the chassis, however, differs considerably in the two types. In each case the movement is manual and controlled from the pilot's cockpit. In the Verville-Sperry the shock absorber cords are located inside of each of the wheel hubs, these being about 9 inches in diameter. In the Bee Line Racer, the shock absorber cords are located on the outer struts and are inside of the wings. The wheels, in each case are of the wire type and in the Verville-Sperry are not covered. When the chassis is retracted, some resistance still remains because of the irregular surface and the open wire wheel on the under surface of each wing. Before the value of this type of chassis can be said to be determined, these faults in streamlining must be corrected so that the folded chassis presents substantially a smooth surface to the air.

The various machines divided into two opposite types so far as wings were concerned. Some made use of the thick wing internally braced principle, while others were frankly of the thin wing externally braced type. The first four machines to finish were of the latter type while the fifth was of the thick wing type. Offhand, this would appear to suggest that the thin wing principle was the most satisfactory for ultra-high speeds but Saturday's race was not sufficiently conclusive in this regard to finally settle the point. While we are basing our performance calculations on exact wind tunnel tests of thick and thin wings, these tests have been made at speeds of 40 to 60 miles per hour and on very small models. Now that we are flying full size machines at 200 to over 220 miles per hour it is an

Order of Finish	Entry	Airplane	Engine	Pilot	Average speed in race, m.p.h.	Fastest lap, m.p.h.
1	43	Curtiss-Army No. 1	Curtiss D-12 400 b.hp.	Lt. R. L. Maughan, U. S. Air Service	206.0	207
2	44	Curtiss-Army No. 2	Curtiss D-12 400 b.hp.	Lt. L. J. Maitland, U. S. Air Service	203.0	216
3	40	Curtiss-Navy No. 2	Curtiss CD-12 375 b.hp.	Lt. H. J. Brow, U. S. Navy	193.2	195
4	8	Curtiss-Navy No. 1	Curtiss CD-12 375 b.hp.	Lt. A. J. Williams, Jr., U. S. Navy	188.0	190
5	49	Verville-Sperry	Wright H-2 350 b.hp.	Lt. E. H. Barksdale, U. S. Air Service	181.0	182

open question if we have any justification for this practice. The National Advisory Committee's compressed air wind tunnel, will go far towards settling this question because it will enable the making of tests under almost directly comparable conditions.

The tendency towards provision of rigid surfacing of the wings on these very high speed machines was noted to be very much on the increase. The sheet type of radiator (already termed "washboard" at the flying fields) provides a very rigid surface where it is used. Thus the two fastest machines, having had plywood covered wing tips and this type of radiator, were provided with substantially rigid wing surfacing. The Verville-Sperry which finished fifth, had wings which were covered with plywood from the leading edge back to the rear beams, about three quarters of the wing surface being thus of the rigid type.

The tendency to close the gap at the control surface hinges (ailerons, elevators, etc.) has reached the point where it is almost general practice in racing machines. In some cases this end is accomplished by the use of rubber fastened to the surface on each side of the hinge and in other cases a metal strip, fastened to its forward edge is used. It was noted, in one case, that after the race the rubber gap closing sheet on one machine had been completely ripped off, carrying its fastenings with it. The condition of the tail surfaces indicated that rubber sheet gap closing is not satisfactory.

Navy "Mystery" Machine

The Navy X machine, which was said to have been surrounded with some secrecy before its assembly at the field, was rather a surprise to those who expected to find it a very high speed racer. This machine which is of the $1\frac{1}{4}$ plane type, was equipped with the new 600 hp. Wright engine. It possessed some unusual and very interesting features but it was obviously not designed for a race such as this year's Pulitzer turned out to be. In the very high speeds attained in present airplane races increased horse power is of only secondary importance. The race is determined by resistance. This is borne out by the fact that the winning machines were equipped with 400 hp. engines while other contestants which did not even approach their speeds had fifty per cent more power. The Navy X with its 600 hp. made only about 186 miles per hour as against the 216 miles per hour clip of a 400 hp. Curtiss Army racer in one of its rounds of the course. Study of the Navy X suggests that the 186 m.p.h. speed is probably within 5 or 10 miles per hour of its maximum. Equipped with two Lamblin radiators, a rather bulky wheel streamline, numerous struts and wires this machine made a strange comparison with the others which were conspicuously free from these. The wheels of the Navy X machine are carried on rocking arm constructions built of steel tube, the short axle being carried by the forward part of this frame while the shock absorbers are carried by the rear. The whole is covered with a very large streamline and my personal impression was that the resistance of the landing gear considerably exceeded that of the more conventional Curtiss-Army racer. In general arrangement of this machine, the forward part of the fuselage is raised above the usual proportion in height so that the angle of the wing is unusually large when tail skid is down. In addition to being used to test out the new Wright engine, the several features mentioned and some others of lesser importance which were noted, indicate that this machine was designed for chiefly experimental purposes.

Other Entries

The Loening machines while not attaining the speeds of some of the other entries, impressed the observer as having been designed solely for service purposes. It appeared possible to use them for this without any change whereas several of those making better speeds would require considerable modification which would, at the same time, detract considerably from the speeds reached in the race. As it stood, one of the Loening machines made about 170 miles per hour.

The Thomas-Morse all-metal monoplane was the most unusual entry in the race. Two of these machines, each equipped with Packard 600 hp. engines, competed, one reaching 165 miles per hour over the course. This type has a semi-internally braced wing of metal and covered with corrugated aluminum or duralumin. The fuselage is constructed of metal channels and tubes with corrugated metal surfacing and oval tube braces are carried from the fuselage to the wings. The radiator is of a very novel type but, while very ingenious, does not look as promising as some of the other types used.

The Dare variable camber monoplane did not take part in the races, the constructors having failed to furnish the technical data required by the contest committee. This machine was more or less of metal construction and had adjustable leading and trailing edges, hence the name "variable camber."

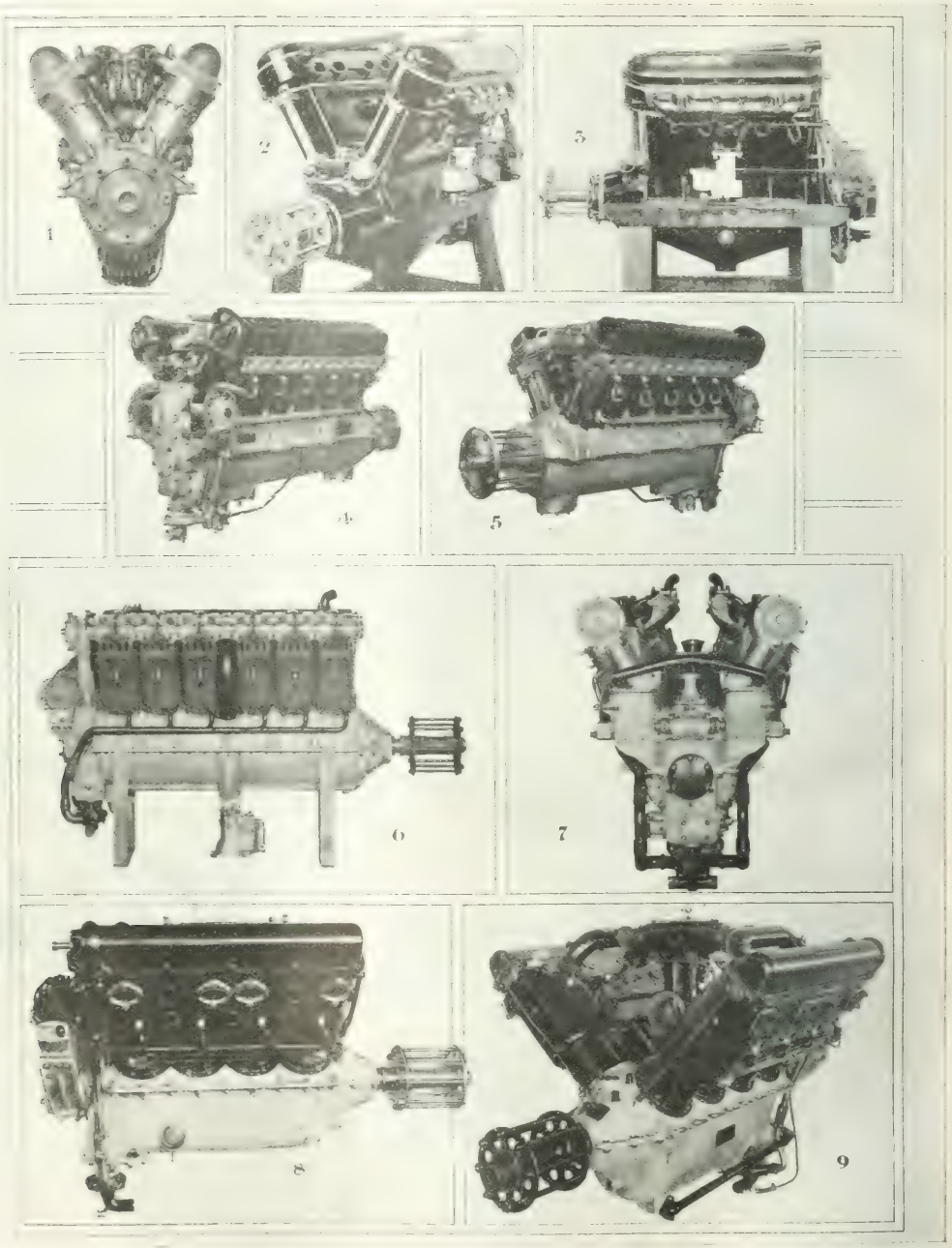
The outstanding engines in the races were the Curtiss CD-12 and D-12, the Wright H-3, E-3 and new T-2, 600 hp., the Packard 2025 the Lawrance J-1 and the Aeromarine U-873. This latter engine was the one which recently underwent a 300 hour test under supervision of the Navy Department. Practically all of these engines have been described previously and more or less completely in AUTOMOTIVE INDUSTRIES although in some cases this was the first opportunity to put them through severe service tests.

In the case of the Wright T-2 with which the Navy X machine was equipped, this was the first time that an engine of this model had been tested in the air. This engine develops about 600 hp. and is of the twelve cylinder Vee type. Cylinders are cast in blocks of three and are water cooled. Ignition is by means of two magnetos and the carburetors, following a practice which is increasing in popularity, are located below the crankcase. This engine is the latest development of the Wright Aeronautical Corporation and the actual engine installed in the machine in the race was the second of its type built. It is an

PULITZER RACE PLANES



1—The Verville-Sperry machine, three of which took part in the Pulitzer Race. 2—Thomas-Morse all metal airplane. 3—The Loening Army racer. 4—Curtiss-Army No. 1, winner of the Pulitzer Trophy Race (a similar machine took second position in this race). 5—The Pulitzer Trophy. 6—Navy TR-1, which finished second in Curtiss Merine Trophy Race. 7—The Verville-Packard, a veteran of former Pulitzer races, which took part in the recent one, the engine having been changed for the latest model of Packard. 8—Curtiss-Navy racer. Two machines of this type took third and fourth positions in the Pulitzer Trophy Race. 9—Curtiss 18-T. (This machine made the highest speed in the Curtiss Marine Trophy Race but ran out of gasoline on the last lap and did not finish the race)



1—Curtiss CD-12, 375-hp. engine as used in the machines taking third and fourth places in the Pulitzer Race. 2 and 3—Aeromarine model U-873, 200-hp. engine, as used in UO-1 Vought machine in Curtiss Marine Trophy Race. This is the model of engine which recently passed a 300-hour Navy test. 4 and 5—Curtiss D-12, 400-hp. engine, as installed in the machines taking first and second places in the Pulitzer Race. 6 and 7—Packard model 2025, 600-hp. engine, used in Loening, Thomas-Morse all-metal and Verville-Packard airplanes. 8—Wright model E-3 Alert 200-hp. engine, used in Navy TS seaplane and Vought VE-7. 9—Wright model H-3 Superfighter 400-hp. engine, used in Thomas-Morse MB-7, Bee Line Racer and Verville-Sperry Racer

entirely new development and bears no resemblance in appearance or design to the Hispano series from which the other models made by this firm were developed.

The Packard model 2025 is already well known. This is a twelve cylinder Vee type following the characteristic lines of design of the other Packard engines. Cylinders are of the individual, steel type as in the other models. This model develops as high as 650 b.hp. at 2200 r.p.m. although rated nominally at 550 b.hp. at 1800 r.p.m.

The Aeromarine U-873 is a development of this company's U-8-D model but weighing about seventy-seven pounds less although eighteen per cent larger in displacement. The principal changes were an increase of bore from 4¼ in. to 4⅝ in., some slight increases in the bearing thicknesses and inlet valve diameters. The redesigned engine is rated at 250 b.hp..

Touring Car Versus Phaeton

By George J. Mercer

THE writer, as a member of the S. A. E. Standards Committee that was responsible for the nomenclature of automobile bodies adopted by the Society of Automotive Engineers, desires to answer criticism of the change from "Touring Car" to "Phaeton," which was approved by this committee.

Due consideration was given to established practice and to the fact that the committee was setting a standard for the future as well as for the present. Consideration was given also to the origin or derivation of the names.

As proof that the committee bore the above considerations in mind, take two of the names selected, "brougham" and "cabriolet." Neither one has a derivative sense as used. There are several distinct outstanding features that are characteristic of the type of body known as the brougham in the carriage days and in the early days of the automobile, that are lacking in the automobile body the committee has selected to bear this name. At the Salon one or two genuine broughams are invariably exhibited. Yet the committee has given this name to the type shown on page K23 of the S. A. E. Handbook (copies of data sheets enclosed) because the general public had seen fit to use the name selected.

In addition, it was felt that the older or original type was not suitable in general for use as an automobile body type. We agreed, therefore, to pass nomenclature on to successors and in naming both the brougham and the cabriolet, we were actuated solely by the fact that the public commonly recognized these bodies by the terms mentioned.

One reason the committee chose the name "phaeton" was that the term "touring" applies to any particular type of body because all types are used for touring, but that was not the only reason. This type of body is the logical successor of the family horse-drawn open carriage known as the phaeton. It was so called in the earliest handbooks issued by the Association of Licensed Automobile Manufacturers. In the 1906 Handbook, Packard, Walters and Stevens-Duryea used the name "phaeton," Pierce-Arrow designated the vehicle in question as a "tonneau" and others used simply the series letters or numbers of the respective models without names. Later, as the design was changed and became a flush-side body such as we know to-day, "torpedo" was the common name in Great Britain, and was used to some extent in this country; while in France the use of the name "phaeton" was general. Packard, Franklin, Cadillac, Stevens-Duryea, Cunningham, Pope-Hartford and Thomas used the name "phaeton" in the 1913 A. L. A. M. Handbook. Hudson has been a consistent user of this term.

This certainly warranted the committee in concluding that the name "phaeton" had a logical right from a priority point of view, based solely on automobile custom, to contend with the name "touring car." Furthermore, as a name it has a wonderful background of history. It is associated with the type of carriage that people have owned and used beyond our memory. It is also applicable to the more expensive carriages that were exhibited at the horse shows.

Referring to the term "roadster" being retained, since all types of car are used on roads, we must again refer to the rules and conditions that governed our work. We gave first consideration to established procedure, and chose between the merits of the existing and to our viewpoint contending names. "Roadster" and "runabout" have been from the beginning the two most popular names for this type of body. The committee chose the first. The matter is simply one of opinion. The term "roadster" has slightly the lead in popularity in advertising and catalogs issued by passenger-car manufacturers.

As it was the task of the committee to select one name from the several in use for each of the various types of body, due consideration was given to the claims of all and the decisions were based on the basis outlined herein. We feel that our work has met with general approval.

Motorboat Nomenclature Studied

AT a meeting of the S. A. E. Motorboat Division on Sept. 28, in New York City, the importance of establishing a definite motorboat nomenclature was discussed and a subcommittee appointed to study the situation and advise as to how the work should be carried out. The subcommittee appointed consists of Irwin Chase of the Elco Company; W. J. Deed, a naval architect of New York and Leonard Ochtman, Jr., of Joseph VanBlerck, Inc. The committee will obtain information as to the current nomenclature used by the engine and boat builders as a basis for determining the scope of the committee's work.

Other subjects which the division is working on are motorboat couplings, exhaust manifold connections, tachometer drives, stuffing-boxes and propeller shafting. The work in connection with stuffing-boxes covers only those dimensions which affect interchangeability.

The division also plans to take up the consideration of interchangeability for marine hardware and other boat parts. There is a real demand for such standardization, as it is appreciated that it will decrease production costs, making it possible for boat builders and users to obtain body hardware at less cost.

Mercer Adds Six To Present Four-Cylinder Line

New chassis has same wheelbase and general characteristics as that built for several years. Changes include entirely new powerplant, stiffer frame, and new three-quarter floating axle.

By Herbert Chase

A NEW chassis with a six-cylinder engine has just been added to the line of the Mercer Motor Co. which heretofore has built only four-cylinder models. For some time past Mercer cars have been marketed chiefly for use where traffic is light and speed is desired, but the increase of traffic even on suburban and country roads has made it desirable to now add a chassis capable of a very wide speed range on high gear. The result is a car which handles well on high gear in traffic and has at the same time requisite power for high speed when conditions admit.

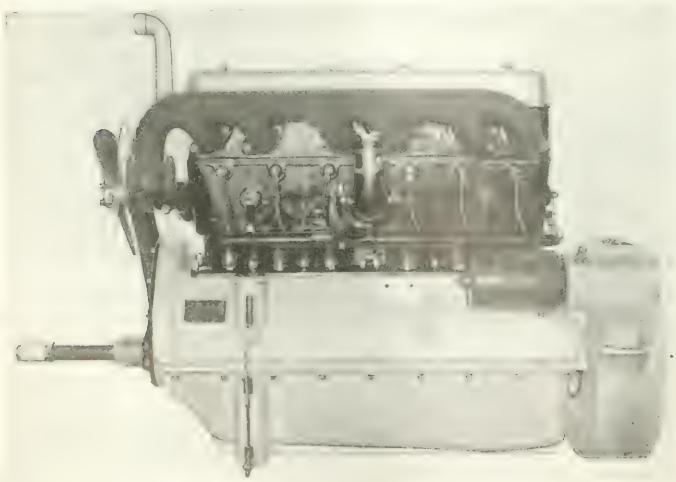
The chassis of the six is not entirely new, but most of its major units are either new or have undergone more or less change in design to accommodate them to a symmetrical whole. At the same time certain features which have been characteristic of Mercer cars, such, for example, as the propeller shaft service brake, are retained. Other unconventional parts, such as the four-speed gearset, are no longer required with an engine of six cylinders, while the use of a unit powerplant has made it desirable to employ three instead of four-point mounting.

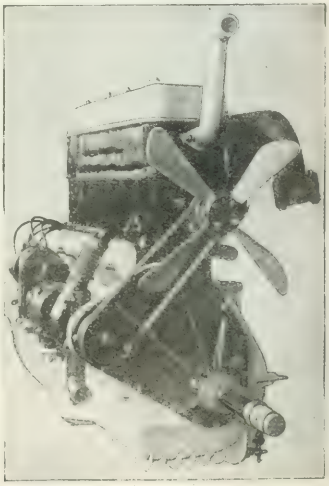
Outside the powerplant, the chief change is the substitution of a new rear axle and the use of additional and stiffer transverse frame members made necessary by the change in engine mounting. The steering gear and front axle as well as the radiator are practically the same as those used in the four-cylinder model, except that the mounting of the last mentioned unit is on spherical instead of cylindrical trunnions.

The wheelbase of both the four and the six is 132 in.

The new engine is of the overhead valve type, with the cylinders cast in a single block from a hard gray iron. The block is narrow and has an unusually clean exterior. It is recessed to enclose the pushrods and is provided with sparkplug openings at each side, one set of which are plugged unless two plug ignition, which is not standard, is desired. The cylinder head casting is perfectly flat on its under surface. Consequently the combustion chamber has a true cylindrical form and all its surfaces are machined all over. The head is attached to the cylinder block by nickel steel studs which are less apt to stretch than studs of soft steel such as are often employed on cheaper engines. The compression ratio employed is 4.7 to 1.

It will be noted that the valves are vertical and seat directly in the head. The inlet and exhaust valves are identical and both are made of tungsten steel. The clear open-





Side and front views of the new Mercer valve-in-head engine

ing is 1 9-16 inches. Care has been taken to see that there is sufficient space between each pair of valves to avoid their seating on a common wall, thus preventing seat warpage which might otherwise occur. The upper surface of the cylinder head is provided with split bearings for clamping in place the two hollow rocker shafts. The rocker arms are quite short and are made as light as practicable in order to reduce the inertia forces. The adjustable screws which contact with the upper end of the push rods are carefully fitted and the rockers are split diagonally and provided with tangent bolts which securely lock the adjusting screw once it is properly set. The lower end of the adjusting screws are hemispherical and contact with the cup shape upper end of the push rod, the cup being kept full of oil which lubricates these parts and provides a cushion which helps to maintain a quiet mechanism. Oil is fed under pressure to the hollow rocker shafts and issues through holes drilled in the shaft and thence through passages in the rocker arms, whence it enters the cups on the upper end of the push rods and overflows running down the rods to the base chamber, lubricating the tappets and cams in so doing.

The push rods are made of steel tubing, the inserted ends being welded in place. The cam followers are mushroom type, and the cams are so shaped as to promote quiet operation.

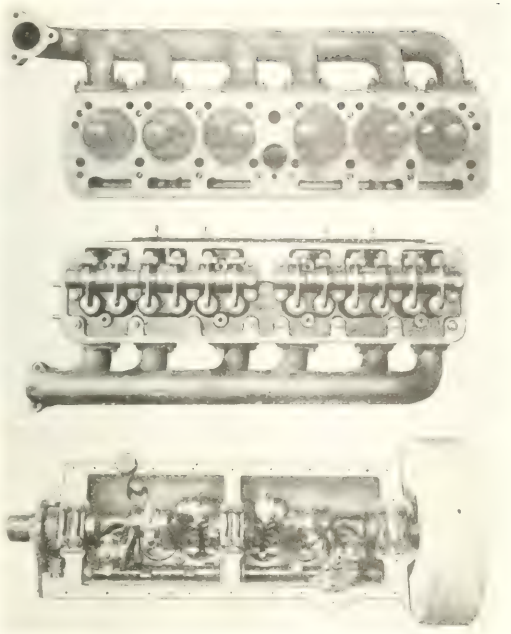
The aluminum cover used to enclose the valve mechanism is well ribbed and securely bolted to the head by eight cap screws. This insures an oil tight joint and obviates the drumming noise which sometimes occurs when a pressed metal cover is employed.

The cylinder block is bolted to an aluminum crankcase which is quite conventional in its general construction. The upper half of the case carries the main bearings while the lower half serves chiefly as an oil reservoir. The main bearing caps are of aluminum, with drop forged steel reinforcements shown clearly in one of the cuts. These bearings are bronze backed babbitt lined and measure $2\frac{1}{2}$ inches in diameter. The front and center main bearings are $2\frac{1}{2}$ in. and the rear main bearings $3\frac{1}{2}$ in. long. The camshaft bearings are die cast babbitt and are pressed into the crankcase. The gear type oil pump is driven by a vertical shaft, its driving gear meshing directly with another gear forged integrally with the camshaft. The latter is a nickel steel forging case hardened and ground to close limits.

Helical Timing Gears Used

After exhaustive experiments it was decided to use helically cut timing gears which are said to have proven quite as quiet and more durable than other forms of drive with which experiments have been conducted. The pinions on the crankshaft and pumpshaft are steel forgings, while the intermediate gear is of Micarta. The gearcase cover is of cast iron heavily rimmed to receive the hollow plug which forms the front support for the engine. The pumpshaft, which carries the fan driving pulley on its forward end is provided with oil slingers and a coarse pitch tread which effectively prevents oil leakage. The centrifugal water pump is provided with a stainless steel shaft to insure feedom from corrosion. The lighting generator is driven off the rear end of the pump shaft while the rear end of the generator shaft is used to drive the Eisemann magneto. Special care has been taken to securely lock to the respective shafts the flexible couplings which are used to drive the units in this train. A tapered shaft end is employed at most points. The fan has four cast aluminum blades and is driven by a flat endless Gilmer belt.

The lower crankcase is provided with external ribs to assist in cooling the lubricant and to stiffen the case. The oil drain cock is provided with a long vertical stem terminating in a handle at a point above the sheeting which is inserted between the engine and frame, the arrangement being such as to make it unnecessary to reach under the chassis to drain off spent lubricant.



Above, two views of cylinder head showing arrangement and location of valves. Below, under side of crankcase of new Mercer engine

The lynite pistons are constant clearance type and are provided with three rings above the pin. No scraper ring is employed. The piston pin is of hollow tapered section and is fastened in the rod.

Connecting rods are drop forged, high carbon steel of H-section and measure 10 in. center to center. The bronze back, babbitt lined, big end bearing measures $2\frac{1}{4}$ in. in diameter by $2\frac{1}{2}$ in. long. The rods are machined on the outside edges and the web is drilled to reduce weight. Two nickel steel bolts are used to secure the big end bearing.

The crankshaft has crescent shape throws, oil being fed through the shaft and around these throws by external pipes placed circumferentially in order that centrifugal force may not interfere with the flow of oil through the pipes.

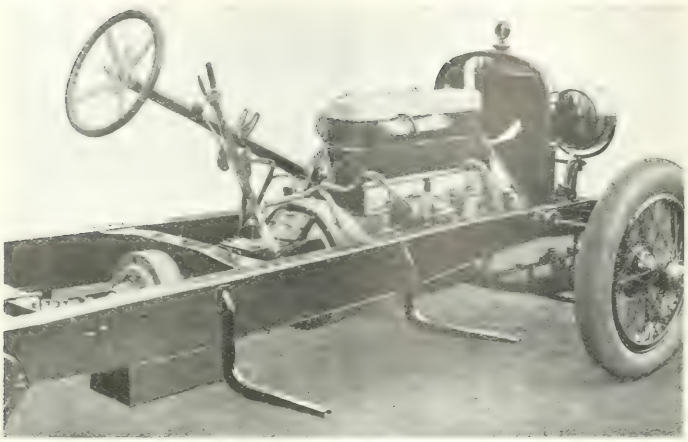
Oil pressure varies from about 5 to about 40 lb. per sq. in. as the speed increases.

The engine has $3\frac{3}{4}$ in. bore and 5 in. stroke giving a piston displacement of 331.3 cu. in. It develops its maximum of 88 to 90 horsepower at a speed between 2800 and 3000 r.p.m.

A $1\frac{1}{2}$ in. Model OC 3 Stromberg carburetor of the side outlet type is employed. The air is pre-heated by contact with the exhaust manifold and the charge is afterward heated in the cylinder block by contact with the water jacketed walls and in the valve pockets where some of the walls are common between inlet and exhaust.

Fuel is fed by a G. G. vacuum tank from a large tank suspended from three points on the rear cross-member. It is fitted with a Rochester gasoline gage.

The exhaust manifold is provided with a front outlet which makes it possible to carry the exhaust pipe well



Front end of the Mercer six-cylinder chassis. Note mounting of propeller shaft brake on center cross member

below the floor of the car and prevents heat from entering the drivers compartment.

The front end of the engine is mounted in a spherical trunnion which is concentric with the crankshaft while the two rear supporting arms of the engine are bolted solidly to the frame. In this case, as with other parts bolted to the frame, rather thick shims are employed to give the desired alignment. This makes it possible to interchange engines in the same chassis without changing the drilling, and still assure correct alignment.

The new three-speed gearset, which in common with the new multiple disk clutch is of Brown-Lipe manufacture is supported on a bell housing bolted to the crankcase. The use of this gearset did not admit of a satisfactory mounting for the same propeller shaft brake which has long been a characteristic feature of Mercer cars. It was consequently decided to mount the brake as an independent unit. The bracket employed is an aluminum casting which carries the brake shaft in two ball bearings. This casting is bolted up to the center cross member of the frame and thus serves as a rigid anchorage for the brake. The brake itself is identical with that employed in the four cylinder chassis. The brake shaft is connected to the gearset by a short shaft and a flexible coupling similar to that formerly employed between engine and gearset. From the brake shaft the power is transmitted to the rear axle by a propeller shaft with two Spicer universal joints. The drive is the Hotchkiss type with the spring torque as well as pushing the car. This arrangement has long been used on Mercer cars and has proven highly satisfactory.

The new rear axle is a Columbia three-quarter floating type. It is provided with a one-piece pressed steel housing which has a single welded joint. The spiral bevel gears give a reduction of 4.08 to 1 in case of closed car axles and 3.77 to 1 in chassis fitted with open bodies. The ring gear is provided with serrations which fit into the splined differential housing and take torsional strains, so that the rivets serve only to hold the two parts together. All bearings in the rear axle are of the taper roller type. The hand operated internal expanding brakes on the rear axle are carried in flanged drums of 16 in. diameter and are completely enclosed.

Both front and rear springs are semi-elliptic and are the same length as those employed in four-cylinder chassis. The front springs are 39 in. long and the rear springs being 59 in. Both sets are 2½ in. wide. The rear springs are underslung directly beneath the side rail and are bolted to axle by U-bolts which pass around the axle housing.

An interesting feature of the spring suspension is the type of shackle employed. The side links of the shackle are forged separately and are then machined with a taper hole in each end. The shackle bolts are necked at both ends and the reduced diameters are threaded through a part of their length to receive nuts. The necked portions do not fit directly into the shackle links but split collars tapered on their outer surface to fit the tapered hole in the link are interposed. Thin washers are placed between the nuts and the collars, after which the nuts are drawn up tight. This forces the tapered collars into the tapered holes at the same time causing them to contract on the necked portions of the bolt, thus making the bolt a tight and rigid fit in the link. The thin washers are then bent over in such a way as to lock the nuts securely in place. The shoulders on the bolt space the links the desired distance apart, this distance being equal to the length of the bushing pressed into the spring eye, so that there is no side shake. With this construction the two bolts and two links become, in effect, a single piece which is exceptionally rigid. The bolts are made hollow to receive Alemite grease fitting and are so grooved on the bearing surface as to permit the grease to reach the whole bearing surface.

The use of a unit power plant with three point support has necessitated some changes in the frame as compared to that employed in the four. The side rails are practically unaltered, but there is a new and rigid cross member to support the front end of the engine and a wider and stiffer rear cross member above the gasoline tank. The central cross member is provided with wider flanges than were formerly used. The tubular cross members one of which was in front of the radiator, and one near the rear of the frame are now eliminated. The battery carrier is attached to the right side member of the frame, under the front seat, while the muffler and exhaust pipe are now on the right end.

The Front Axle

The front axle, made complete in the Mercer plant is substantially identical with that used and found highly satisfactory for several years. It is of conventional inverted Elliott type and is forged from nickel steel. The steering knuckles and arms are made of heat treated chrome nickel steel. The bent arms are originally forged straight. The tapered ends are then machined after which the arms bent to the desired form. The part is then carefully heat treated and tested for hardness. The steering pivots have ball thrusts and are given a 2½ deg. rake to the rear.

The Gemmer steering gear which has been used successfully on the four is used also in the six cylinder chassis. This is a worm and gear type. The steering post is slung on an adjustable bracket which permits of its being raised or lowered to suit the drivers of different stature.

The appearance of the front end of the car has been slightly altered by removing the tubular frame member in front of the radiator and changing the shape of the splash pan. The front horns of the frame are now provided with

fore and aft bolt holes for bumper mounting, and carry a new design of lamp bracket. This is triangular in side elevation and has at its upper end a socket in which forked lamp supports of various sizes can be attached.

The weight of the six-passenger phaeton is 3900 lbs. ready for the road including two extra tires. The complete car with closed body weighs about 4300 lbs.

Six standard body models are offered. The open models include a four-passenger roadster, six-passenger phaeton and four-passenger sport model. The closed bodies include a sedan and a touring limousine, each seating six, and a four passenger coupé. Body lines are similar to those which have characterized the Mercer cars in the past. The bodies are low hung and the passengers sit well down in the body, following European practice in this respect.

The open models will sell at $3,750 and closed cars for $5,000. These prices include, among other items, the following equipment: 6—32 x 4½ in. cord tires, Rudge Whitworth wire wheels on open models, artillery type wood wheels on closed models, Waltham clock and speedometer, Moto-Meter, Alemite lubricating system on chassis parts and a special form of finger operated dimmer switch arranged just under the steering wheel rim where it can be operated without taking the hand off the wheel.

A New Portable Electric Drill

PORTABLE drills are used for a variety of automotive production work and are also a most convenient tool for use in the service station. They are employed not only for drilling, as in body work and frame assembly, for example, but for setting screws, turning up nuts, valve seating and a variety of production jobs not easily accomplished on a fixed machine. They have, therefore, become a labor-saving device which is finding an increasing field of application.

Rapid advances have been made in recent years in the design of electric drills. This type of tool has been developed into a rugged and dependable machine capable of handling successfully drills of considerable diameter without the failures in service which characterized early products in this field. This has been brought about by greater care in construction as well as by better design—larger bearings, better ventilation and proper lubricating means as well as by superior electrical characteristics and materials. In addition convenient attachments such as screw feed devices, special handles and even bench presses have been added to increase the field of usefulness.

A good example of modern practice in drills of this type is that recently placed on the market by the A. F. Way Co. The features of this drill include a 1 3 hp. motor designed especially for the purpose by the General Electric Co., 20.7 to 1 reduction gear, plain, "wick packed" and oil tight bearings and a rigid aluminum housing with proper openings to insure, in connection with a blower mounted on the armature shaft, an adequate circulation of cooling air.

Probably the most unusual feature of this design is the use of a special form of plain bearings on the ½-in. armature shaft, which has a no load speed of 500 r.p.m. The bearing blocks are spool shaped and have two grooves in the babbitt lining. These grooves are parallel to the axis and terminate in holes which run through to the smaller outer diameter of the spool. Wool wicking is threaded through the groove and the holes and the loose ends are then wound around the spool several layers deep. When soaked in oil the wicking becomes, in effect, an oil reservoir from which the oil is fed automatically to the wicking in contact with the bearing surface. The feed is so gradual, however, that oil is not thrown out of the bearing. Any small amount which may tend to escape is prevented from so doing by felt washers provided for the purpose.

Brush holders are of the tubular G. E. type fitted with long springs and easily replaceable brushes good for at least 500 hours of operation. A standard G. E. snap lever switch is recessed into the handle in such position as to be near the operator's hand. The lead wire is covered with heavy rubber tubing and is securely fastened in place by four contracting jaws drawn up by a tapered nut.

The gear reduction is by spur pinions arranged in an over and under clock train. There are three steps in the reduction involving the use of six gears. Each pair of gears as well as the single gear on the chuck spindle, has a bronze bearing on both sides. Only the armature pinion is overhung and that has a long relatively high speed bearing. This pinion and the gear on the chuck spindle and threaded onto their shafts against shoulders, the threads being so made that the torque tends to tighten the pinion on the thread.

The small pinions of the gear train are integral with their shafts and are double the length of the bearing face. Half of this length is recessed into the splined hub of the gear, which is broached to fit it tightly. The use of keys is thus entirely avoided.

A ball bearing is provided to take the thrust of the chuck spindle, and this, in common with the gears and their bearings, is enclosed and packed with grease which fills the separate gear compartment. The drill is equipped with a ⅜-in. three-jaw Jacobs chuck.



The Way portable electric drill with screw feed attachment mounted on stand

The screw feed is provided with a hand wheel which operates through bevel gears. This avoids the use of a wheel concentric with the spindle and thereby maintains the same side clearance which is had without this attachment.

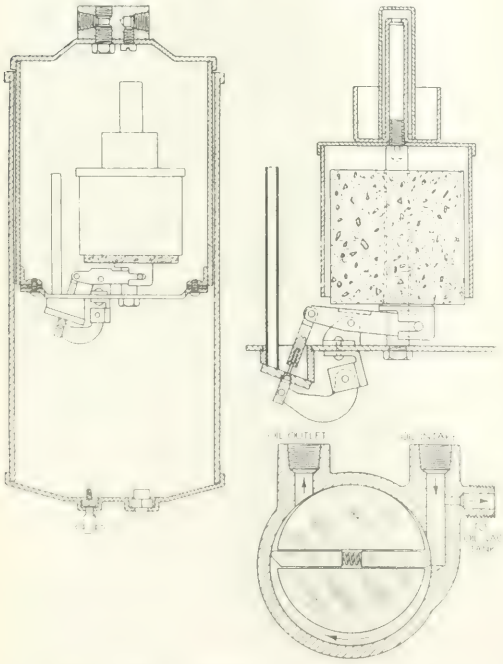
The drill stand shown in the cut converts the portable unit into a bench drill, which is an exceptionally convenient tool in any shop.

New Fuel Feed System Uses Vacuum Created by Oil Pump

Acts as safety device in that car will not operate when oil supply is exhausted. Vacuum increases with engine speed regardless of throttle opening. Installation includes vane type oil pump. Hydraulic control operates the only valve in entire system.

AN oil circulating and vacuum feed system has recently been placed on the market under the name "Oil-Vac." It is the product of Byrne, Kingston & Co. This system differs from other vacuum fuel feeds in that it utilizes vacuum produced by an oil pump instead of that created in the intake manifold. For this reason there is no infringement on patents covering fuel feed systems operated by manifold vacuum. In the Oil-Vac system vacuum increases with the speed of the engine and is not dependent upon throttle opening.

An engine equipped with this system cannot operate without oil. If the oil supply runs out vacuum ceases to exist and fuel ceases to flow thus preventing burning out bearings through exhaustion of lubricant.



Cross-sections of "Oil Vac" units showing details of tank construction, operating mechanism with hydraulic control of valve and vanes and rotor of special oil pump

The system consists of a fuel tank and an oil pump. The tank is made in two units. One unit is a slip tank which contains all the mechanism mounted on a detachable bottom plate held in place by screws and sealed by a cork gasket. The other unit is the incasing tank which holds the slip tank in its upper part while the lower part serves as a fuel reservoir. The tanks are made of Parkerized, soft drawn steel and are enameled.

Special Vane Type Pump

A vane type pump is used. This special pump is fitted to insure vacuum at low engine speeds. It can, if desired, take the place of the regular oil pump used to supply force feed lubrication. The vanes, which are machined steel, case-hardened, are arranged to slide in the eccentric rotor and are held apart with a spring. The pump housing is made of cast iron and the rotor is made of cold rolled steel.

At the pump inlet there is provided a connection for a pipe running to the top of the vacuum tank. The top fitting of the slip tank also contains a connection for a pipe running to the main fuel tank. The connection at the bottom of the outer tank leads to the carburetor.

Communication between slip tank and outer tank is through a valve, the only valve in the whole system. As the pump reduces the air pressure in the slip tank fuel is drawn in from the main supply tank. As the fuel level rises the cork float is lifted and the valve is opened by it when a certain height is reached. This permits the fuel to flow from the slip tank into the lower reservoir which connects with the carburetor.

This operation repeats until fuel in the reservoir reaches the valve opening at which level it is maintained throughout operation of the engine. The fuel supply which the carburetor draws upon remains at an approximately constant level, hence the static head is substantially constant. Air enters the lower tank through the space between the walls of the slip tank and the incasing tank.

Hydraulic Control of Valve

The hydraulic control of the valve is positive and no springs or toggles are employed. The float is of cork and is of such size that gas-logging does not affect its operation. The valve is always wet with fuel and is self-aligning and self-cleaning. It is easily inspected by lifting out the slip tank and the float mechanism is made accessible by removing the plate which forms the bottom of the slip tank.

Affixed to the mouth of the valve is a small standpipe,

the lower opening of which is closed when the valve is closed while the upper end is above the fuel high level. When the valve opens, air passes from the reservoir to the slip tank thus rapidly equalizing the pressure to permit quick dumping of fuel from the slip tank. The float is inclosed by a cover which prevents the fuel entering the slip tank from being discharged against the float.

The reservoir discharges its fuel to the carburetor regardless of what takes place in the slip tank, furthermore the slip tank pumps fuel only so fast as the reservoir discharges to the carburetor. The float chamber has no direct connection to the air, hence entrance of dust or dirt is rendered practically impossible.

A self-cleaning drain valve is provided to break up and remove any ice or caked dirt which may accumulate from the fuel.

A Combined Poppet and Sleeve Valve Engine

IN some recent tests conducted at Armour Institute of Technology under the direction of Profs. Daniel Roesch and H. A. White a single cylinder engine designed and built by Victor R. Stenger, formerly in charge of the experimental department of the Thomas-Morse Aircraft Corp., showed rather good power and low fuel consumption.

The engine was made to test a valve layout which consists of a single poppet valve A, shown in the cross sectional view, carried in a cage B, which also acts as a guide for the sleeve valve C. This cage is in reality the cylinder head and is held in place by the nut D threaded into the cylinder block. The poppet valve is operated in the conventional manner by the rocker arm E. The sleeve is operated in much the same manner by two parallel rocker arms F. The inlet and exhaust ports are shown by G and H respectively.

Among the claims made for this valve layout as compared to conventional types are the following: A gain of 20 deg. on the full opening period of the inlet port; greater ratio of valve area to the cylinder volume with consequent less throttling of the incoming and outgoing gases; low ratio of flame swept area to cylinder volume. The valve is readily accessible for cleaning and repairing, and there is said to be relatively even temperature for the cylinder walls and valve.

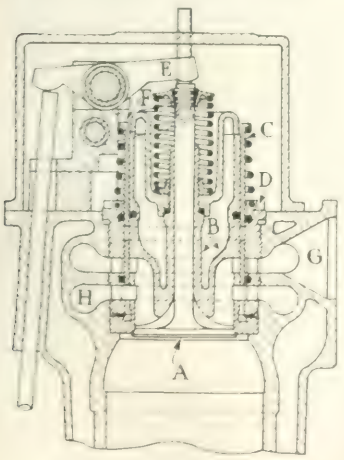
The curves shown were taken from average runs on a single-cylinder 4 x 5¾ in. engine. The fuel used in the tests was ordinary commercial gasoline.

All the working parts of the engine are inclosed and work in a spray of oil. From the sectional view it will be noted that the valve guide is made in such a way as to permit the introduction of water from the cylinder jackets to assist in keeping the valve cool. This is an important matter in this case where the single valve assumes a large diameter.

The entire valve mechanism can be removed in about 10 min. and one cylinder of a multiple can be repaired without disturbing the others. The threads on the member which holds the cage in the cylinder block are quite coarse and inasmuch as they never are subjected to the heat of the explosion they are not likely to stick.

THE popularity of motor buses is increasing to such an extent that the market which is derived from the demand for such vehicles promises to become a vitally important outlet for automotive products.

The world-wide growth of public automotive transportation is reflected in an increasing flow of reports to the Commerce Department from countries with a highly developed transportation system as well as from relatively unpopulated and undeveloped areas such as the Near East. In the course of one week reports on motor bus operations from London (Ont.), Geneva, Damascus, Aden and Melbourne have reached the Automotive Division.





Left—Sectional view of Stenger combined poppet and sleeve valve engine. Right—Power, torque and fuel consumption curves of Stenger engine

Showing Up the Weak Spots in Motorcycle Design

British Six Day Motorcycle Trial indicates marked improvements in design. Judges' report makes frank criticism of the entrants. Manufacturers learn much from this severe yearly contest.

By M. W. Bourdon

THE judges' report of the annual Six Days' Motorcycle Trial, organized by the national body of motorcycling, the Auto Cycle Union, records "vast improvement" over any previous trials result, though the detail design of the majority of the machines which competed does not escape somewhat severe criticism.

The trial this year was run during the week Aug. 21 to 26, and the course was in general decidedly severe, and while the full distance on the road was but 830 miles, it represented some thousands of miles of ordinary use in the hands of the average rider. On the whole the weather was favorable, though rain fell on two or three of the daily runs and wet roads were encountered on several others; the conditions were sufficient to be a severe test of mudguarding, etc., but not bad enough to make the test hills unduly difficult.

With one exception, there were no remarkably stiff hills, though gradients of from 10 to 20 per cent were frequent, many of them over mountain tracks—rutted, stony and grass grown. The stiffest gradient was one of 30 per cent and of considerable length; this was an optional test with five bonus marks for a successful climb, and of the forty-five competitors who made the attempt only two failed. Overheating was noticed on some of the longer climbs among the Welsh mountains, but even in this respect improvement was evident in this year's machines.

In all there were 142 starters out of an entry list of 144, and these were divided into ten classes, ranging from "featherweight" machines with engines of 250 cc. or under to solos, combinations and cyclecars with engines of 1100 cc. and less. Gold medals were awarded to 78, and 43 failed to complete the course.

Extracts from Judges' Report

The following are extracts from the judges' report issued late in September:

Cleanliness. There was enough bad weather to indicate that many machines should be better guarded. In view of the fact that they are usually traveling fast, protection from dirt carried by wind currents is of great importance in securing cleanliness for rider and machine. Oily dirt is very objectionable and ranks worse than road dirt, which is easily washed away, provided that water-excluding bearings are fitted or that proper shielding of transmission is adopted. The discharge of oil from the transmission or exhaust on to tires was rather too common and is particularly objectionable. Actual mudguards show improvement, and are mostly well designed for strength and ease of cleaning.

Light weight machines. Particular attention is drawn to the fact that it is primarily the very inexpensive light weight to which we must look to popularize motorcycling, and it is therefore very important that the small machines should be adequately mudguarded, well silenced and clean. The crude means adopted for lubrication of the transmission in many machines prevents them from being even reasonably clean.

Increasing Thermal Efficiency

The small engine can, it is evident, be increased in thermal efficiency to a point where performance appears to almost equal that of the largest types. This is apt to mislead the public as to the undoubted value of the larger engined machines, which use material in similar strength only less highly stressed. The larger machines are therefore capable of giving more reliable service and a more lasting standard of performance than the light weights when used under comparable conditions. The vibration of engine and transmission on many light weight motorcycles not only causes wear and tear, but gives great discomfort to the rider. In cases where weight of rider and machine are not greatly different, much can be gained by properly springing the rider alone. Possibly the general improvement in the final condition of cycle parts as a whole was due to the generally improved springing of saddles and the fitting of large tires.

Engines. In some of the lighter machines where it is impracticable to carry the engine on a relatively heavy cradle, a great deal of engine vibration takes place. Much more attention should be given to the balancing of light weight engines in some of the cheaper machines.

Valve Breakages. Valve breakages were too frequent; the ordinary rider regards such a failure as quite a serious breakdown. Valve guides and springs should be inclosed, as is done on several engines, when in consequence they can be slightly lubricated. Overhead valve gears should never be left exposed. It is regrettable that the lubrication of such parts should be left to the smearing-on of lumps of grease or constant applications of the oil-can. It is difficult to keep the lubricant in its place owing to the comparatively high temperature at which the parts have to work.

Two-Stroke Engines. Two-stroke performances were very excellent. If more attention were devoted to the reduction of petrol consumption and greater freedom from carbonization, this class of machine would in the larger classes become extremely popular on the grounds of simplicity and maintenance of tune alone.

It is of the utmost importance that adjustments, how-

ever simple, should not be frequently required on motorcycles, because they are seldom made at the right time. Motorcycles in particular should be simple, not only to ride, but to maintain. The difficulty of making adjustments on parts necessarily exposed to dirt is a serious point in the public mind.

More Silent Operation Needed

The modern engine requires too frequent decarbonization, and should therefore be made very accessible for the carrying out of this process.

Silence. A very notable improvement has taken place in general silence, but there is still room for an all-round reduction of noise. No really objectionably noisy machines were entered; but, on the other hand, no entry reached the desirable degree of silence.

Transmission systems in particular were frequently objectionably noisy. Much of this mechanical noise is produced by the absence of proper lubrication. Mechanical clatter is inexcusable.

Mufflers should be situated as near the valves as possible, and where an attempt is made to cool the expansion chamber, it should be remembered that at a distance from the port the heat gradient is so slight as to render finning ineffective.

Brakes. Each competitor was taken down the test hill at Brooklands on the 25 per cent gradient and required to pull up with the gear in neutral position.

In mechanical design and general operation brakes have improved enormously, more particularly front wheel brakes. Special brake drums are now the rule rather than the exception. Improvement in some of the front wheel brakes is still needed, however. Two points requiring attention are (*a*) side-car brakes, and the fitting of ratchet brakes to combinations to enable them to be held on a gradient. (*b*) Hand-operated adjustment should be provided, as it is not pleasant to require tools every time either brake has to be taken up.

Fittings, etc. The general aspect of most machines from the point of view of multiplicity of small parts is better. Greater accessibility on light weights is important, as is more standardization of nuts. Gearsets or their equivalent in chain transmission are still offenders on the score of being too light, with clutch parts and gear wheels of rather small dimensions. An undue proportion of retirements was due to gearset failure.

Steering Heads. Still need strengthening and larger ball races should be used where wear is possible.

Wheels and Bearings. Wheel bearings in many cases showed looseness and the rear wheels of several of the light weights suffered considerably. Rims were very good.

Lighting. It is regrettable that more machines were not fitted with electric lighting, which could be reduced considerably in cost if more widely used.

Foot Rests. The attachment of these is now much sounder than formerly.

Stands. To lift a relatively heavy machine on to a stand is not easy, and the fitting of "prop" stands in addition to the rear stand would be convenient for short stops.

Side-car Connections. Were sound throughout, and this despite the fact that the side-cars themselves were mostly heavy.

Controls. Many machines had clutch controls operated with difficulty from badly placed handles.

Reliability. As regards the finishing machines, it was very notable that general mechanical design and construction had been very much improved. Only three machines which completed the course lost the maximum award on account of deduction of marks at the final examination.

Improvement Over Previous Trials

This is a vast improvement over any previous Six Days' Trial result, and is a matter for congratulation to manufacturers. Now that engine power is ample there is no tendency to cut weight in important parts, with the result that from a mechanical point of view construction is much sounder. On the other hand, the percentage of retirements, namely, 30.3 of starters, is the highest of any trial since the war.

General Remarks. The motorcycle, from the most inexpensive light weight to the heaviest combination, has, in spite of many manufacturing difficulties, made enormous strides in general convenience, reliability, comfort and simplicity.

There is no make of machine receiving a premier award that cannot be used with confidence, and the objections of many of the buying public as regards noise, dirt, and complications have been met to a remarkable degree.

The 1922 Six Days' Trials provided a severe test, and as many of the retirements are attributable to causes beyond control, such as collisions, it is remarkable that such good performances have been shown.

Motorcycles Selling Well in South Africa

THE motorcycle business in South Africa has suffered but little from the general depression of the last eighteen months, says Vice Consul Cawston, Capetown, in a report to the Department of Commerce, as many people who would have purchased passenger cars under normal conditions have bought motorcycles instead. While the passenger car and truck business has fallen off tremendously during the past year, most of the motorcycle dealers state that their business is holding up well, and one agent in Cape Town who handles one of the best selling American motorcycles in South Africa says that he is selling almost as many machines now as he did during 1920.

Heavy, powerful motorcycles are the most popular in South Africa.

People who in the United States would not ride motorcycles ride them extensively in South Africa. It is not at all uncommon to see well-to-do and sometimes prominent men riding motorcycles in this country, often carrying their wife and one or two children in a side car. The economy of operation which is a very important factor in motor transportation in this country as gasoline costs from 60 to 70 cents a gallon, is another important reason why many people prefer motorcycles to other motor vehicles.

Although more British machines were sold in South Africa before the war than American makes, motorcycles from the United States are now more popular than English machines and according to reliable figures twice as many American machines are now sold here as English.

Gear Makers Urge Better Cost Systems and Discuss Technical Problems

Careful estimating, apprentice training, standardization and the measuring of gear noise chief topics considered at convention of American Gear Manufacturers' Association. Technical progress reported. History of gear development traced from ancient times.

By P. M. Heldt

THE necessity for more careful estimating in the gear industry was the chief topic of discussion at the semi-annual meeting of the American Gear Manufacturers' Association, which was held at the Drake Hotel, Chicago, on Oct. 9, 10 and 11. The standard method of cost accounting developed by the Association is a great help in this connection, but, unfortunately, it is not as widely used as would be desirable, and some members believe that the Association could do much more in propagating sensible methods of estimating.

On the other hand, the Commercial Standardization Committee realizes that there are certain limitations to its activities, set by law and by court rulings, and there is absolutely no intention to venture on legally dangerous grounds. In the discussion of this subject it was brought out that another association had been advised by attorneys that it would be unwise to suggest uniform action on—

Furnishing samples of machines with or without charge.

Acceptance of quantity future delivery contracts according to which products are to be delivered and accepted by the purchaser.

Length of time contracts for future delivery.

Length of time payment and discounts to be extended to different classes of customers.

Allowing all or part of delivery charge.

Consigning stock to central stations.

Furnishing without cost, of advertising matter, etc., to resale customers.

The same attorneys, however, approved the use of a uniform contract form if legally approved, as adopted by A. G. M. A. last year.

Commercial Standardization

Various committee reports were presented at the opening meeting, including that of the Commercial Standardization Committee to which reference has been made already. In this report the importance of using the standard costing system was emphasized and illustrated by the following example: A certain company with a capitalization of a million and a half dollars pushed one particular branch of its business because it believed it to be the most profitable branch, but when a proper costing system was applied in this department, it was found that it had been run at a loss for years and was entirely discontinued. The committee believes that the work of standardizing methods of estimating, which is now being taken up by the Cost Association Committee, is of prime importance.

The Purchasing Agents' Association has been working for years on proposed standard invoices and buying forms, and, when this work yields results, they will be presented to the A. G. M. A. with a view to their adoption for use among gear makers. An inquiry was made by the committee as to the use by members of the Association's present commercial standards, and it was found that out of 49 companies sending in replies, only 11 made use of the proposal form, while 11 more expected to put it into use in the near future. Of the 27 not using the form a great many gave as their reason that they had found their own letterheads satisfactory for this purpose.

Training Machine Shop Help

In his report for the Industrial Relations Committee, J. B. Foote referred again to the apprenticeship system. He had made an inquiry among members of the Association and found that very few kept apprentices, one complaining that he could not get good boys. Foote came to the conclusion that mechanical training schools supported by manufacturers in any particular district, for instructing young men in the every day operation of lathes, drill presses, planers, shapers, etc., was a better plan than co-operation with technical schools taking the form of part time employment of students. The latter plan had not proved practical for several reasons. Manufacturers as a rule cannot afford to have a lot of machines stand idle part of the time to have them available for the students when they arrive at the plant. At a special school young men could get training and be developed into all-around machinists in two to three years. The manufacturers of the district would furnish the work or the material on which to operate, and for passable products by advanced students they would pay at rates corresponding to the cost of production in their own plants.

Chairman B. F. Waterman of the General Standardization Committee made a report both for that committee and for the Sectional Committee of the American Engineering Standards Committee. Last spring the committee passed for printing five standards, namely, Gears and Pinions for Electric Railway Service, Gray Iron Industrial Spur Gears, Specifications for Forged and Rolled Steel for Gears, Specifications for Brass and Specifications for Bronze. These were printed in

Mechanical Engineering for May and on Sept. 26 were reconsidered in the light of criticism and correspondence on them which had been received in the meantime. It is now proposed to submit them to the sponsor bodies for their approval as tentative American standards, whereupon they may be submitted to the Main Committee as such.

At the last meeting it was decided to submit for approval for printing the standard on composition gearing, recommended practice for inspection of gears, recommended practice for herringbone gears and recommended practice for industrial spur gears.

Progress of Standardization Work

In the report of the General Standardization Committee was given an outline of the work so far done and that now in hand by the several sub-committees. In this connection it is of interest to note that the Tooth Form Committee has under way experimental work to determine the possibilities of a stub tooth profile which would permit the use of the same proportions of tooth elements as now in common use and, at the same time, give the advantages of a longer tooth, which many think desirable.

F. L. Eberhardt said that the committee so far was in full accord on only one feature of the stub tooth—that the pressure angle should be 20 deg. E. W. Miller, engineer of the Fellows Gear Shaper Co., which concern originated the common form of stub tooth designated by dual pitch numbers, admitted that the change in proportion of tooth elements with the diametral pitch was illogical. This system was adopted because it was convenient to the manufacturers of gear cutting machinery, but in order to be consistent the proportions of the tooth elements should be constant throughout. It was pointed out that both the Dutch and the French engineering standardization bodies are working on stub tooth forms, and Waterman said that he recently saw a German standard for the proportions of change gears for machine tools. Eberhardt also referred to the subject of short and long addendum gears, but ventured the opinion that in taking up this matter the committee would enter the field of specialized gear forms.

George L. Markland of the Philadelphia Gear Works presented a short paper on The Evolution of the Gear. He traced gear history from the time when metal pinions and racks were used in water clocks in Egypt 300 B. C. Mechanism for cutting clock wheels, built about 1750, was still in use for the same purpose in 1908. Epicycloidal teeth, or, rather teeth approaching to the epicycloidal form, were used first. Leonardo da Vinci (1690-1730) occupied himself with the problem of gear tooth form. An English book by Mandey, published in 1702, in an appendix deals with epicycloids and their use in mechanisms, it being stated that the matter on this subject was taken from a French book published in 1700. Camus, a French engineer (1699-1768), wrote an article on gear teeth about 1738, an English translation of a later edition of which was brought out by John Isaac Hawkins in 1868. Hawkins says he was at first willing to agree that the epicycloid was the only gear form, but he later came to the conclusion that the involute would supersede it.

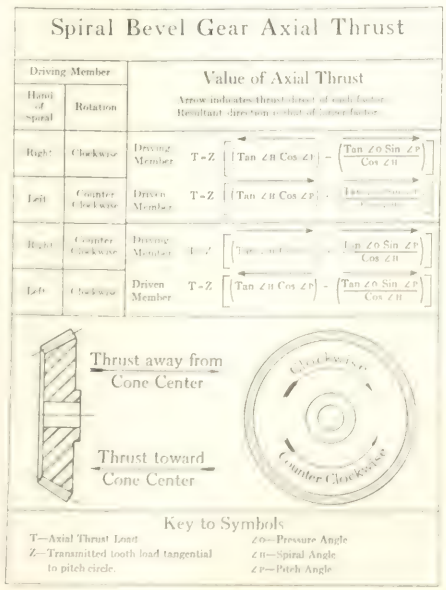
The report of the Spur Gear Committee was made by the chairman, Frank E. Eberhardt, of the Newark Gear Cutting Machine Co. This was a report of progress only. An outline was given of the work to be put through during the winter months. Horsepower tables have been obtained from the members and are being arranged for convenient use by gear makers and users. In connection with the power transmitting capacity of gears, it is getting to be more and more important to consider the tooth form, number of teeth in contact and the present day higher speed ranges. It is the plan of the committee to shortly present a good working table of safe horsepowers for general industrial gearing. The Nomenclature Committee, of which F. E. Eberhardt is also chairman, had obtained from members the names and symbols in use in their respective factories and in committee work, and planned to tabulate the material for distribution and criticism. The Sectional Committee of the American Engineering Standards Committee had made available to the Nomenclature Committee valuable data from abroad and this is being checked with our own terms, which, it is believed, will result in a more uniform nomenclature.

The Tooth Form Committee made a progress report. Since the last meeting Earle Buckingham of the Niles-Bement-Pond Co. had joined the committee. Data are being compiled on all tooth forms, particularly stub teeth. Samples have been secured of stub tooth gears made with disk cutters, planing cutters and hobs. A grouping according to pressure angle as in the Gleason bevel gear system might be feasible. The Baush & Lomb Optical Co. had placed one of their projectoscopes at the service of the committee and the Jones & Lamson Machine Co., a Hartness comparator.

During the evening session on Monday P. C. Molter, superintendent of the Department of Industrial Education of the National Metal Trades Association, presented a paper on "Apprenticeship," outlining the system developed by his association.

Bevel Gear Report

The Bevel and Spiral Bevel Gear Committee, through its chairman, F. E. McMullen, submitted for adoption the system of bevel gear design presented and discussed at the meeting in Buffalo last spring. Mr. McMullen said that descriptions of this system had been sent to all members the past summer and that, since it had undoubtedly been tried out by them, he looked forward to considerable discussion. It was explained that the sys-



tem was intended for generated bevel gears only and that it was to supersede all standards of tooth proportions previously adopted. The report included a table of tooth proportions for the lower numbers of teeth in spiral bevel pinions, which forms an extension of a similar table printed in the original report. In addition it contains a table of values for the factor y in the Lewis formula for gear strength, for both spiral and straight bevel gears. These factors were obtained by considering the load applied at the outer end of the tooth. In the explanation of the system, however, it was pointed out that the point of application of the load should be determined for each combination, since it is a function of the number of teeth in contact. The calculated strength of the gears based on the Gleason method would be greater than that obtained by the Lewis method, in some cases as much as 100 per cent. It was felt, however, that, owing to the general familiarity with the Lewis formula, it would be desirable to submit values of the constant y entering into that formula. The report also contained a chart giving the formulas for calculating the axial thrust in spiral bevel gears for different combinations of spiral and direction of rotation. This table is intended chiefly to obviate mistakes due to differences in nomenclature.

In commenting on this report, S. O. White of the Warner Gear Co., suggested that the recommendations ought to be kept in the form of recommended practice for a considerable time. His firm had made some use of the system in an experimental way and considered it logical and consistent. They had found, however, that frequently they were obliged to deviate slightly from the proportions recommended. Several members seemed to consider it unnecessary to have three pressure angles, and the elimination of the intermediate angle, 17½ deg., was suggested, but McMullen in reply said that if this were done some desirable quality would be sacrificed. As regards the addendum, it was brought out that a long addendum not only adds to the strength of a pinion with a small number of teeth but it also gives longer wear. Waterman inquired whether the proposed form of tooth would be used for the inside gears of a differential and whether by the adoption of this standard the Association would be adding to the burden of gear cutters. Reply was made by S. O. White who said that the Committee on Differentials had been endeavoring to standardize some form of inside gears. These gears do not function except when a vehicle turns a corner and the tooth form from some points of view is, therefore, not of any great moment. So far, nothing has been accomplished in this direction.

S. O. White, chairman of the Differential Committee, made a progress report. Drawings have beeen made of two sizes of differentials with inside gears complete, with 20-11 and 18-10 teeth of 5-7 pitch. These have been sent out to the membership and should return soon. It may be necessary to divide the subject of standardization of differentials into three parts, viz., outside or case

TABLE 1

Addendum for 1 Diametral Pitch for Spiral Bevel Gears

To obtain addendum select from table value corresponding to ratio given by this formula:

$$\text{Ratio} = \frac{\text{Number of teeth in gear}}{\text{Number of teeth in pinion}}$$

Ratios		Add.	Ratios		Add.	Ratios		Add.	Ratios		Add.
From	To		From	To		From	To		From	To	
1.00	1.00	.850	1.15	1.17	.750	1.41	1.44	.650	1.99	2.10	.550
1.00	1.02	.840	1.17	1.19	.740	1.44	1.48	.640	2.10	2.23	.540
1.02	1.03	.830	1.19	1.21	.730	1.48	1.52	.630	2.23	2.38	.530
1.03	1.05	.820	1.21	1.23	.720	1.52	1.57	.620	2.38	2.58	.520
1.05	1.06	.810	1.23	1.26	.710	1.57	1.63	.610	2.58	2.82	.510
1.06	1.08	.800	1.26	1.28	.700	1.63	1.68	.600	2.82	3.17	.500
1.08	1.09	.790	1.28	1.31	.690	1.68	1.75	.590	3.17	3.67	.490
1.09	1.11	.780	1.31	1.34	.680	1.75	1.82	.580	3.67	4.56	.480
1.11	1.13	.770	1.34	1.37	.670	1.82	1.90	.570	4.56	7.00	.470
1.13	1.15	.760	1.37	1.41	.660	1.90	1.99	.560	7.00	....	.460

TABLE 2

Values of "K" for Circular Thickness Formula

Select value corresponding to number of teeth in pinion and ratio given by above formula.

Number of teeth in pinion	Ratios →	Values of "K" for different ratios														
		1.00 to 1.25	1.25 to 1.50	1.50 to 1.75	1.75 to 2.00	2.00 to 2.25	2.25 to 2.50	2.50 to 2.75	2.75 to 3.00	3.00 to 3.25	3.25 to 3.50	3.50 to 3.75	3.75 to 4.00	4.00 to 4.25	4.50 to 5.00	5.00 to ....
9		.000	.010	.025	.040	.055	.070	.085	.095	.105	.115	.125	.135	.150	.165	.185
8		.000	.010	.030	.045	.065	.080	.095	.110	.125	.135	.145	.155	.170	.180	.195
7		.000	.025	.050	.075	.095	.115	.135	.155	.170	.185	.195	.205	.220	.235	.250
6		.010	.035	.060	.085	.105	.130	.150	.165	.180	.195	.210	.220	.235	.250	.265
5		.020	.040	.075	.110	.135	.155	.170	.185	.200	.215	.230	.240	.255	.270	.285

VALUES OF OUTLINE FACTORS "Y" FOR BEVEL GEARS

Proportioned According to the Gleason Works System

For use in the Lewis Formula. Values below are for either gear or pinion.

STRAIGHT BEVEL GEARS

Number of teeth in pinion	Ratios: 1.00 to 1.25	1.25 to 1.50	1.50 to 1.75	1.75 to 2.00	2.00 to 2.25	2.25 to 2.50	2.50 to 2.75	2.75 to 3.00	3.00 to 3.25	3.25 to 3.50	3.50 to 3.75	3.75 to 4.00	4.00 to 4.50	4.50 to 5.00	5.00 to ...
	Values of "Y" for Lewis Formula														
10	.231	.260	.280	.294	.305	.315	.324	.332	.340	.347	.353	.358	.365	.371	.377
11	.268	.264	.273	.286	.296	.303	.309	.315	.320	.324	.328	.332	.336	.340	.342
12	.248	.265	.281	.295	.308	.318	.328	.335	.341	.345	.348	.351	.353	.355	.356
13	.264	.278	.291	.280	.278	.286	.291	.295	.298	.299	.301	.303	.305	.307	.310
14	.242	.254	.263	.272	.281	.288	.294	.299	.304	.307	.310	.313	.316	.318	.319
15	.248	.258	.266	.274	.283	.290	.296	.301	.305	.308	.312	.315	.318	.319	.320
16	.252	.261	.269	.277	.285	.292	.298	.304	.308	.312	.314	.317	.319	.321	.323
17 to 18	.257	.265	.273	.281	.288	.295	.302	.307	.311	.315	.318	.320	.322	.325	.326
19 to 21	.265	.272	.279	.286	.294	.300	.307	.312	.317	.320	.324	.326	.328	.330	.332
22 to 25	.274	.281	.288	.295	.301	.307	.314	.319	.324	.327	.331	.332	.335	.337	.338
26 to 30	.284	.291	.297	.304	.310	.317	.322	.327	.332	.336	.339	.342	.344	.346	.347

SPIRAL BEVEL GEARS

Number of teeth in pinion	Ratios: 1.00 to 1.25	1.25 to 1.50	1.50 to 1.75	1.75 to 2.00	2.00 to 2.25	2.25 to 2.50	2.50 to 2.75	2.75 to 3.00	3.00 to 3.25	3.25 to 3.50	3.50 to 3.75	3.75 to 4.00	4.00 to 4.50	4.50 to 5.00	5.00 to ...
	Values of "Y" for Lewis Formula														
5	.297	.322	.343	.361	.376	.388	.398	.406	.411	.416	.420	.424	.431	.438	.450
6	.310	.332	.353	.372	.386	.398	.406	.414	.419	.424	.428	.431	.436	.443	.452
7	.318	.333	.347	.360	.373	.384	.392	.398	.405	.410	.415	.419	.426	.432	.439
8	.298	.320	.336	.348	.357	.366	.373	.379	.384	.388	.392	.394	.397	.400	.405
9	.292	.313	.327	.338	.346	.352	.357	.363	.367	.370	.373	.376	.380	.384	.388
10	.315	.338	.353	.363	.371	.345	.326	.342	.351	.357	.363	.367	.371	.374	.377
11	.316	.335	.343	.325	.327	.333	.338	.344	.350	.356	.361	.367	.375	.384	.390
12	.298	.318	.333	.343	.351	.357	.363	.368	.372	.377	.379	.381	.384	.386	.388
13	.302	.320	.334	.343	.351	.358	.365	.371	.376	.381	.384	.386	.388	.391	.393
14	.306	.322	.334	.345	.354	.362	.369	.374	.378	.382	.386	.389	.391	.393	.395
15	.314	.330	.342	.352	.360	.368	.374	.380	.385	.389	.392	.394	.397	.399	.402
16	.322	.335	.347	.358	.367	.374	.381	.386	.390	.394	.397	.400	.402	.404	.406
17 to 18	.329	.343	.354	.364	.373	.382	.389	.394	.398	.400	.403	.406	.407	.409	.410
19 to 21	.339	.351	.362	.373	.382	.389	.396	.401	.405	.407	.410	.411	.412	.414	.415
22 to 25	.351	.363	.373	.382	.391	.398	.403	.407	.410	.412	.413	.414	.415	.417	.418
26 to 30	.364	.374	.384	.393	.399	.404	.407	.410	.412	.414	.415	.416	.417	.418	.419

mounting dimensions, inside dimensions and gear tooth design. The S. A. E. favors fixation of the outside dimensions only. A capacity rating for each size seems desirable from an A. G. M. A. point of view, and Mr. White said he would like an expression of opinion as to how far this standardization should be carried.

L. G. Hewins, sales manager of the Van Dorn & Dutton Co., presented a paper bearing the title "Why Buy a Pig in a Poke?" Mr. Hewins recommended buying drop forgings, hand forgings and castings by the piece instead of by weight. He claimed that if this practice was followed the parts would come much nearer true to drawings, which meant less machining and less unnecessary weight. If this system of buying is used the foundry and forge won't add to the weight at every opportunity, as they are tempted to do under present conditions. Hewins gave a number of practical examples illustrating the advantages of the method. In one case it was found that a certain hand forging could be made to weigh 85 lb. when paid for by the piece, whereas the same forge had formerly turned out these forgings weighing an average of 100 lb. They had been asked previously to make the blanks closer to size but had replied they couldn't do it. Much of the excess weight was due to excessive stock where the forging had to be finished, and it was found that 40 cents a piece could be saved on turning time after the new method of buying had been introduced. On malleable castings Hewins had so far found

Spiral Bevel Gears

For generated spiral bevel gears operating at right angles where the pinion is the driver and has less than 10 teeth.

The proportions given below have been based on the assumption that the spiral angle used is 30 degrees. In order to obtain the desired tooth action it is recommended that the spiral angle selected should not be less than 27 degrees.

WORKING DEPTH, WHOLE DEPTH, PRESSURE ANGLE

For combinations having	Working Depth	Whole Depth	Pressure Angle
9 teeth in pinion	$\frac{1.700 \text{ in.}}{\text{D.P.}}$	$\frac{1.888 \text{ in.}}{\text{D.P.}}$	17½ deg.
8 teeth in pinion	$\frac{1.600 \text{ in.}}{\text{D.P.}}$	$\frac{1.788 \text{ in.}}{\text{D.P.}}$	17½ deg.
7 teeth in pinion	$\frac{1.600 \text{ in.}}{\text{D.P.}}$	$\frac{1.757 \text{ in.}}{\text{D.P.}}$	20 deg.
6 teeth in pinion	$\frac{1.500 \text{ in.}}{\text{D.P.}}$	$\frac{1.657 \text{ in.}}{\text{D.P.}}$	20 deg.
5 teeth in pinion	$\frac{1.400 \text{ in.}}{\text{D.P.}}$	$\frac{1.557 \text{ in.}}{\text{D.P.}}$	20 deg.

ADDENDUM OF GEAR

For combinations having	
9 teeth in pinion	Addendum of gear = $\frac{\text{Addendum for 1D.P. (Table 1)}}{\text{D.P.}}$
8 teeth in pinion	Addendum of gear = $\frac{\text{Addendum for 1D.P. (Table 1)} \times .80}{\text{D.P.}} + .85$
7 teeth in pinion	Addendum of gear = $\frac{\text{Addendum for 1D.P. (Table 1)} \times .80}{\text{D.P.}} + .85$
6 teeth in pinion	Addendum of gear = $\frac{\text{Addendum for 1D.P. (Table 1)} \times .75}{\text{D.P.}} + .85$
5 teeth in pinion	Addendum of gear = $\frac{\text{Addendum for 1D.P. (Table 1)} \times .70}{\text{D.P.}} + .85$

ADDENDUM OF PINION

For all combinations Addendum of pinion = Working Depth − Addendum of gear.

DEDENDUM OF GEAR

For all combinations Dedendum of gear = Whole Depth − Addendum of gear.

DEDENDUM OF PINION

For all combinations Dedendum of pinion = Whole Depth − Addendum of pinion.

CIRCULAR THICKNESS OF GEAR

For all combinations having	
9 teeth in pinion	Circular thickness of gear = $\frac{1.976 \text{ in.}}{\text{D.P.}} + [.7 \times \text{Addendum of gear}] - \frac{\text{K (Table 2)}}{\text{D.P.}}$
8 teeth in pinion	Circular thickness of gear = $\frac{1.911 \text{ in.}}{\text{D.P.}} + [.7 \times \text{Addendum of gear}] - \frac{\text{K (Table 2)}}{\text{D.P.}}$
7 teeth in pinion	Circular thickness of gear = $\frac{1.931 \text{ in.}}{\text{D.P.}} + [.8 \times \text{Addendum of gear}] - \frac{\text{K (Table 2)}}{\text{D.P.}}$
6 teeth in pinion	Circular thickness of gear = $\frac{1.971 \text{ in.}}{\text{D.P.}} + [.8 \times \text{Addendum of gear}] - \frac{\text{K (Table 2)}}{\text{D.P.}}$
5 teeth in pinion	Circular thickness of gear = $\frac{1.011 \text{ in.}}{\text{D.P.}} + [.8 \times \text{Addendum of gear}] - \frac{\text{K (Table 2)}}{\text{D.P.}}$

CIRCULAR THICKNESS OF PINION

For all combinations Circular thickness of pinion = 3.142 − Circular thickness of gear.

it impossible to get bids under the new plan, but he hoped to succeed there, too, later on.

On Tuesday evening an informal banquet was held, J. B. Foote acting as toastmaster. The musical entertainment and the speakers of the evening were furnished by the Chicago members. The speakers were the Hon. Marcus Kavanaugh, Judge of the Superior Court of Cook County, Ill., and Gen. John D. Clinnin. Contrary to custom on such occasions, both spoke in a serious vein on topics of national interest. The subject of Judge Kavanaugh's discourse was "Business Men and Law Enforcement." The judge dealt with the great increase in crime, and especially in murder and manslaughter, in this country in recent years and impressed upon the members their duty as citizens to do all in their power to suppress this crime wave. They should not try to evade their jury duty and when on such duty should see to it that criminals get their just deserts. Gen. Clinnin spoke on "The World War and Its Effects on American Business." He pointed out that there were in the Treaty of Versailles at least six clauses that tended to breed future wars, and he predicted that, just as the United States had entered the war and assured victory for the Allies so it would have to step in again in the near future and demand a revision of the Versailles Treaty on such lines as to eliminate these features that tended to breed further wars. The position of the United States as creditor of the various allied nations and the demand of further financial assistance from European states would enable it to take such a step.

At the final session on Wednesday morning, Prof. A. E. White, director of the Department of Engineering Research, University of Michigan, presented a paper on Engineering Research. Prof. White discussed what should be the research program of the universities and of the technical associations. He had been glad to note in the morning papers that the Meat Packers' Association, which was simultaneously holding its convention at the same hotel, had decided to institute an extensive research program. The encouragement of research work was one of the objects of all technical societies, but difficulties were encountered owing to lack of funds. To raise the necessary funds it would, in many cases, be necessary to increase the membership dues, and in the case of strictly technical associations this was practically out of the question, as it would mean the loss of a great many members. The A. G. M. A., on the other hand, represented an entirely different case. It was largely made up of executives of large, going concerns, and sufficient funds for this service should be made available.

Gear Noise Research

Under the direction of Prof. White, Prof. Daniel L. Rich has been making an investigation at the University of Michigan of the problem of measuring or comparing noises, and Prof. White said that they had come to the conclusion that at an expenditure of $3,500, distributed over a period of one year, it would be possible to develop a device for comparing the noise of an individual pair of gears and with an expenditure of an additional $3,500 it would be possible to develop an apparatus capable of determining the noises not only in simple sets but in trains of gears. If the Research Department of the University were entrusted by the Association with this work, absolutely no overhead would be charged. If the work were important to the Association or to any section thereof, it should be carried out, either at Michigan University or at some other institution, if one could be found that had better facilities.

This problem of measuring gear noises comes up in connection with the work of the inspection department, and J. E. Frost, a member of the inspection committee, presided at this session. One of the members wanted to know what would be the further procedure after the apparatus referred to in Prof. White's plan had been developed. Frost said that it was necessary to first have some instrument for comparing noises, next a stand-

ard of noise must be established and, finally, the various causes of noisy operation must be investigated. He thought that if arrangements along the lines indicated could be made between the Association and the University it would be of benefit all around. In the past students had been working largely on abstract problems that did not interest them, whereas here was a chance to set them to work on a problem of immediate practical value.

Bethune of the Gleason Works expressed the fear that if the work was not done hand in hand with the men in the industry, the results would be of no practical value. They might tell the practical men that the sound waves which were most objectionable had a certain wave length but that would be of little help to the men in the shop. Prof. White stated that it was the purpose to do the work in co-operation with a committee of the A. G. M. A. He said that it had been suggested that the expense of such an investigation could be shared with the automobile industry. A motion was made that a committee be appointed, but it was later decided to leave the decision in the matter with the Executive Committee.

Standard Keys for Shafting

Not much progress was made during the past half year in the work of the Keyway Committee. A meeting of the A. S. M. E. committee on shafting and keyways was scheduled for Oct. 19 and it was decided by the A. G. M. A. committee to postpone further action until after that meeting. Lars Nilson, chairman of the committee, stated that few men had any decided views on the subject of keyway sizes, as shown by the fact that of about 190 who replied to a questionnaire, practically all seemed to be satisfied with the first A. S. M. E. table or list of sizes. C. B. Hamilton, Jr., criticized the proposed table of keyway sizes, which was originally submitted at the Buffalo meeting, for the reason that it contained a lot of bastard or non-standard sizes. He referred to one size in particular which he said was a paper standard, but not actually manufactured. He said that many people were only too willing to agree to anything that looked as though someone else had done effective work on it. There were altogether too many sizes, and in practice it was not nearly so important that a key size were theoretically correct as that you could get the stock called for. It developed in the further discussion that the A. S. M. E. committee planned to prepare a table for key sizes for shafts up to 6 in. diameter only, but the A. G. M. A. committee wants to go as far as 12 in. diameter.

Inspection Report

F. G. Eppley presented the report of the Inspection Committee which proposed certain recommended practices. Under the heading "Hardness Test" it was stated that "the scleroscope is recommended for testing hardness of gears, but it is necessary to keep the scleroscope in good condition, and therefore checks of the instrument should be made at intervals. In case of argument the Brinell hardness test is recommended as final." C. B. Hamilton, Jr., made the objection to this section that no mention was made of the Rockwell testing device which, he said, was in some ways better than both of the other two (Brinell and Scleroscope). He moved that this section of the report be held over for six months and gone over in connection with the Metallurgical Committee. This request was acceded to. Mr. Copland objected that the report did not give any tolerances. For instance, it was stated that a gear must have an accurate involute curve in order to function properly, but no tolerances for permissible variations from the true involute form were given and it was well known that it was commercially impossible to produce teeth of absolutely true form. In reply to this objection it was stated that the setting of tolerances fell within the province of other committees, such as the spur gear committee, the herringbone gear committee, the keyway committee, etc., and all that the inspection committee had to do was to suggest methods for determining whether any gear was within the specifications to which it was to be made. One speaker doubted the possibility of observing limits on the involute form. The report with the hardness test section eliminated was finally adopted and therefore became a recommended practice. It reads as follows:

Involute Curves.—In order to determine the accuracy of the involute curve, it is necessary to have some instrument which will check this curve in the same manner as it is unwound from a base cylinder.

An instrument of this type should have a straight edge rolling on the base circle of the gear and an indicator fastened to the straight edge, the indicator point being in contact with the gear tooth to be tested.

As the straight edge is moved along, it will roll the base circle and also the gear attached to the base circle and the indicator which is in contact with the great tooth should register zero if the involute curve is correct. If it is not correct, it will show the amount of inaccuracies.

It is necessary that a gear have an accurate involute curve in order to function properly, and the involute curve-testing instrument can determine this; also whether a gear has been cut off center and whether the pressure angle of the gear is correct, etc.

Angular Velocity.—If a pair of gears are properly mated, they should function with uniform angular velocity but, in order to know this, it is necessary to have some instrument for so testing.

The principles embodied in an instrument of this type should be to test a known motion, such as produced by a pair of rolls, against the unknown motion produced by the mating gears, and the variation of the gears should be automatically recorded on a paper chart. If the tooth curves are correct and the spacing is correct, gears should run with uniform angular velocity, but if the tooth cuve is not correct, these instruments would show a variation in motion, or, if the spacing of the teeth is nonuniform, it will also show a variation in motion.

Thread Inspection.—"Go" and "No go" plug and ring gages of proven dimensions, the "Three Wire Method" for pitch diameter, or the projection method for pitch diameter, outside diameter, lead, angle and form should be used.

All plug gages and taps should be tested by the projection method.

External Threads.—If shown to be of proper diameter by the use of the "Three Wire Measurement," and at the same time a good fit in a ring gage, this is proof the lead, profile and pitch diameter are correct.

On threads coarser than twelve per inch, good results can be obtained by the use of Prussian blue to prove up the bearing of the thread in the ring gage; if it is a good hand fit and shows good bearing surface it is proof the lead, angle and diameter are correct.

Internal Threads.—Internal threads that are tapped may be inspected by the "Go" and "No go" plug gage, but the tap should first be inspected by the projection method to insure correct lead, profile and diameter.

After an internal thread is smooth enough to show a good Prussian blue spotting off the plug gage, a half section can be cut away and the plug rolled into the remaining half section to show if the lead and angle are correct.

Worm Inspection.—The lead should be tested by attaching the worm to the end of a master screw having the same lead as the worm to be tested and rotating the screw so as to travel the worm past a fixed indicator bearing against the profile of the thread.

The pressure angle of worms having rack type threads should be tested by inclining the worm from a vertical line the exact amount of the pressure angle and sliding an indicator on a horizontal line with its working point on the profile of the tooth.

Worms having curved thread profiles should be tested for tooth form by running them at right angles to and with a master worm wheel and noting the bearing by the use of Prussian blue or some similar agent.

On single jobs or small quantities it should only be necessary that the worm bear properly with its mating gear unless special accuracy is specified.

HOB INSPECTION

Testing Holes.—"Go" and "No go" plug gages are to be recommended for this purpose.

Testing Keyways.—"Go" and "No go" plug gages with a key inserted are to be recommended for this purpose, as size of keyway and alignment—in relation to the hole—can be best tested by this means.

Concentricity.—Hobs, teeth, squareness of end of hob, can be best tested in ordinary bench centers with a dial indicator.

Gash Testing.—Whether a gash is radial or not can best be tested on bench centers with a plug which carries a finger that can be inserted into the gash of the hob and a sight reading taken. On straight gashed hobs it is necessary to test the parallelism of the gash with the axis of the hob, and this can be readily done by mounting the hob on bench centers and passing an indicator along the gash.

On spiral gashed hobs it is necessary to know whether the spiral of the gash is correct or not, and this can be tested either with the use of a form that has the correct spiral or a special machine made with a taper attachment that will impart the necessary spiral rotation.

Tooth Dimensions, Thickness and Depth.—The ordinary gear tooth calipers are best adapted for measuring the thickness of all types of hob teeth. Where topping hobs, or worm hobs are to be measured, the ordinary depth micrometer is recommended for measuring depth of tooth.

Tooth Form, Spur, Worm, Spline and Sprocket Hobs.—To correctly measure the contour of hob teeth, an instrument for this purpose is to be recommended. The hob should be mounted on a mandrel and a contact finger connected with an indicator should be passed along the contour of the hob tooth. Any variations in the contour will be shown on the indicator dial. Charts can be made of the theoretically exact contour desired and hob teeth can then be checked against these charts.

Lead.—The hob should be tested for lead; that is, to see whether all the cutting edges fall in the true helical path. A simple instrument is to be recommended in which a master screw with the same lead as a hob is used. The hob is mounted on the arbor end of this screw and as both are rotated at the same time an indicator can be used to detect the variation in the cutting edges. In this test, charts should be plotted and records kept of the actual condition of the hob.

Metallurgical Report

A report covering two subjects, viz., Carburizing and Case Hardening, and Heat Treatment of A. G. M. A. Carbon and Alloy Steels, was presented for the Metallurgical Committee by C. B. Hamilton, Jr. The first item under the former heading, viz., Carburizing Materials and Pots, was presented in a tentative way at a previous meeting and has already been printed in substance in these columns. The report also covered Local Carburizing, Heating and Quenching; Prevention of Shrinkage and Warpage; Prevention of Scale and Quenching Media. Mr. Hamilton in presenting the report (without reading it) stated that S. P. Rockwell was largely responsible for it.

In connection with this report five charts were presented showing the variation with the carbon content of the heating temperature required for different treatments with each of five different general groups of steels. The charts, it was explained, were based on the work of Scott of the Bureau of Standards and of Stead. An explanatory sheet will later be printed to accompany the charts. In as much as the material was not in its final shape it was decided to give it six months further consideration and act on it definitely at the next meeting. Hamilton also mentioned that at the Buffalo meeting last spring the subject of considering the choice of a new name for the product which at present has the misnomer semi-steel applied to it, was postponed for six months. The term high test cast iron is being used by some other organizations, and he asked that the A. G. M. A. help to kill the term semi-steel. The American Society for Testing Materials is preparing specifications for high test cast iron and the term is coming into regular use. The proposal that the A. G. M. A. substitute high test cast iron for semi-steel was adopted, and any specification which the A. S. T. M. may adopt will probably be accepted later by the A. G. M. A.

Another recommendation made by the Metallurgical Committee was that flanges for composition gearing be made of a red brass of from 78 to 88 per cent copper content, corresponding to S. A. E. specification No. 40. The limits on the components were to be set later. The use of cast iron flanges for such gears was discouraged. It appeared from the discussion that the trade in raw hide gearing is very much demoralized at the present time and one member thought that the proposed flange material was of too high a grade in view of the fact that "you can't get anything for those gears anyhow." Others held that it would not do to use ordinary white brass for these flanges and that the material recommended was much tougher and therefore better for the purpose. No definite action was taken on the subject.

To Show Model Laboratory

At the next spring meeting the Metallurgical Committee expects to show the members a model metallurgical laboratory for a medium sized shop. The advisability of employing a consulting metallurgist for the association was also broached. It was stated that the New England Foundrymen's Association and the American Malleable Castings Association had found a consulting metallurgist highly desirable, and the view was expressed that the A. G. M. A. could do something similar. The next meeting of the association will be held in Cleveland during the last week in April.

The meeting concluded with an automobile ride over the Chicago Boulevard System in cars furnished by the Chicago members.

New Danzig-Warsaw-Lemberg Air Service

AN aeroplane passenger service between Danzig, Warsaw and Lemberg has been inaugurated by the newly organized Warschauer Luftverkehrgesellschaft Aero-Lloyd, G.m.b.H., says Vice-Consul Bowman, Danzig, in a report to the Department of Commerce. The technical organization as well as the Danzig agency will be in charge of the Danziger Luftpost, G.m.b.H. The planes to be used are of the Junker type and heretofore have been operated in the service of the Danziger Luftpost.

Services are as follows: Monday, Wednesday and Friday—leave Danzig 8 a. m., arrive Warsaw 10:30 a. m., leave Warsaw 1 p. m., arrive Lemberg 4 p. m. Tuesday, Thursday and Saturday—leave Lemberg 8 a. m., arrive Warsaw 11 a. m., leave Warsaw 3 p. m., arrive Danzig 5:30 p. m. It is planned to establish a daily service later in the month.

The fare is but little higher than by rail, the rate at present being 42,000 Polish marks (approximately $5.50 at present rates) to Warsaw, and 70,000 Polish marks ($9.25) to Lemberg. Besides passengers, the planes carry mails and freight.

How Highways Are Being Built in the Southern States

Educational campaigns have borne fruit. Considerable road work going forward throughout the South. Motor vehicle owners pay large share of maintenance as well as part of construction costs in certain cases. Texas problem difficult.

By R. H. Bethea

PRIOR to the enactment of the Federal aid road act in 1916, the roads of the South were built chiefly for horse and mule-drawn vehicles. The truck had not been put into use in the rural districts except in rare cases, the automobile was just beginning to become a necessity on the farm, and the South had not awakened to the possibilities of motor traffic. A few States were assisting the counties in building roads, and some progressive counties were even then building wonderful systems, but the general tendency was toward building unconnected highways of value only to a few people living in the immediate vicinity.

With the enactment of the Federal aid act and the grasping of the vision it contained of a connected highway system, including seven per cent of all the public roads in the country, and according to figures compiled by several States, serving between 80 and 85 per cent of the total population, the Southern States began to wake up. They realized that road building was one of the requisites for a prosperous citizenry as well as a first aid in the education and enlightenment of their people. Little was accomplished in this work, however, until after the war and the largest proportion of the road building has been since 1920.

It is hard to visualize the size of this project viewed merely from the angle of its effect on the South. The system in the South alone ultimately will include at least 75,000 miles of finished highways. In addition several of the States are contemplating constructing additional highways, such as Tennessee, which proposes to build 10,000 miles. This and other States will bring the total now contemplated up to practically 100,000 miles.

There is no uniformity in the plans of the various Southern States either for financing roads or for their construction and quality. Every State is living up to the provisions of the Federal aid act, however, and they are pushing forward with the idea of increasing their efficiency in road building and maintenance.

It has been found necessary in every State in the South to institute educational campaigns on the value and the maintenance of roads. The southern people have a constitutional dislike for large public and bonded indebtedness. To pass bond issues for road building it has been necessary to educate them to the value of completed roads carefully maintained.

These campaigns have been carried on through road associations, booklets gotten out by the highway departments, newspapers and word of mouth propaganda. One of the main objects sought has been to teach the fact that though a road has been built up to the standard required by the Government and in accordance with the traffic using it, maintenance is necessary every day and that without proper maintenance the road will soon be in just as bad or worse shape than it was originally.

Considerable attention has been given to the improper use of roads, such as dragging plows along the highways and otherwise treating them so that even the best maintenance cannot keep them up. The great benefit of the roads to the public has been stressed.

These campaigns were found necessary in order to awaken the people to the advantages of good roads, and they are bearing fruit in practically every State. One of the most extensive campaigns is now being carried on in Texas for the purpose of getting adequate laws under which to operate and to procure the necessary bonds with which to build their proposed system of 17,000 miles of connected highways.

IN this State the laws governing roads include a definition of a "first class road," which reads: "Cleared 20 feet wide and with stumps cut off 6 inches high." All the people interested in roads are endeavoring to get amendments to laws containing such "jokers" as this.

In the South many people think that the road systems are being built primarily for tourist travel, and this gives them an antipathy to any plans that might be promulgated. As pointed out by practically all of the highway builders, nothing could be further from the truth. As the highway engineer of Alabama puts it:

"The roads are primarily being constructed for the citizens of the State, whether they live in the cities or on the farms. Any main road in the State of Alabama will, of necessity, serve a large number of farmers."

In Louisiana, however, the highway department is pushing the construction of the so-called National highway first and looking after the other roads as a secondary proposition.

The financing of roads in the South to obtain government aid is on practically a distinct basis in every State. They have some methods in common, however.

There seems to be a general tendency in the various States to put the entire burden of maintenance on the motor vehicle, either through the motor fuel tax, or through a combination of the motor fuel and license taxes.

The financing of the original construction has been carried on in a number of ways. Bond issues have been put on the market by the various States, counties and even road districts. The motor license fees in practically every

State are set aside for the building or maintenance of roads. In some States the entire amount goes to the State Highway Department, but in others a portion of the amount is given to the counties to help them carry the burden of roads.

In Texas the chairman of the State Highway Commission, R. M. Hubbard, has proposed a method of financing road construction and maintenance that includes the levying of a tax on gasoline sufficient to maintain the roads, including resurfacing and replacing drainage structures. One-fourth of the cost of the construction of roads would be met by an advalorem tax or long term State bonds; one-fourth by license fees and the other half by Federal aid. At the rate Texas is now building highways it is estimated that it will take several years to complete the system, which will cost several hundred million dollars. Texas now receives $1,750,000 a year from the license tax on automobiles for the highway department. It has a very low license tax on the 500,000 cars of the State, the average being about $3 less than the average for the United States.

IN Georgia $2,000,000 is received from license fees, which is the basis for the entire fabric of road financing. The Federal aid is being accepted in full and the State and counties are backing it up and meeting the requirements. The $2,000,000 fund is considered entirely inadequate by the engineers and the men who are backing the building of roads in this State.

Tennessee will vote on a $75,000,000 bond issue in the near future. A two cent tax on gasoline and the turning over of the entire license tax fund to the State Highway Department is contemplated in this State. It is pointed out that the gasoline tax and the license fees would finance the $75,000,000 bond issue and maintain the roads. This would put the entire burden of the State's roads on the motor vehicle owner.

South Carolina uses a different method of financing highways. In this State a very low motor vehicle license fee is charged, bringing in only $700,000 a year. This fund is turned over to the Highway Department. In addition to this there is a two mill per dollar property tax for road construction. This tax was suspended for 1921, however. The plan in this State contemplates that the two mill tax be continued and that in addition a one cent tax be placed on gasoline to provide sufficient funds for the Highway Department.

Louisiana now has a tax of two cents per gallon on gasoline, and a motor vehicle tax which brings in approximately $1,500,000 per year. It formerly levied a tax of ⅛ mill for road building, but this was repealed this year. The gasoline tax brings in approximately $1,000,000 a year. It is proposed that this entire gasoline tax be devoted to the maintenance of the roads as fast as they are completed. In addition to this the horse-drawn vehicles in this State are taxed and the proceeds turned over for highway construction. The total tax on these vehicles amounts to approximately $350,000 per year.

These methods of financing and maintenance are employed in part by all the other States in the South, together with bonds issued by counties, parishes, road districts, and other sub-divisions of the States.

Maintenance of roads is an even more important problem than construction. It is through the systems of maintenance that the public is convinced of the value of good roads and by this method the Southern States are now endeavoring to sell all their citizens on the value of a connected system of highways.

In the South are found many schemes of maintenance, all of them based upon the government requirement that the States maintain all highways on which the Federal aid has been given. They vary from the patrol system employed in Georgia and North Carolina to the mere supervision of county work in Arkansas.

In Georgia the entire system of State roads is under the State Highway Department. These roads are divided into sections of 50 miles and the sections are divided into patrols of 10 miles in length. The sections are in charge of foremen who are experienced and competent road men. The patrols are in charge of men living near or on the 10 miles they have in charge. The entire system of State roads was worked between May and September this year, and they are under daily maintenance observation for their entire length. In this way Georgia is reclaiming and putting into repair some roads that have not been completed under the provisions of the Federal act.

The roads of North Carolina also are on the daily inspection and working system. In this State the entire system of completed roads, some 5086 miles, is directly under the Highway Department for maintenance. The balance of the proposed system of roads, or about 1000 miles, is under construction. North Carolina is out in front of all the Southern States in the building and maintenance of highways.

South Carolina maintains all the roads completed in the State system through the State Highway Department. It uses several different methods of maintenance, however. Parts are maintained by patrols, similar to those employed in Georgia, others by the gang method and still others by the counties. In addition to this, a few localities have a general force which handles numerous little stretches of road, and work them only occasionally.

Maintenance in Texas is probably the largest single road question in the United States. The vast system of 17,000 miles gives a problem which would tax the ingenuity of the best equipped engineers. The funds for properly maintaining the roads by the State Department are not in hand, and they have been kept up this far by the counties with State aid and supervision. The Texas road commission proposes a tax on gasoline to furnish the money for this maintenance. It is estimated this tax would produce $10,000,000.

Maintenance in Arkansas has not been worked out to the satisfaction of the Highway Department, which has been supervising maintenance by the counties and co-operating with the counties. Educational campaigns have been carried on among the officials of the road improvement districts by the State engineers.

ARKANSAS has a State road system of approximately 7000 miles, of which 5332 are government aid. Of the mileage under the system 4330.62 miles have been graded; 2561.93 have base course completed; 2306.57 have surface course completed, and 1001.80 have not been worked. The estimated cost of Arkansas road system is $73,000,000, and $52,000,000 in bonds have been sold. In 1921 Arkansas increased the license fees on automobiles, based on horsepower and weight, and placed a one cent tax on gasoline. Seventy per cent of the license fees and 50 per cent of the gasoline tax is apportioned among the various counties for road construction and maintenance while the balance is turned over to the Department of State Lands for highway improvements and the maintenance of the department.

The highway department of Mississippi acts merely in an advisory capacity to the county organizations both in construction and maintenance, with the exception of the completed government aid projects which the Highway Department maintains with funds derived from 40 per cent of a gasoline excise tax and 50 per cent of the automobile license fees, which amounts to approximately $540,000 a year.

In Alabama the Federal aid system, comprising seven per cent of the roads, will be maintained by the State High-

way Department. Approximately 600 miles already have been taken over for maintenance, and the other roads will be included as soon as completed. Alabama got a late start in highway building because of a decision of the Supreme Court of the State that a $25,000,000 bond issue was not constitutional. The bond issue has been repassed since and is now in force.

NECESSITY for early reconstruction and improvement of road surfaces faces many of the Southern States. In Texas a road was constructed in Wichita county to the Wilbarger county line. It served an oil field when it was constructed. When its construction was under consideration some 400 vehicles passed over it each day, but now approximately 3000 vehicles, carrying about 8000 persons, use it every twenty-four hours.

This is an exceptional case, but the increase in traffic on almost any improved road is far beyond the estimates of the engineers, and this is causing the realization that much mileage will have to be rebuilt of better materials before long. The Texas Highway Commission draws the following conclusions from a study of this road and others:

"1. The enormous number of motor vehicles in use seem to be a necessary part of our modern civilization and roads must be built to carry them.

"2. Our main highways must be constructed not only of durable types, but must have also adequate widths and every care should be taken in the selection of alignments and grades, the posting of signs and warnings, etc., so as to make these highways reasonably safe.

"3. It is essential that our highways be properly maintained and sufficient funds be provided for this purpose."

Throughout the South, prior to the recent building of roads and the advent of the great automobile and truck traffic, water-bound macadam roads were constructed. This was considered the best type of construction in those days, and mile upon mile was built, but it is said to have been found too light for heavy traffic.

Alabama has found macadam inadequate to meet present day needs. Tennessee agrees with Alabama, and very few miles of macadam have been laid in the past three or four years on heavily traveled roads. Kentucky is making an effort to reclaim a number of these roads by treating the surfaces with gravel and limestone chips, tar and oil.

A popular type of road throughout the Southeast is the sand-clay and topsoil. These roads are being built in North Carolina, South Carolina, Alabama, Georgia and parts of Florida. They are easily maintained when the traffic is not too heavy for them. In South Carolina tests show that where not more than 500 vehicles a day use a road of this type it is very easily kept up, and that when the best materials are used they will stand a traffic of 1500 vehicles a day. Ordinary automobile traffic and moderately loaded trucks have no effect on the heavier highways, except to necessitate scraping and maintenance by the usual processes.

The gravel road is used in a great many States and is found particularly in Mississippi, Louisiana, Arkansas, Texas and Alabama. These roads will stand a moderate traffic and are maintained without great trouble.

SOUTHERN States are building a system of connected good roads which will aggregate 75,000 miles when completed. Here are some of the things individual States are doing:

State	Mileage Proposed	Mileage Completed	Under Construction
North Carolina	6,052	5,086.5	965.5
South Carolina	3,500	1,750	
Georgia	5,500	2,700	
Kentucky	4,000	720	347
Tennessee	10,000	4,000	
Alabama	4,000	600	460
Arkansas	7,000	2,306.5	3,694
Louisiana	7,000	2,500	750
Texas	17,000	2,600	1,900
Mississippi	3,500		

In Kentucky there is a native rock asphalt which is used to a large extent in road building. This material is particularly adapted to certain conditions in that State. A road constructed of this material, leading from Louisville to Camp Knox, was observed during the war, and as many as 4000 vehicles a day traveled over it. The road stood up exceedingly well.

Tennessee is doing a considerable amount of road building with a native chert. This material is being used where the traffic is not excessive.

Local conditions in a large part of Florida make it practically imperative for the roads in that State to be built of the most durable materials. As a result a great many miles of roadways in the peninsula proper are being constructed of brick and cement. Some asphalt and bitulithic roads are, also, being constructed. This makes progress in Florida slower than in some other States, but they have been at it longer and their roads are in good condition. In the portion of Florida immediately south of Alabama a great many roads are constructed of the sand-clay and topsoil types.

In Louisiana the Highway Department is placing greatest emphasis on national highways. The Jefferson highway covers 420 miles through this State. Improvement of 337 miles of this highway has been completed; 42 miles are under construction and 41 miles remain to be placed under construction. The Old Spanish Trail, or Southern National Highway, covers 287 miles in this State and 229 miles have been completed; 29 miles are under construction and 19 miles remain to be constructed. From this it will be seen that two roads crossing the State in different directions have been practically completed and will be finished within a few months.

Every State in the South is considering in some way taxation and control of the motor transport companies which are springing up like mushrooms. Some States contemplate a tax based on the damage they do to the roads, as well as a license fee. Other States seem to consider that they will be adequately taxed on the basis of the tonnage of their trucks and gasoline excise taxes.

The road situation throughout the South is improving. A summary shows that at the present rate of progress the system now proposed will be completed within ten years, with the probable exception of Texas. Some of the States are crying for "Good Roads, Now," and are arranging their finances so that their programs will be expedited.

Federal aid is being matched in every State and in a number of them it is being exceeded by large sums. Money is being raised in every conceivable way to build roads. Financing is being put on a sounder basis.

The work already accomplished has been of vast aid to all the citizens of the States as well as to the owners of motor vehicles and farmers in particular. Maintenance is the key to the situation, according to practically every road engineer in the South, and it is through maintenance of the roads built and building that they expect finally to reach the goal for which they are striving—a connected system of highways.

Why Trucks Can Be Sold to the Gold Coast

There are 3,500 motor vehicles in the Gold Coast, despite the fact that white population is only 3,000. Trucks are indispensable for transporting cocoa to coast. More vehicles needed. Roads are available. Gross weight permitted is 1½ tons.

By E. C. Petrie

HERE is a most interesting and informative story about automotive conditions in the Gold Coast. It tells many facts of direct value to American exporters and brings out certain information not generally known by our manufacturers.

A great cocoa industry has grown up in the Gold Coast during the last thirty years. Its success and growth have largely depended upon the ability of the planters to get their product to the seaports.

Because of the prevalence of the tsetse fly, animal transport was impracticable, and the increasing demand for labor made human porterage both wasteful and costly.

The motor truck saved the situation. Its utility has resulted in more motor vehicles than white population in this territory. Many crops are still going to waste, however, because of lack of transportation. More trucks are needed. The natives have a passion for road building and will provide the necessary highways.

IT is customary in the United States to talk of British West Africa as if it were one country and had one Government. This is not so. The West African colonies of Great Britain, composed of Gambia, Sierra Leone, Gold Coast and Nigeria, not only each have their own government, but none of them is even contiguous. Between each of them passes a wedge hundreds of miles wide, mostly of French soil. As all of these colonies lie between 4 and 14 degrees North latitude, however, they have much in common economically.

The second largest of these colonies, the Gold Coast, provides a striking commentary as to the development made possible by the introduction of the motor truck into a new country. Twice the size of Kentucky, the Gold Coast has about the same population, although the total number of whites is less than 3000.

In the later years of the last century the cocoa plant was introduced, and such has been its development that at the present time the Colony supplies the world with nearly half of its cocoa. The credit for this rapid progress belongs almost entirely to the natives.

As the cocoa trees came to fruition it became increasingly difficult for the native planters to get their produce down to Secondi or Accra. Because of the prevalence of the tsetse fly animal transport was impracticable, and the increasing demand for labor made human porterage both wasteful and costly.

Fortunately, about this time the transportation value of the motor truck came to the notice of the native, and in it he saw his chance. Feverishly he devoted himself to road construction, and rapidly he bought trucks until the slump in cocoa prices at the beginning of last year forced him to cry a temporary halt.

Despite the fact that about 3500 motor vehicles are estimated to be in the Colony, there is insufficient transport to carry all the cocoa grown, and in the more remote corners of the coast province and Ashanti many thousands of tons are left ungathered annually because of the lack of transport facilities.

Transport is also required to develop other of the Colony's industries. So much energy has been devoted to the cultivation of the main commodity that insufficient attention has been paid even to the production of necessary food crops. Consequently, food shortage is often felt in the larger towns. What food is brought in is mainly done by human porterage relays, and, as at each point loads change hands at increased rates, by the time food reaches the consumer prices are very high. It would appear that here lies an opportunity for properly organized motor transport companies to bring foodstuffs from the producing districts.

Palm and ground-nut cultivation is held back, and 100,000 tons of shea-nuts are left to rot annually, because of inadequate means of transport to the seaboard. Socially the natives suffer also, as sanitation schemes are held in abeyance and school attendance restricted.

The Government is doing its best to set a good example. At the end of 1920 the Motor Transport Department had under its charge 60 passenger cars, 160 trucks, 20 mail vans, and 4 buses. Many of these vehicles, as a result of bad running conditions in the north, plus reckless driving and inadequate service, are often out of operation for considerable periods, and even if the whole of the Department's vehicles had been in commission throughout the year they could not have coped with the merchandise stored along the service routes.

Nevertheless, much useful work was done. At Salaga five trucks carried 1900 loads over 12,038 miles in two months. During 1920, the truck loads entering and leaving Coomassie totaled 11,182, while a test conducted over 80 miles of road in Ashanti showed that 4335 vehicles covered 237,054 miles during the last four months of the same year. These figures are all the more significant in that they were taken in the less developed center and north. If statistics were available for the coastal region the figures would be larger still.

Railroad construction is proceeding as fast as available funds and labor will allow. At present there are 304 miles of line, and this will be increased by a further hundred miles by next March. Because of high freight rates, many planters prefer to use motor transport. There is room, however, for railroads in the Gold Coast and co-ordination with other services still leaves much scope for the truck as feeder for railroad, river, and shipping stations.

At the end of 1920 the Colony's motor highways were classified as follows:

Perennial roads	650	miles
Available for most of year	365	"
Dry season roads	165	"
Under construction	200	"
Periodically available for light motor traffic	2300	"
Total	3680	"

This mileage will rapidly increase, for the natives possess a perfect passion for road building. Villages off the main roads are promptly connected by feeder roads, and, when this is not practicable, villages are often taken from their old sites and transplanted astride the motor highway.

The maintenance of these roads, together with their linking up by bridges, is providing a problem for the Government. A motorable road now traverses the Colony from south to north, and Timbuctu, far into French Sudan and once a synonym for inaccessibility, can now be reached by auto from Accra, 900 miles away.

The Gold Coast Government does not mean to allow its roads to depreciate under heavy loads. Unless special permission is given by district commissioners—permission that may be withdrawn at any time—the gross weight of any vehicle, including driver and passengers, must not exceed 1½ tons. Moreover, trucks must be fitted with pneumatic tires, while twin wheels are forbidden. The result of this legislation has been a demand for trailers, and twelve months ago there were 308 of these in Ashanti alone.

Most of the 2040 motor vehicles in 1920, valued at £1,090,352, were 10, 20, and 30-cwt. trucks. The United States was the leading supplier, but, if it is to maintain its position, it must not neglect good sales essentials.

The mother country shows signs of an overseas trade revival, and, as the Gold Coast is one of the most accessible of its offshoots, it will be one of the first to receive the attention of British makers. Moreover, its erstwhile eastern neighbor, Togoland, was, until the war, a German colony, and competition may now be expected from this quarter in view of the fact that the Teuton embargo has just been lifted. France, too, is well positioned to trade with the Gold Coast. Motor vehicles can be imported into the Colony free of duty.

The Government is endeavoring to encourage agricultural activity, and eleven stations have been established for this purpose throughout the Colony. A few tractors have been introduced for demonstration purposes, and, as the native farmers are keen and industrious they might easily be prevailed upon to adopt modern methods if irrigation schemes materialize. At present, however, little demand is to be expected, although there might be possibilities among the mahogany lumberers.

Most of the motor fuel used to-day in the Gold Coast comes from the United States. It is believed, however, that local oil prospectors will eventually prove successful, and it is reported that an area of 390 square miles in the Appolonia district, adjacent to the sea, will ultimately prove payable. Failing that, the Colony is rich in the raw materials necessary to the manufacture of power alcohol.

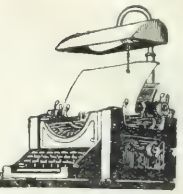
New Republic 19-Passenger Interurban Bus



New Republic interurban bus exhibited at the recent convention of the American Electric Railway Association. It is mounted on the Republic 175-in. wheelbase chassis fitted with a Knight engine. The body, which seats 19 persons, is made by the Bender Body Co. It has a 26 in. floor height, 72 in. headroom and is 72 in. wide and 210 in. long, inside dimensions. The tires are 36 x 5 in. pneumatics, dual in rear. Budd-Michelin wheels are used, an extra tire on a wheel being carried in compartment under rear of body



The FORUM



Electrical Equipment for Trucks

Editor AUTOMOTIVE INDUSTRIES:

We believe the suggested standardization of generator and starting motor sizes, with particular reference to their output and power, does not seem to conform to our conception of the purpose and usefulness of S. A. E. standardization. The standards, as outlined in the Sept. 7 issue of AUTOMOTIVE INDUSTRIES, pages 480 and 481, appear very close to the borderline of curbing individuality of development and design.

Generator and starting motor dimensions for facilitating mountings are already so satisfactorily standardized that the measure has undoubtedly saved the industry considerable expense. Heretofore S. A. E. standards have meant the definite classification of unit and mounting *dimensions* and also the definite classification of the constituents and treatments of materials for the best approved results. There has been no attempt to classify with purposes of standardization the power output of motors or the power output that a motor should have according to its type, L-head, T-head or overhead valves.

The size and power of a motor in relation to the weight of the car or truck it is to be installed in is an item that is directly up to the manufacturer and there unquestionably is a very great variety in the ratios of motor power to vehicle weights. This leads us to believe that if motor accessories are standardized as to their capacities that eventually there will be agitation toward standardized motor torques, etc. for motor sizes and vehicle weights, which would undoubtedly prove a barrier to the development of individuality in design.

Another point that would surely arise would be the predicament of motor manufacturers whose motors were unfortunately in intermediate positions between two generator or starting motor sizes. It is quite possible, that in such a case, the smaller generator or starter size would be highly desirable because of price, but it would be actually overloaded under the motor manufacturers' requirements while the next sized accessory units would be over capacity for his requirements and thus expensive to install. Such a manufacturer would really require a special generator and starter to suit his exact needs, or conversely he would need to rebuild his motor.

For instance: Carburetors have been standardized as to their dimensional and control mountings but an attempt to control their individual principles of operation or specify in a general way their requirements on a motor for useful standardization purposes would be folly. These, definitely, are points that the motor manufacturers and carburetor manufacturers must test and determine for their mutual advantages. The same arguments hold true on ignition units. Sizes or capacities of the units are not standardized but spark plug and magneto mounting dimensions are extremely simplified by standardization. These are our understanding illustrations of the trend and purpose of S. A. E. standards.

Another point. Chairman Joseph Bijur mentions, in his classification of generator capacities, the hot and cold outputs of the generators as items to be classified, evidently for the purpose of protecting the requirements of certain sized generators. It is true, of course, that the output of a generator is reduced as it becomes hotter and very careful engineering is essential in designing a generator so as not to endanger its windings in the hot stage. They are usually protected from overload by a fuse or cut-out of some sort, but we know of one electrical manufacturer whose product masters the hot and cold situation by a different and more protective method. A thermostat, capable of cutting in or out resistance is built into the generator so that as the line temperature increases the thermostat is actuated and resistance is cut in which reduces the generator output.

This arrangement permits a high rate of charge when the battery is low and just after the starting motor has been used and a safe, controllable low rate of charge when the battery is up and there is no great drain on it. Such an arrangement permits the motor manufacturer to specify a broader range for the utility of his electrical units and it also affords a more tangible protection to these units so that, as President Libby mentioned, "he need not be afraid to guarantee them." This point serves to illustrate the development of an individuality of design that would have been rendered unnecessary had the Automotive Electric Association's Standards prevailed at the time.

We would suggest that the Automotive Electric Association devote further efforts toward the dimensional standardization of their units, instead of toward their capacities. The body diameters, as well as the overall lengths of starters and generators and terminal locations are not at present standardized, that we know of, and it seems that these items would be of broader assistance to engineers than the proposed standards.

The following is a study of the proposed standards in relation to our own requirements.

On our Lycoming motors used in the Model "S," the generator speed is 96 r.p.m. per mile per hour truck speed and the No. 1 generator, recommended for standardization, is listed at 70 r.p.m. per mile per hour car speed. This generator also has a rather low output, being only 10-13 amperes hot at a listed 23 m.p.h. car speed. The generator on our Lycoming Motor is driven at a $1\frac{1}{2}$ to 1 ratio, but if we consider a generator driven at crankshaft speed (on our Model "S" this would be 64 r.p.m. per mile per hour car speed) which would be the necessary speed for through shaft generators driving magnetos we could utilize generator No. 2 to fair advantage. This generator is specified in the standards at 63 r.p.m. per mile per hour car speed and its maximum hot output of 11 amperes would cover our requirements on the speed truck and if anything would be overcharging.

Our Model No. 61 motor turns 89 r.p.m. per mile per hour car speed. This ought to take the No. 3 generator

but it is stipulated in the standards that the No. 3 generator should operate at a lower speed than that of No. 2, which is 63 r.p.m. per mile per hour car speed. A generator on our Model No. 61, of course, would have to run at crankshaft speed so as to drive a magneto in tandem hook-up. The output of No. 3 generator (which is the same as that of No. 2) would amply cover the requirements of our Model No. 61.

Almost the same conditions apply to our Model No. 101 except that the motor r.p.m. per mile per hour car speed is slightly higher, being 92, which is the speed that a generator would have to operate at.

While these speeds appear to be rather high, in comparison to the stipulated speeds of the generator, we can easily understand, because of the governing of the great majority of truck motors, that the generators installed on them will be almost constant speed machines. Generator No. 2 is intended to give its maximum output at 30 m.p.h., this would make the generator turn 1890 r.p.m. On our Model No. 61, we will say that the maximum speed of the truck is 20 m.p.h. which would require a generator giving its maximum output at 1790 r.p.m., instead of 1890 r.p.m. Furthermore, the touring car motor is usually capable of turning up to about 3000 r.p.m. or say 50 m.p.h. and it also runs much higher than normal speed when the car is pulling in its lower gears, thus making a great many instances where the generator would be operated far above its maximum output r.p.m. Such instances as running above maximum output speed on a truck motor would rarely occur, in fact ought never to occur, and this places the generator's requirements within such narrow limits that we do not see how power outputs could be very well standardized for general use.

From the points cited we can see that our own products could get by by adhering to the proposed generator standards but not to our best advantage. We do feel, judging particularly from the requirements of our own products, that a generator with the specifications listed for No. 3 would cover the requirements of the majority of truck manufacturers. Examination of the motor truck specifications listed in AUTOMOTIVE INDUSTRIES of Feb. 16, 1922, shows a wide range of governed and ungoverned truck motor speeds, the extremes being 849 r.p.m. for a 2½ ton, 4 cyl. 4⅛ x 5¼ engine and 3500 r.p.m. on a 1 ton, 4 cyl. 3⅜ x 5⅛ engine. Most manufacturers, however, list their engines between 1200 and 2200 r.p.m.

We believe that starting motors would be capable of smaller classification than the generators; say, at the most that four sizes would cover practically all manufacturers' requirements. Here we have a little more leeway than with the generators, for the size of the flywheel ring gear can be changed a little. The No. 1 starting motor would be too small for our requirements on truck motors. We should recommend a motor with a capacity of at least 16 lb. in torque and capable of turning 2000 r.p.m. to give a desirable cranking speed of about 200 crankshaft r.p.m. The power consumed should, of course, be as low as possible for these results.

The No. 5 generator recommended for bus use differs somewhat from the capacity that we have developed as satisfactory. We have retained the 6-8 volt system in a 150 watt type generator, which we have found to be light, inexpensive and in more general conformity to automotive practice. This system develops ample power for lighting our 25 passenger bus.

The generator we have developed for our railway car differs from the recommended No. 6 generator in its voltage. We have decided upon a 32 volt system to conform to railway practice. The wattage output, however, is approximately the same as proposed. It seems that standardization on the railway car is a rather premature project as this branch of the "automotive industry" is as yet somewhat unsettled.

In summing up we wish to say that we are not convinced that the proposed standards would result in any great saving to the industry, especially from a viewpoint of complete satisfaction. Any material reduction in price that might be effected by adhering to the proposed standards, we feel, would be offset by many "misfits" or where the misfits were avoided by the extra cost that would be necessary in getting a generator or starter of the correct size.—International Harvester Co., H. E. Derr, Chief Engineer Motor Trucks.

Evaporating Cooling Systems

Editor, AUTOMOTIVE INDUSTRIES:

Mr. Clayden's article, "Advantages of Evaporating Type of Cooling System," in your issue of Sept. 14, covers the whole subject so fully that little more can be said. In his description of the Rushmore system, however, Mr. Clayden has not made entirely clear the purpose of the blow-off valve attached to the top of the radiator.

The blow-off valve has, really, nothing to do with the operation of the system. It is put there solely for moral effect. Owing to the higher temperature gradient, any radiator large enough to cool a given engine with water circulation will be much larger than required with the vapor or evaporating system and, so long as the fan is running, no steam will ever be discharged from the wide open overflow vent.

If, however, the engine is stopped immediately after working under a heavy load, the excess heat from the pistons and the slightly superheated water in the jackets will fill the radiator with steam and, for never more than thirty seconds, steam will be blown off. As in the Navy, it is a tradition that a motor vehicle must never show steam. So we have put on the little blow-off valve to hold back the small amount of excess steam for the few moments after the engine has stopped and the pressure never runs up to more than a pound per square inch.

It should be explained also that the considerable jacket pressure of 4 or 5 lb. Mr. Clayden has observed at times on cars equipped with the Rushmore system has not always been due to the setting of the blow-off valve, but rather to the resistance to flow of steam and water through makeshift pipe connections where water type radiators have been adapted to vapor cooling.

On most of the jobs we now have in service the outlet piping is of ample size, so that the jacket pressure rarely exceeds that of the atmosphere. On the contrary, where everything is fairly tight, we usually have an appreciable vacuum in the system, and consequent jacket temperatures somewhat below 212 deg. Fahr.

One of the advantages of the Rushmore system, which Mr. Clayden apparently overlooked, is the comparative immunity from loss of water should the radiator be injured in any way. As, normally, only the lower portion of the radiator contains steam, there is nothing but air to leak out of a puncture in the upper two-thirds of the core. Should a puncture occur in the lower, steam filled portion of the core, only steam can escape. As, with a given orifice and pressure, it takes about 180 times as long for a pound of steam to escape as it does a pound of water, a puncture that would quickly drain the usual water system would cause only a negligible loss with steam.

As most radiator leaks occur in the core, the vapor or evaporating system offers practical immunity from loss of water, notwithstanding the common notion that the "steam" cooling system must be dangerously liable to run dry.

S. W. RUSHMORE.

Production Costs More Important Than Wage Rates

Results of coal strike show futility of general adjustments in labor relations. Study in individual relationships in each plant offers most satisfactory solution. Scale of wages should be considered in relation to unit production cost.

By Harry Tipper

THE coal strike is no sooner merged into the peace of the recent truce when the formal request is made upon the operators for the consideration of new demands at the end of the present period.

Talk of the necessity of maintaining the present rate of wages or securing increases begins to crop out again among other trades.

The index of living costs shows the present position at 173 or 73 per cent above 1913 with a tendency to rise.

There is a shortage of labor already in some lines of employment and some grumbling about the operation of the immigration law, with its practical embargo on certain kinds of desired accretions to the working population.

The car loadings have reached a record and the system of business demands agreement, stable organization, with much construction in order to do the future work without too much creaking and groaning.

Labor difficulties are with us to the same extent as ever. They do not decrease in their capacity to disturb business, and place an additional burden upon the user. There seemed to be a general impression that the labor question was solved by the events of the latter part of 1920 and 1921. Many manufacturers acted upon that belief and some of them so stated in their public discussions of the matter. The fundamentals of the problem had not been studied and it was evident that no proper examination would lead to such conclusions and that any cessation of industrial problems from a labor standpoint, would be due either to the individual plant in its industrial relations or to every temporary general situation.

One of the most important indications of this belief on the part of manufacturers was the wholesale abandonment of the departments of welfare and labor relations when the scarcity of labor in 1919 was succeeded by the general curtailment of business activity in 1920 and 1921.

A good many of these welfare activities and labor relations developments were better out of the way. They had been started with little thought, operated without sufficient study, and sometimes actually were harmful to good relations between management and men. Nevertheless, the whole business fraternity dropped almost all operations of the kind when the depression came, the exceptions being few and conspicuous.

Not only that, but almost as though someone had been organizing the propaganda, discussions on the necessity of curtailing wages appeared everywhere. Speeches were quoted at length in the newspapers, conventions resolved and manufacturers frequently operated on the program arbitrarily.

At that time, AUTOMOTIVE INDUSTRIES pointed out the absurdity of abandoning any well-constructed plans and studied activities of the kind because of a temporary advantage. It also pointed out the history of wages and the general tendency for these to retain new levels once the new levels had been established.

These matters are referred to because the present conditions point to more active labor demands and the necessity of determining methods of meeting the situation more successfully than we have done in the past.

The coal operators finally acceded to the demands of the miners, largely because the necessity for coal to most industries and householders is so much more important than a slight difference in price, that the approaching stagnation of business brought to light a demand that the strike cease and coal production begin.

For the same reason, other groups of employers find it hard to stand solidly together when the effects of a strike begin to eat into the activities of business very seriously.

Individual Action Best

The manufacturer who is having difficulty with his workers is convinced of the necessity of his own action; he relies upon the sympathy of other manufacturers and the forebearance of the public in regard to the difficulties of the dispute. He does not properly estimate the reasons for this sympathy and forebearance and the circumstances which will alter it. The change in this respect was indicated very fully in the course of the coal strike by the discussions in the newspapers and the attitude of the other industries. So long as there was a reserve supply available for the continuance of production and the weather conditions made it unnecessary for the householder to accumulate any coal, the public was indifferent and the other industries sympathetic to the coal operators' position. As the time approached, however, when the reserves would be entirely wiped out, the householder began to worry about his winter supply, and the pressure for some kind of an arrangement which would permit of the opening up of coal production became much greater than the previous indifference or sympathy. If the strike had continued a little while longer, the public discussions would have shown the entire impatience of the public with the whole situation and their desire to secure coal regardless of the exact

conditions under which production was started.

The same thing is true in connection with almost all individual industrial strikes or similar difficulties. The stress of competition leads the manufacturer to seize whatever advantage he may secure rather than close his plant and lose a large amount of money. Consequently, the loss of any essential material for manufacture becomes more important finally than the question of prices and there is a pressure for peace which is greater than the pressure for any particular agreement as a condition of peace.

Reduced Wages

These conditions all operate to increase the difficulties of securing a lower level of wages, whether temporary or over the whole surface of business. In isolated instances and in some particular fields, wages are successfully reduced for a time. In other fields of endeavor, the levels are maintained and finally new levels are established as a matter of course. The employer who hopes to settle this question in combination with other employers and other general union activities, can derive little encouragement from past events. The employer who hopes, in combination with other employers to destroy the union, faces a similar situation in all industries where strong unions obtain.

Any settlement provides only a basis for new demands. In such cases, a victory for the employers is likely to lead to a new consideration. A victory for the unions is sure to be followed by new demands.

Even if no strikes eventuate, general agreements between groups of employers and workers' unions are difficult to maintain over more than short periods, are just as difficult to renew, and do not have any definite relation to costs.

That manufacturer has been well advised, who has gone forward with his own studies into the labor problem of his own organization and the possibilities of bettering conditions in his own plant.

Even though the results of his efforts have been discouraging and apparently have not attained the things he hoped, he has a much better opportunity to make peace with his workers and keep it than the employer who has made no such studies but intends to work through a group of employers in general sessions with the unions.

High wages do not mean a high cost of production necessarily. They do mean a higher cost of production if the production pace averages the same. Wherever the allegiance to the union is more effective than the belief in the individual organization, higher wages do mean a greater cost to produce, but in a number of plants in this country, high wages are being paid on a reasonable production cost by more effective management.

The most desirable production system is the one whereby high wages can be paid and low production costs obtained. This enables the worker to purchase more largely out of his surplus because the cost of living is not so nearly related to his maximum earnings. Wherever plants have been able to manage affairs so as to pay a high rate of wages without increasing and in many cases reducing production costs, their contribution to general prosperity is much beyond the value of their product.

The attention of employers and managers of industry should be directed to the question of production costs and the elements entering into production efficiency. Entirely too much of the discussion is devoted to the question of wages and hours without consideration of production pace and maximum development of organization. Between the most efficient plant in any industry and the less efficient plant, there is a wide variation in costs. This variation is always much greater than the variation in wages. Frequently, there is no variation in wages at all, the difference in production costs arising out of more efficient management of the plant through its understanding of the labor necessities and development of the equipment.

This study, of course, must be an individual study related strictly to the individual plant. Information of value in conducting the study may be secured by the examination of conditions in other plants, but the study itself must be undertaken in order to apply it to the particular operations and conditions. Regardless, therefore, of the general situation, the most important job in connection with labor costs, as studied in the individual plant, is concerned with production and production effect.

This study should include not only the direct labor but the indirect labor classified as overhead, so that the organization may be maintained at the high production pace and consequently secure good wages without such wages increasing the production costs.

General agreements between groups of employers and groups of workers affect wages, hours, etc., only. They do not affect conditions of management or organization. They do not look to production costs or production speed. They are utterly incapable of bettering the production condition or the reduction of the avoidable wastes.

Conditions in the coal mining business illustrate this. Engineers and experienced men in this field have pointed out great possibilities of improving the organization and capacity of the business, but the operators and unions continue to argue about wages and hours, while the public need is for organization and efficiency.

The general agreements between groups of employers and groups of workers tend to introduce privileges and limitations which act adversely upon the production possibilities so that high wages are not accompanied by a decreased production cost. In Great Britain where the custom of treating as between groups of employers and unions has obtained for many years, the number of rules and regulations relating to production is very large and practically controls the possibilities of production volume per man in some lines of industry. It is not likely that such general agreements will operate in any other way in the future and consequently they do not increase production efficiency or improve the economic position particularly.

Finally, in some way or other, the management of the individual plant will be obliged to take the full responsibility for the organization of the plant and the production value of the labor therein.

UNFAVORABLE economic conditions have reduced Swiss automotive trade in both imports and exports. A loss of two-thirds was experienced in exports for the first half of 1922, as compared with the first half of 1921, while imports fell off about half. The import drop came despite the comparatively high value of the Swiss franc. This fact gives some measure of the strenuous character of economic disturbance, since the Swiss automobile manufacturing industry itself is far from being in a position to supply the present automotive needs of the country.

Imports from the United States have increased at the expense of Germany. Swiss trade figures for the first six months of 1922 as compared with the same period for 1921 were:

	1922	1921
Exports	1,200,000 fr.	3,300,000 fr.
Imports	13,300,000 fr.	28,100,000 fr.

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Make Them Mean Something

THIRTY new S. A. E. standards have just been finally adopted. These are the standards which were approved at the last summer meeting. The letter ballot, as is usual, has resulted in an overwhelming majority in favor of nearly all the recommendations approved by the standards committee.

Will executives and designing engineers of the industry remember two months from now that these new standards have been adopted? Will they put into use these simplified practices that they have had a part in making? Or will it be possible in future years to apply to some of these new standards the same phrase that has been used of some others in the past. They are fine in themselves but the industry fails to make use of them.

Less than 10 per cent of those eligible to vote cast a ballot on any of the proposals. The total number voting on any one proposal did not exceed 194. The total number of members eligible to vote is in the neighborhood of 3000.

It was not to be expected that an extremely high percentage of possible votes would be returned. Many members know the careful work done by the standards committee and simply rely on the fact that the recommendations made will be accepted whether they vote or not. But there is undoubtedly a certain proportion of pure indifference included in the 90 per cent of non-voters. It is largely indifference which prevents wider use of standards.

Executives can save thousands of dollars a year, make their service easier to handle, at the same time preserve all the desirable individuality of their product by getting behind the movement to put standards into actual use more widely. The chief executive of every organization can profitably ask for a report from his engineering department on the extent to which they are using standards and an explanation of any failure to use them in cases where standards are available.

Guessing Market Probabilities

RESEARCH departments are essential parts of modern business. Automotive companies are finding imperative the necessity for study of future markets.

But the compilation and use of statistical research data are of comparatively recent date. Interpretation of such material, especially, is still in the experimental stage. Mistakes made in using research departments and statistical data have inclined some executives to disparage all work of this character. The difficulty lies, not in the essential idea of basing future procedure on facts insofar as possible, but in the misuse or misinterpretation of those facts.

Collection of research data is not an end in itself. It does not and never will take the place of judgment and constructive thinking in the operation of a business. Rather, it increases the scope and necessity for sound judgment. The research department should be used to provide for the executive those facts which he needs in order to make proper decisions.

"Any business judgment is as sound as the facts upon which it is based," said Henry S. Dennison, president of the Dennison Manufacturing Co., the other day at a meeting of the Business Paper Editors. A proper assembling and study of facts are essential to sound judgments, Dennison believes.

Some business decisions must be taken before complete facts are available, but the proportion of such decisions should be reduced to a minimum. Executives should strive to take the guess out of business to the best of their ability.

Research departments are needed to provide material upon which to base plans. They supplement very materially, but in no sense replace, the necessity for judgment.

Practical Theories

"MEN do not begin to act upon theories. It is always some real danger, some practical necessity, that produces action and it is only after action has destroyed old relationships and produced a new and perplexing state of affairs that theory comes to its own. Then it is that theory is put to test."

This statement is made as a result of a careful and comprehensive study of the history and actions of man since the beginning of time. It is made by H. G. Wells in his "Outline of History." An examination of the past indicates its essential truthfulness so far as the past is concerned. But it need not hold true of the future.

Executives in the automotive industry are beginning to see possibilities for profit in acting on the basis of sound theory before compelled to do so by dire necessity. Some of them are practicing this new doctrine in their handling of industrial relationships. They are attempting to adjust the relation between the worker and his job in a satisfactory manner long before any pressure for such adjustment is exercised by the worker. By so doing they are finding the adjustments easier and less expensive to make and are securing the benefit of mental as well as physical cooperation from employees. They are studying personnel problems carefully whether trouble has appeared on the horizon or not.

Others are making similar studies and are developing similar sound theories along marketing lines. They are trying out theories that look practical and useful before compelled to "try something" by economic forces. This studied investigation and experiment gives them ample time to modify and adapt various phases of the original theory to practical needs. They are making their market policy adjustments without the haste and inaccuracy necessary in changes forced by circumstances.

Preventing Oil Pumping Troubles

MANY modern engines, especially those used in lower priced vehicles, suffer from excessive lubrication so far as the cylinders are concerned, with the result that much oil passes the pistons, fouls the plugs and tends to cause accumulation of carbon. This trouble, commonly known as "oil pumping," is by no means confined to old cars with badly worn cylinders and bearings. It is due, in the case of new cars, to two main causes—faulty design and careless manufacture.

In general oil pumping results from an excessive amount of oil being thrown on the lower portion of the cylinder barrel. With properly designed pistons and rings this excess oil is returned to the sump without causing pumping troubles, but with faulty pistons and rings an excessive amount is quite certain to reach the combustion chamber. It would thus seem to be self evident that it is desirable to prevent too much oil from reaching the cylinder barrel in the first instance.

In the case of splash lubrication this can be accomplished by making arrangements whereby the oil level is properly maintained under all conditions. The portions of the rod which dip into the lubricant must, of course, be correctly proportioned. In one case we know of the use of connecting rod bolts which were longer than necessary gave rise to a lot of pumping trouble.

With pressure lubrication much depends upon proper location of the oil holes in the crank pins. The intelligent use of baffles arranged to deflect most of the oil thrown from the bearings away from the cylinder bore is also understood to produce the desired result, but ordinary flat baffles fitted at the base of the cylinders are said to have aggravated the trouble in other cases.

Too much emphasis can hardly be placed upon the importance of a perfectly true cylinder bore and of well-made and well-fitted pistons and rings. Evidences of careless manufacture of these parts are all too frequently found. A small sum spent during manufacture in better finishing cylinder bores and in the careful selection and fitting of rings, will, we believe, pay the car and engine builder many fold, not only in preventing oil pumping and its attendant evils, but in general improvement and satisfaction in the use of the finished product.

Shifting Emphasis in Production

AUTOMOTIVE production is entering a new phase. The fact that the first S. A. E. production meeting is about to be held is not without significance. Production is passing from its period of radical and revolutionary improvements to a stage of minor refinements of considerable importance.

Ten years ago a production man might gather some valuable and practical information by a general survey of another plant or by reading a general description of its operating methods.

To-day he must examine intimately the details of operations. To get anything of practical value from his fellow production man, he must discuss mutual problems and ask questions about details.

Production progress of the next ten years may be equal in importance and efficiency to that of the last ten, but it will be different in character. It will consist of an improvement in a multitude of small matters rather than in a few radical changes in major operations.

Attention must be concentrated upon a closer analysis of production details and a studied effort at small refinement, if production is to make the strides in increased efficiency which will still be demanded of it during the coming decade.

2,000,000 Year Assured for 1922

1,873,000 Produced in Three Quarters

Will Need Only 403,000 to Equal High Record That Was Established in 1920

NEW YORK, Oct. 16—The automotive industry has entered the final quarter of the year with assurances that no matter what may happen to retard progress during this period the total production of cars and trucks for the twelve months will surpass the 1921 aggregate and from all indications will forge ahead of the record established in 1920, the banner year in the industry.

What the industry has accomplished in production so far this year is evident from a comparison of the totals for the last two years and for the first three quarters of 1922.

In 1920 there were produced 2,276,000 cars and trucks of which 1,928,000 were built in the first nine months, the slump which affected all lines of business seriously hitting the industry in the last quarter. The total output in 1921 was 1,668,550 and in the first nine months of 1922, 1,873,000. To reach the production record of 1920 the industry must produce 403,000 cars and trucks in the next three months, which is less than 60,000 under the total of the third quarter of 1920 when the industry was suffering its most severe setback, and only 68,000 more than for the third quarter of last year, which was not an exceptional period.

Work on High Schedules

There is little question but that this figure will be reached and that 1922 will be another 2,000,000 year. Ford, which reduced its total in September through the closing of its plants, has come back with a 5000 daily production schedule and the majority of other plants are working on high production programs. Reports of parts makers that orders are being placed well in advance indicate the purpose of the car manufacturers to keep output at a high mark.

These manufacturers, however, are ready to start the tapering off process in operations as soon as a decline in sales comes in a sufficiently large volume to warrant it. So far, October has shown no signs of more than a slight falling off in sections widely separated. Interest has been sustained until the industry has started

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Business in Brief

NEW YORK, Oct. 18—Cool weather has had its effect on trade and industry in that it has bolstered up retail business appreciably, while it has caused wholesalers to become apprehensive of transportation congestion, which has caused them to buy liberally.

Car shortages seem to be the chief cause of complaint, especially in the steel industry. Despite this, prices of pig iron are reported easing in the West. Car loadings for the week ended Sept. 30 were the largest since Oct. 22, 1920, with 30,988,381 or 9.2 per cent over last year and only 3 per cent above the peak total of Oct. 15, 1920. This is 15,090 more than the preceding week. Transportation is held up by the lack of power, it would seem, many locomotives being in need of repair.

There is great activity in wheat movements, more than 70,000,000 bu. of spring wheat having left farms in the Northwest, while 120,000,000 bu. have been moved in western Canadian provinces. Corn harvest is progressing.

Railroad earnings decreased in August, but this was to be expected because of the strikes and the 10 per cent reduction in freight rates. According to the Interstate Commerce Commission's reports, the railroads failed by more than $66,000,000 to earn 6 per cent on their valuation in August. Operating revenues were $473,877,000 and expenses $387,150,000.

There was considerable activity in the stock market caused by announcements of big dividends like the Standard Oil Co. of New Jersey's announcement of a 400 per cent stock dividend. Money was firmer, exchanges strengthened slightly, bonds were fairly active and steady while commercial paper discounts ruled unchanged. Business failures were 366 as compared with 314 the preceding week.

Bank clearings for the week totaled $6,323,982,000, a loss of 18.7 per cent from the previous week but a gain of 15.8 per cent over the same week last year.

2,500,000, Output in 1923, Willys Says

Of This 1,900,000 Will Be Replacements—This Year's Production, 2,250,000

CLEVELAND, Oct. 19 — John N. Willys has given an answer to the question of what will happen next year in view of the unprecedented number of cars that have been sold in 1922.

Willys answer is: "I say there will be between 2,500,000 and 2,600,000 cars produced and marketed in 1923, and of this number 1,900,000 will be replacements. Some of the companies which are in the field to-day will vanish during this coming year. But there will be automobiles sold. A year ago we were laughed at when we made the prediction that automobile production for 1922 would total 2,250,000. At the end of this year the figures will show an output of between 2,250,000 and 2,300,000."

This statement was made by Willys when he came to Cleveland last week to help Walter F. Wright start his new company here on the campaign for Overland and Willys business. Wright recently took over the business of the Toledo corporation in this city.

Good Service Essential

Speaking to a group of business men associated with Wright, Willys said:

The automobile industry is a big business. It is a big job to make and sell 2,500,000 motor cars and trucks. The organization having manufacturing and merchandising policies that are right will come in for its good share of the business, but the greatest determining factor in the industry to-day is service. A manufacturer can build the best car in the world and it will fail unless he has provided that its owner shall have good service and at a price that will make him a booster as well as a customer.

When the owner of a motor car knocks it, and his kicks are justified, the reason generally is poor service, and yet the manufacturer is the one who suffers. So we are paying more attention to service to-day than at any time in the history of the company.

How does this apply to the manufacturer? In order to get the right kind of distributing and service organizations he needs to have franchises that are worth holding and he must have a product which the people will want to buy. I have heard a lot about good salesmanship, and my definition of good salesmanship is getting hold of a product having sufficient merit for the public to want to buy it. That's where the manufacturing comes in.

Willys paid a compliment to Wright. The latter in outlining his policies said that his first concern was to surround himself with men who would go more than half way in meeting the demands of Willys Overland car owners.

New Ford Cut Puts Phaeton at $298

$50 Taken Off All Models Except One

Four-Door Sedan Not Lowered in Price—Truck Affected But Not Tractor

DETROIT, Oct. 17—Effective to-day, the Ford Motor Co. has announced a reduction in prices for the second time this year. Fifty dollars has been cut off the list on all Ford models, with the exception of the tractor and the recently announced four-door sedan, which will remain at its original price of $725.

Under the new list the five-passenger open car will sell for $298, the lowest it ever has been. Originally it was listed at $360. That was in 1916, but in 1920 it had reached the peak, $575. Since then the price has been reduced gradually—to $440, $415, and $355 in 1921, and on Jan. 1, this year, $7 was taken off the $355 list. Now comes the sensational drop to $298.

The new Ford prices, without starter and demountable rims, are as follows:

	Old Price	New Price
Chassis	$285	$235
Runabout	319	269
5-pass. phaeton	348	298
Truck chassis	430	380
Coupe	580	530
Sedan	645	595

Edsel Ford Assigns Reasons

The reductions are made possible by increased production and the acquisition and operation by the company of many of its supply sources, according to a statement by Edsel B. Ford, president. The new prices represent a cut of almost 100 per cent from prices prevailing in March, 1920.

Ford said:

The revision in prices is the result of the increased volume of business which our company has enjoyed during the present year and also to the fact that we now own and operate many of our own sources of raw material which enables us to continue increasing the quality of our product and at the same time keep the price so low that Ford cars are within the reach of everyone.

Our production for 1922 already is in excess of 1,000,000 which has been an important factor in bringing down costs, and our present daily output is averaging better than 5,000 cars and trucks which means a complete Ford every five and a half seconds of each working day. It is in anticipation of this continued demand that price adjustments are being made in order to keep in effect the policy of selling Ford products at the lowest price consistent with quality.

Quality will continue to be the prime consideration in the building of Ford cars. As our business has increased we have constantly increased our equipment and manufacturing facilities so that this price reduction merely reflects the progressive methods which come as a result of increased volume.

This reduction is the sixth since March, 1920, and brings the price of the Ford phaeton from $575 to the present low level of $298. Corresponding reductions have been made on all other types. The

(*Continued on page 795*)

Younger Generation, Demanding Modern Touch, Influences Style of Car Produced

By Carroll Downes

Vice President, Durant Motors, Inc., President, Durant Motor Co. of Michigan, and President, Star Motors, Inc.

DETROIT, Oct. 17.

SOME idea of the extent and scope of the automotive market may be gleaned from the fact that already Star Motors has accepted orders for all the cars it can build in its first calendar year.

Our estimated production for the first year, based upon the number of engines that can be built, is 231,000. Orders for 505,000 of these vehicles are in our files in New York, eliminating those of which we are doubtful we have over 200,000 left which will take practically every car we can make.

Buyers of motor cars are demanding more style and individual characteristics in their purchases all the time. Manufacturers who are successful in interpreting the desires of the people will always be busy. We have seen and are seeing instances every day where the product of the more standardized manufacturer is passed up in preference for a car from a lesser known source which has been given a more modern touch.

This is largely due to the influence of the younger generation which wants more dash in its motor cars. Sport cars are not a novelty. They represent a definite taste on the part of many thousands of buyers. They will continue to hold an important place in the manufacturing schedules of our factories and will in time, I believe, usurp the place now held by the present standardized open models.

In addition to successful interpretation of public desires, the automobile manufacturer who will be successful must be organized along the most economical lines. Every man in an organization must have a definite place to fill. There are many companies today maintaining expensive positions and departments which might easily be dispensed with. Where such conditions exist a company cannot compete successfully.

The dealer situation about the country as we find it is good. We have doubled our dealer organization since the first distribution of Durant products was started and have been compelled to hold up opening all of the territory in the United States because of lack of sufficient production. The foreign field has been practically untouched for this reason. With all factories operating we shall be enabled to open the way for Durant representation in every part of the world.

The railroad situation delayed us in our manufacturing plans somewhat but this condition is now improving through the splendid work on the part of executives. Though the industry was hit by the car shortage, we had splendid cooperation from railroad officials and because of this came through the trying strike period with much better service than might ordinarily have been expected. The industry owes the railroads its thanks for their efforts. With the peak of the crop movement passed conditions should rapidly right themselves.

MERCER DIRECTORS

TRENTON, N. J., Oct. 17—Directors of the Mercer Motors Co. have been elected as follows: J. F. Brice, A. S. C. Fiske, W. M. Swain, E. D. Meyerowitz, C. A. Bona, W. G. Kimball, J. L. Kuser, J. L. Kuser, Jr., E. C. Stokes, N. A. K. Bugbee, G. P. Smith, J. W. Richmond, R. N. Barnum, W. A. Smith and H. D. Fogg.

Commercial-Continental Plan Has Been Ratified

NEW YORK, Oct. 16—The proposal whereby the Commercial Credit Co. of Baltimore was to acquire control of the Continental Guaranty Corp. of New York, has been ratified by the stockholders and the exchange of stock will take place in Baltimore on Oct. 25. While both concerns will retain their identity, after Nov. 1 they will operate under the control of the Baltimore company, according to the announcement.

These two finance organizations have been prominent in the handling of automobile credits and the New York corporation numbers John N. Willys and J. D. Dort, automobile manufacturers, among its directors.

Stock Issue Legal, Goodyear Answers

Contract with Leonard Kennedy Not Unfair, Company Says, Replying to Suit

AKRON, Oct. 18—Answers and demurrers to the four suits filed two months ago in the common pleas courts of Akron, by Laura L. T. Weiss of Cleveland, attacking the legality of the refinancing of the Goodyear Tire & Rubber Co., have been filed by the Goodyear company and its co-defendants including Leonard Kennedy & Co. of New York, the A. G. Becker Co. of New York and by other financial syndicates represented in the Goodyear reorganization.

Leonard Kennedy & Co. seeks to have the service of the summons upon it quashed on the ground that it is not within the jurisdiction of the Akron court.

Mrs. Weiss, in her four separate actions, charged the illegal issuance of 10,000 shares of management stock and the payment of $10,000 a year to each of three trustees of such stock; charged a dissipation of the Goodyear company's assets in paying Leonard Kennedy & Co. $250,000 a year for five years plus 5 per cent of net profits per year between $10,000,000 and $20,000,000 for the services of E. C. Wilger, as president, and of other officers, and claimed as irregular the payment of a bonus on prior preference stock and first mortgage gold bonds issued and sold by the syndicate negotiating Goodyear's $80,000,000 refinancing last year.

Sets Forth Accomplishments

Mrs. Weiss is the holder of 50 shares of Goodyear common stock and 100 shares of Goodyear preferred.

The Goodyear answers to the four actions set forth the accomplishments of the company under the new management which succeeded the Seiberling regime. They claim all the securities were properly authorized by the stockholders and were legally issued, and hold that the contract with Leonard Kennedy & Co. is not unfair or unreasonable under the circumstances. The documents state that the Goodyear company on Jan. 1, 1921, had an indebtedness of $64,000,000, and that its losses for the 14 months up to March, 1921, were $14,000,000.

BUYS JEFFERSON PLANT

JEFFERSON, WIS., Oct. 16 — A concern known as the National Vacuum Street Sweeper Co. has purchased from the receiver the entire property of the defunct Jefferson Rubber Co., which was established here about three years ago to manufacture tires, tubes and mechanical rubber goods. A new plant, representing an investment of about $100,000, was erected and equipped. This will be remodeled and retooled at once for the production of motor-driven street sanitation machinery.

FRENCH RAIL TRUCK PLANS ARE AVAILABLE

WASHINGTON, Oct. 17—Plans and specifications of several types of motor truck chassis and engines, now being used on railways in France, have been received by the Bureau of Foreign and Domestic Commerce. They will be loaned to automobile manufacturers upon application for miscellaneous exhibit No. 268, automotive division of the bureau.

According to the plans there is a growing demand for this character of equipment. The Renault Co. is now manufacturing a gasoline-driven locomotive for the standard French railroad of 1.44 meters, which is provided with an engine of 40-60 hp. and weighs 19 tons empty. This type of railway transportation, it is stated, is gaining ground in France.

Templar Plant to Reopen When Inventory Is Taken

CLEVELAND, Oct. 16—The work of taking an inventory is still in progress at the plant of the Templar Motor Co., which was placed in the hands of Receiver T. L. Hausman last week by Federal Judge D. C. Westenhaver.

The plans provide for the re-opening of the plant immediately after the inventory is completed. It will be operated under the management of the receiver, who was given such authority. While the plant is down, dealers and distributors will have sufficient cars from the stock on hand when the Federal Court took over control of the plant to supply the wants of customers.

When the institution does re-open it will have sufficient working capital to carry on plant operations, as authority has been asked to borrow money for this purpose. The company also will have the protection of the court. Plans for the reorganization are going forward rapidly.

Ford to Quit Manchester; Buys Site at Southampton

LONDON, Oct. 6 (*by mail*)—After negotiations extending over several months, the Ford Motor Co. in England has concluded arrangements to acquire 20 acres of land alongside a deep-water quay at Southampton for the erection of a plant which will displace the one now at Manchester, where the lease expires in a few years' time.

The new plant will form the headquarters for European distribution, and it is hoped to have the building completed and the plant in operation within 12 months.

Chalmers Expansion Likely to Come Now

First Development in Reorganization Movement Marks Action of Noteholders

DETROIT, Oct. 18—The consent of Chalmers' note holders to the plan by which the company will become an integral part of the Maxwell Motor Corp. properties marks the first development in the reorganization movement, according to President W. R. Wilson of Maxwell. Several more weeks will be required to work out the final arrangements, he said, and when these are complete the company will announce its plan for the development of the Chalmers line.

Production of Chalmers for the past six months has been on a limited scale, owing to the determination of Wilson to hold its operation to a basis in keeping with its financial position. This scale of operations was lower than sales requirements and was not extensive enough to meet its financial obligations, though sufficient to cope with ordinary operating expenses and yield a profit. Under this operating plan, the large stock of materials on hand when the plant came under Wilson control has been practically cleared out.

To Follow Maxwell Plan

Some time ago Maxwell officials outlined a plan for the operation of Chalmers should their organization arrangements be approved. This was not disclosed, but is understood to follow the plan used in the development of Maxwell whereby this car came in for unusual demand and became one of the big money makers of the industry almost over night. This was accomplished largely by the popularity of its models. It is understood a number of new models will be added to the Chalmers line.

The impression that the Chalmers' plant in Detroit might be discontinued with the vesting of title rights in the Maxwell organization has been denied on several occasions by executives. Recently a bid was entered by Maxwell for the Chrysler plant at Elizabeth, N. J., and it was regarded as indicating Maxwell's desire to locate an eastern plant for the manufacture of both cars, with the Maxwell plant in Detroit making both cars for middle west and western business. Wilson at that time said Maxwell wanted the Chrysler plant because it was regarded a good buy at a certain figure.

PAN MOTOR RECEIVERSHIP

ST. CLOUD, MINN., Oct. 16—Edward E. Clark and R. E. Gale have been appointed receivers for the Pan Motor Co., following the filing of a suit for $30,000 against the concern. Assets, apart from deferred capital stock and good-will, are given as $2,633,385, with liabilities of $506,061.

New Capital to Aid Stutz Development

Stockholders Will Be Asked to Authorize Issue of $1,500,000 Bonds

NEW YORK, Oct. 16—New financing of the Stutz Motor Car Co. of America, Inc., is proposed to furnish money for a campaign of development and improvement in the company's business. In order to secure the new capital a meeting of stockholders has been called for Nov. 1 to authorize an issue of $1,500,00 face value of the 15 year 7½ per cent convertible sinking fund gold debenture bonds of the company, of which it is intended to issue $1,000,000 face value at present.

The stockholders also will act on a proposed increase in the authorized number of shares of the company by 63,000 shares. Of this amount 33,000 shares are intended to be set aside to provide for possible conversion of the bonds, and the remaining 30,000 are intended to be offered to stockholders at $20 a share in the proportion of three shares of the new stock to 20 of the old. Both the $1,000,000 of debenture bonds and the 30,000 shares of stock have been underwritten.

The company explains that the convertible bonds also will be offered pro-rata to stockholders. The basis of conversion will be 33 shares of stock for each $1,000 bond.

duPont Again Locates Factory in Wilmington

WILMINGTON, DEL., Oct. 16—Originally established in Wilmington, duPont Motors, Inc., now located at Moore, Pa., near Philadelphia, is to be moved back to Wilmington. E. Paul duPont of this city is president and chief owner of the company, which manufactures the duPont car.

The company expects to occupy a group of buildings in the double block bounded by Market, Lammot and Twenty-second Streets and Vandever Avenue, formerly occupied by E. I. duPont deNemours & Co., for the company's advertising division. Originally this was a textile mill. The Moore plant will be gradually moved to Wilmington.

The company was formed by duPont several years ago to produce high-grade, high-speed cars, ranging in price from $3,000 to $4,000. The company is making slight changes in the models of its cars, and production on a normal scale will not be started until these changes have been completed.

SUPREME MOTORS BANKRUPT

CLEVELAND, Oct. 17—With liabilities of $1,067,099 and assets of $238,653, the Supreme Motors Corp. of Warren, Ohio, has filed a petition in bankruptcy in the Federal court.

FILMS TO TELL STORY OF AMERICAN ENGINE

WASHINGTON, Oct. 17—The story of the American automobile industry, through the medium of films, which have already been made by the Government in the Studebaker plant at South Bend, Ind., is to be augmented by an additional film, telling the story of the American engine. These films will be distributed by the Bureau of Foreign and Domestic Commerce in foreign countries, wherever there is a potential field for the American-made automobile.

"The Story of a Valve in Head Motor" will be filmed by the motion picture division of the bureau, under the management of M. F. Leopold. This film is being made possible through the financial support of the Buick Automobile Co., the bureau announces. The Government also plans to make another film on "The Story of the Internal Combustion Engine" as soon, Leopold says, "as the financing of the film can be arranged."

Work on the film of the "Valve in Head Motor" was begun this week in the Buick factory at Flint.

Hendee Sales, $3,000,000 for Year Ending Aug. 31

SPRINGFIELD, MASS., Oct. 19—The Hendee Manufacturing Co. lost approximately $1,100,000 owing to the industrial depression, inventory depreciation, high operating expenses and heavy overhead, according to the report for the fiscal year ending Aug. 31, 1922. Despite this loss, the report says that the concern is on a sound financial basis, having an earned surplus of $936,192. The inventory has been adjusted, overhead reduced and administrative and selling departments reorganized.

Prices have been reduced to a pre-war level, and with improvement in general business and better exchange rates, an increase of orders has ensued and the outlook for the future is encouraging. Sales, less returns and allowances for the year, are given as $3,097,480. Assets are given as $12,584,227 and liabilities as $648,035. There are outstanding 10,000 shares of preferred 7 per cent cumulative capital stock amounting to $1,000,000 and 100,000 shares of common stock amounting to $10,000,000.

FILLMORE A. DRAKE DEAD

NEW YORK, Oct. 14—Fillmore A. Drake, known in rubber circles for many years, died at his home in East Orange, N. J. After being associated for some time with the Goodrich Rubber Co. and G. & J. Tire Co., he became president of the Berrodin Rubber Co. of Philadelphia. More recently he was sales manager of the Howe Rubber Co.

Elgin Plans Go on Under Receivership

Efforts Will Be Made at Reorganization—Petition in Bankruptcy Filed

CHICAGO, Oct. 13—An involuntary petition in bankruptcy against the Elgin Motor Car Corp. of Argo, Ill., a suburb of Chicago, was filed in Federal court here yesterday by three bank creditors. Fred E. Hummel was appointed receiver.

It is stated that the plant will be continued in operation and that efforts to effect a reorganization will be continued.

The company had been in the hands of a creditors' committee since Sept. 30, and efforts were being made to raise additional capital to continue operations. Since Oct. 2 the corporation has been under the management of R. W. Phelps, a representative of the creditors' committee, and the official personnel had been greatly reduced to save expense. Charles S. Rieman is president of the company.

Petitioners for the receivership were the Central Trust Co., Greenebaum Sons Bank & Trust Co. and the Century Trust & Savings Bank, each with a claim of more than $10,000. The petitioners claim the company's liabilities are more than $1,000,000. Counsel for the company asserts that liabilities are $600,000 and that assets are more than $900,000.

The Elgin company was organized in 1915 with a capital stock of $1,500,000, which was raised in 1920 to $5,500,000. There were about 17,000 stockholders, the stock having been sold widely to small investors.

Committee Organized by Holmes Bondholders

MILWAUKEE, Oct. 16—Wisconsin holders of securities of the Holmes Motor Co., Canton, Ohio, have formed a protective committee, following the receivership proceedings instituted against the corporation. It is stated that approximately $250,000 of the Holmes company's two-year bonds, sold with a bonus of common stock, were disposed of in Milwaukee and immediate vicinity.

George F. Moss, president of the Western States Envelope Co., Milwaukee, has been appointed chairman of the committee, which has asked all holders of securities to deposit them with the First Wisconsin Trust Co., Milwaukee, while efforts are made to recover.

The committee had an appraisal made of the Holmes property, which reveals assets of $600,000, not including the worth of valuable patents on its air-cooled engine design. It is stated that while the issue of two-year bonds was in the sum of $750,000, only about $400,000 was actually sold and more than half of this amount was sold in Milwaukee.

Ford Surveys Power Sites in Wisconsin

May Establish Hydroelectric Plant to Provide Materials for Tire Factory

MILWAUKEE, Oct. 16—Reports have come from a half dozen communities in Wisconsin, where large developed and potential hydroelectric generating capacity exists, that Ford is making surveys with a view of purchasing water power sites. In connection with these reports come others to the effect that the Ford interests plan to establish a new hydroelectric plant for the purpose of a contemplated zinc oxide manufactory in Wisconsin to provide a supply of materials for a proposed tire factory. Nothing definite has grown out of these rumors and reports, however.

Color has been lent to the reports by the information coming from Platteville, which is the center of the extensive southwestern Wisconsin lead and zinc mining district, that for six months representatives of the Ford interests have been mingling with owners, operators and miners of zinc. It is stated that options have been taken of certain proved zinc mining lands, but that the name of Ford has not appeared in any of these negotiations.

While reports of Ford surveys of power sites have come from widely scattered points as far north as Rusk county, a long distance from the zinc mining district, one comes from Prairie du Chien, at the mouth of the Wisconsin River, which is only a short distance from Platteville. The Wisconsin River is the largest stream in the State and empties into the Mississippi south of Prairie du Chien.

Tremaine and Blossom Elected to Grant-Lees

CLEVELAND, Oct. 16—The Grant-Lees Co., manufacturing motor car and truck transmissions, has elected Henry A. Tremaine president and director and Carl W. Blossom, director.

Tremaine succeeds Richard Ferguson. He is vice-president of the Crouse-Tremaine-Kulas Co., treasurer of the Standard Equipment Co., and a director in several local companies, the Peerless Truck & Motor Co. being among them. Blossom succeeds F. E. Simmons, who has resigned. He is president of the Automobile Screw Products Co.

The corporation is capitalized with 80,000 shares of no par value common stock and has outstanding $142,500 of an authorized issue of $150,000 first preferred stock and $800,000 of an authorized second preferred stock.

PACKARD ANNIVERSARY

DETROIT, Oct. 16—The Packard Motor Car Co. is preparing to celebrate the 23d anniversary of the production of its first automobile. The first Packard was completed at Warren, Ohio, by J. W. Packard, Nov. 6, 1899. It had a one cylinder motor with a belt drive and three speeds forward and reverse through sliding the belt. The Packard factory was moved to Detroit from Warren in the fall of 1903.

OUTPUT CURTAILMENT STORY HAS NO OWNER

WASHINGTON, Oct. 16 — Reports, as printed in several New York newspapers this morning, that the National American Automotive Association last night "at their annual banquet at the New Willard Hotel adopted a resolution favoring the curtailment of the automobile production," were to-day reported as being untrue.

Managers of the Washington bureau of the newspapers denied that such a story had been filed by their bureau. Officials of the hotel denied that such an organization had ever held a banquet there, and local automobile officials deny knowledge of any such organization as the National American Automotive Association.

The story as carried by the two New York dailies stated that representatives of certain automobile manufacturers were present and voted the curtailment. Local representatives of these companies deny any knowledge of either the organization or any action such as reported.

Dr. Stratton Leaves Government Service

WASHINGTON, Oct. 14—Secretary of Commerce Hoover has accepted the resignation of Dr. S. W. Stratton as director of the Bureau of Standards. Dr. Stratton has been elected president of the Massachusetts Institute of Technology.

Dr. Stratton has repeatedly declined attractive offers from the automobile industry. In retiring from the government service he stated that this step was necessary because of the small salary attached to the position. It is known that Secretary Hoover has paid the many experts employed in his department from his personal funds, in order that the Government might retain their services.

LAUSON ADDS NIGHT SHIFT

MILWAUKEE, Oct. 16—The John Lauson Manufacturing Co. of New Holstein, Wis., manufacturer of the Lauson tractor, farm gas engines, etc., has added a night shift in order to meet its delivery specifications, particularly on small gas engines. Tractor trade, likewise, is showing a healthy increase. The Lauson plant has been operating a full day shift since last spring.

Parts Makers Show Improved Position

Finances of That Branch of Industry Secure—Operations at Peak Rate

MILWAUKEE, Oct. 16—Production of automotive parts and equipment is proceeding virtually at the peak rate of output reached during the summer, and there has as yet been no appreciable let-down in the volume of shipments, as delivery specifications are coming freely. As a rule, however, local parts shops have caught up on directions and are keeping about even. This is considered a very satisfactory situation.

It is regarded as significant that as the result of operations in the past eight or ten months, the financial position of automotive parts industries here is gratifyingly secure. This is reflected by the fact that one large interest which among many others issued preferred stock shares during the time of financial pressure to gain more adequate working capital and general funds is now taking advantage of its option to call in these shares for payment. While the wisdom of calling in securities bearing high rates of interest at a time when ruling interest rates show a decided decline dictates this procedure to some extent, it is the fact that these industries find themselves able to repay much sooner than expected, which is significant. It is indicative of greatly improved earnings, gross and net, and represents a situation that even the more optimistic financial interests did not look to come into existence probably for another year or two.

Best of all, perhaps, is the fact that in calling in the so-called emergency securities for payment, the industries do not find it necessary to refund these debts, which is so often the case at times when it is possible to take advantage of lower interest rates by calling in high-rate paper and funding it with low-rate securities.

Farm Demand Sustained

Manufacturers of passenger cars in this territory are able, to state it broadly, to sell all they can make. The improved demand for passenger cars from the rural districts and the farms is well sustained, and is becoming more and more noticeable with respect to the medium-priced cars. Accessories are also enjoying a good demand.

Commercial car business is making slow but substantial progress, with passenger-carrying vehicle demand growing steadily and a better call for freight trucks discernible right along. Power farm operating equipment is reported to be moving better than at any time since the spring of 1920. Tractor trade, while it has not taken any decided spurt, is active once more, and predictions are freely made that 1923 will at least equal if not exceed the best year this class of machine has ever enjoyed.

Conditions in South Take on Better Tone

Crops Yielded Well and Bring Good Prices—Farmers Liquidating Debts

ATLANTA, Oct. 18—The monthly business report of the Federal Reserve Bank of Atlanta, just issued, shows general business and industrial conditions as a whole in the Southeast to have improved considerably during August and September, in spite of the railroad strike. With the strike settled, the outlook promises unusual activity during the next several months.

Automobile sales during September succeeded in holding their own, though no improvement was noted over August. Automobile and accessory business as a whole, however, was much better than the same period in 1921, with higher priced cars in much greater demand.

Financially, the district is in excellent shape, better than in two or three years. The buying power of the southeastern farmers is at least 100 per cent greater than last year. All crops yielded well and are bringing very good prices. A cotton crop in excess of 10,000,000 bales appears certain, and selling at the highest prices in some years will bring southern farmers millions of dollars in profits.

Tractor and implement sales during September were considerably better than in August and are still better the early part of October. As a whole tractor sales are more than twice as great as in the same period in 1921, and in some districts three times as great. The outlook portends normal tractor sales between now and next spring.

Better business is resulting in the organization in all southeastern States of several new automobile companies, and more construction of automobile buildings than at any time since the period of deflation immediately following the war.

Liquidating Debts

BIRMINGHAM, Oct. 18—Conditions in the South and particularly in Alabama point to a good sales season for all medium priced cars during the fall months. Another indication of good fall business is contained in the increasing popularity of the closed cars in this section. Many agents report that their sales of this type have increased 100 per cent during the past year.

In Alabama figures made public during the past few days indicate that ten of the farmers' crops will produce revenue to the farmers in excess of $52,000,000 more than the same crops produced last year. This is considered the prime reason why the farmers are taking up their old notes, some of which are three years past due, and looking around for ways and means of investing their surplus funds.

The entire back indebtedness, of course, will not be absorbed this year, but it is thought that a great many farmers who have been in debt will emerge from that condition with considerable excess funds. All of them will be good prospects for automobiles during the fall, as in Alabama the only closed season is when the roads get too muddy, and that happens in the summer months as often as during the winter.

Good Market in Chattanooga

CHATTANOOGA, Oct. 18—The bankers of this city recently made the statement that the indicated development in the entire South was far in excess of anything known in the past and gave a review of conditions to support this claim. They sought to prove that Chattanooga was the center of the proposed developments and was the best potential market in the South.

In their review they pointed to the steadily increasing production of textiles in the South, which they accredited to the abundance of cheap power, climatic conditions and efficient labor.

Included in their statement was the fact that $185,000,000 of bonds have been sold in the sixteen southern States during the first six months of 1922. This amount may be divided into $71,000,000 for roads, $59,000,000 for miscellaneous issues, $34,000,000 for schools, and $20,500,000 for sewers and drainage. The large increase in building also was cited as indicative of the better conditions now prevailing.

CARRIAGE BUILDERS RETAIN ASSOCIATION

NEW YORK, Oct. 14—At the meeting of the Carriage Builders Association in this city, the question of consolidating with the Automobile Body Builders Association was discussed at length, but was dismissed without being put to a vote.

It was felt that each organization served a distinct purpose and that they would not be benefited by a merging of interests.

W. C. Durant and J. D. Dort are still members of the Carriage Builders Association which dates back to early days.

E. E. Hughes was elected president, and G. W. Huston is secretary.

RUBBER PRODUCTS ELECTION

AKRON, Oct. 18—C. C. Schultz has been elected president of the Rubber Products Co. of Barberton, succeeding W. A. Johnson, one of the original officers of the company. Other new officers elected include J. J. Johnston, vice-president; J. M. Wiley, treasurer; John B. Chisnell, secretary and assistant treasurer. New directors elected are F. M. Hickman of Barberton, J. E. Finefrock of Canal Fulton and F. L. Graham of New York.

Survey Will Be Made of Foreign Markets

Government to Act in Co-operation with Three Automotive Associations

WASHINGTON, Oct. 17—A world wide survey of foreign markets for American made automobiles, trucks and accessories will be made by the automotive division of the Department of Commerce co-operating directly with the Motor and Accessory Manufacturers Association, the Automotive Equipment Association and the Association of Automotive Equipment Manufacturers.

Necessary plans for the survey have already been worked out with the first two named associations, and government officials will meet with members of the Automotive Equipment Manufacturers Association in Chicago on Nov. 3 to set forth their plans.

Questionnaire to Be Issued

In a word the plan is to find out from the industry, what information it desires in foreign fields in order that it may carry on a larger volume of export business. This will be put into a questionnaire and sent to commercial attaches in every country. The reports of these attaches will be transmitted to the industry through the trade press and to the associations' members by bulletin.

In addition to disseminating this information in this way, it is planned to summarize the conclusions and recommendations in order that any concern engaged in the automobile or accessory business may readily refer to these data and at a glance see whether or not there is any current demand, or likely demand in the near future, for its product in any given country, and, if so, in what part of that country.

To Give Dealers' Addresses

One of the chief problems, it is recognized, is the establishing of a contact or dealer's facilities in foreign countries. Where possible the survey will give the names and addresses of reliable dealers with whom American exporters may negotiate for foreign representation. Other necessary data, such as service facilities, advertising in that particular country, duties, tariff, and merchandising problems will be contained in the survey.

"This survey will be the most complete of its kind ever undertaken," stated Gordon Lee, chief of the automotive division. "The function of the Automotive Division of the Department is to promote foreign trade for the automobile manufacturer and allied interests. We have now come to the point where we can translate general educational work and co-operation into actual dollars and cents resulting in increased prestige for the American automobile industry the world over."

Men of the Industry and What They Are Doing

Sweet Heads Klaxon

Alfred P. Sloan, Jr., vice-president in charge of operations of the General Motors Corp., announces the appointment of William M. Sweet as general manager of the Klaxon Co., with headquarters at Bloomfield, N. J. Sweet, who has been a director and vice-president of the Klaxon company for several years, relinquished his other duties with General Motors last October to devote his entire attention to Klaxon interests. He was for years general manager of the Motor and Accessory Manufacturers Association, going from there to United Motors, where he filled a high executive office. When United Motors was taken over by General Motors he went with it as assistant to the then president of the accessory division of the G. M. C., A. P. Sloan, Jr.

I. M. Lewis Resigns

I. M. Lewis has resigned from the Bessemer Motor Truck Co., effective Nov. 1. Lewis has been president and general manager of the company since its organization 14 years ago. His plans for the future are indefinite at present, but he expects to continue in the motor truck business.

Britishers Visit Plants

Representatives of British financial interests headed by Sir Harry MacGowan closed a tour of inspection of General Motors plants in the Detroit district Friday and left for Montreal. With Sir Harry were Sir Ralph Anstruther, Donald Hope and George Watson. The party was accompanied on its tour by General Motors executives headed by President Pierre S. duPont, vice-presidents A. P. Sloan, Jr., and J. J. Raskob, and was entertained in the several cities in which are located units of the corporation by officers of the unit companies.

Fiat Executives Expected

Guido Fornaco, vice-president of Fiat Co. of Turin, Italy, and M. Gobbato, works manager, are on the Aquitania, which arrives in New York the latter part of the week. This is their first visit to America, and their plans call for a stay of about a month, in which time they will visit the leading automotive plants, accompanied by Harry T. Clinton, Fiat's American representative.

Hugh M. Craig on Vacation

Hugh M. Craig, sales manager of the Samson Tractor Co. at Janesville, Wis., since the General Motors Corp. established this plant at that point, has left for a two months' vacation with his family in Florida. It is stated that at the end of his vacation he will re-enter the service of General Motors, but with another division and with headquarters elsewhere than Janesville. Craig was connected for 18 years with the Janesville Machine Co., maker of farm implements, which was acquired by General Motors in 1918 as the nucleus of the Samson industry. Much of the Samson capacity is being converted to the use of the Chevrolet and Fisher body divisions of General Motors at this time.

To Attend Association Meeting

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, and M. L. Heminway, general manager of the Motor and Accessory Manufacturers Association, will attend the annual meeting of the American Trade Association Executives at Buckhill Falls, Pa., Oct. 25-27.

Carl G. Fisher Sells Home

Carl G. Fisher, founder of Prest-o-Lite and closely identified with the Indianapolis motor speedway, has sold his country home in that city. While he has not discussed his plans for a future home it is known that in recent years he has spent many months each year at Miami, Fla., where he has a residence and a number of interests.

New Duties for Connolly

Edward J. Connolly has been appointed production manager in charge of the body divisions of the C. R. Wilson Body Co. He has been chief engineer of the factory for the past two years and will continue this work. As production manager he will have entire charge of inspection.

United Motors Names Beardsley

Volney S. Beardsley has been appointed eastern district sales manager of the United Motors Products Co. of Grand Rapids, Mich., which is actively in production now of its new one-ton speed model, the Highway Special. Beardsley's headquarters are in Los Angeles. Appointments will be made immediately of dealers in coast cities not already closed, as Beardsley will act only as the factory representative, controlling no retail outlets himself.

Dort Adds to Staff

Sam C. Mitchell, formerly branch manager of the Cleveland Tractor Co. at St. Louis, has joined the Dort Motor Car Co. as assistant sales manager. Another addition to the Dort sales personnel is William Hufstader, former manager of the convention bureau and the publicity manager of the Flint Chamber of Commerce. W. Harold Kingsley, a newspaper man of long experience, has taken charge of the Dort publicity department. Kingsley returned last month from Paris, where he was on the European staff of the *Chicago Tribune*.

Behringer and Goodall Promoted

A. C. Behringer has been appointed assistant sales manager and Arthur S. Goodall advertising manager of the Dorris Motor Car Co., St. Louis. Behringer has been with the Dorris organization for more than two years as traffic manager. Goodall, formerly advertising manager of the Streckfus Steamboat Line, has been associated with the Dorris company for a year and a half in an advertising and sales capacity.

Tool Company Engages Maisel

Lorenz Maisel has been engaged as general works manager for the Allan-Diffenbaugh Tool & Wrench Co., Baraboo, Wis., which has completed plans for a material enlargement of its output to meet the increasing demands of the jobbing trade. Maisel was formerly designing engineer of the Burgess Battery Co. at Madison, Wis., later organizing the Madison Tool & Stamping Co., his interest in which he sold recently to make the present connection.

Reed with Spring Company

Robert W. Reed has resigned as vice-president and sales manager of the Lakeside Bridge & Steel Co., Milwaukee, to become a stockholder and vice-president of the Babcock Automobile Spring Co., manufacturing and jobbing vehicle springs, and conducting the pioneer spring service station in Milwaukee, established in 1913.

Sohn Opens Advertising Agency

Monte W. Sohn, a former editor of *Motor Life*, has organized an agency to specialize on automotive advertising, with offices at 25 West 45th Street, New York City.

Bray Joins Autocar

J. B. Bray, who has been service manager of the Grant Motor Car Corp. for a number of years, has resigned and will join the sales force of the Cleveland branch of the Autocar Co.

Cushing Makes Change

George W. Cushing, formerly advertising manager of the Hudson Motor Car Co., has resigned from the Buffalo office of Barton, Durstine & Osborne, to join the merchandising and advertising staff of C. C. Winningham, Detroit.

Distributor Appoints Leach

W. H. Leach of the Buick sales department has resigned his factory position to accept the position of assistant sales manager of the Pence Automobile Co., Buick distributor for Minneapolis and the Northwest. He will assume his new duties at once.

PERSONAL NOTES

William T. Bush Resigns

William T. Bush, for several years a sales executive of Studebaker and Packard factories and more recently director of sales of the Gray-Dort factory, Canada, has resigned from the latter position, and has returned to Detroit to reside. He has not announced his future plans.

Frick Made Chief Engineer

The Precision & Thread Grinder Manufacturing Co., Philadelphia, which was recently acquired by A. T. Doud, president of the company, has appointed William H. Frick as chief engineer in charge of engineering, development and service departments. Frick was equipment engineer for the Budd Wheel Co. He was associated with Doud at both the Diehl Manufacturing Co. and the Hero Manufacturing Co. D. F. Bruce has been appointed superintendent in charge of manufacturing and production. Bruce has had extensive mechanical experience with such concerns as W. F. Sellers, Remington Arms Co., J. E. Lonergan Co. and was formerly superintendent of the McCambridge Co.

Booth Appointed Sales Head

F. E. Booth has been named sales manager of the motor bearings division of the Hyatt Roller Bearing Co., following an extensive period of service with the company in the engineering and sales departments. Latterly he has been assistant sales manager.

Pickens Tuscora Sales Head

B. F. Pickens, formerly connected with the Amazon Rubber Co., has been appointed sales manager of the Tuscora Rubber Co. of Dover, Ohio.

McDonough Joins Overland

C. G. McDonough, formerly of the Templar Motors Co., in charge of eastern sales, and previous to that with the Clydesdale Motor Truck Co. as district sales manager, is now with the Willys-Overland Co., in charge of the taxicab and commercial car sales.

Horn Represents Bear Tractors

Richard Horn has resigned as district sales representative at Portland for the Cleveland Tractor Co. to represent Bear Tractors, Inc., as district sales manager on the Pacific Coast.

Packard Honors Harrington

Packard executives and department heads held a dinner at the Waldorf-Astoria, New York City, Oct. 13, to celebrate the twentieth anniversary of A. C. Harrington's connection with the Packard Motor Car Co. Harrington joined Packard in 1902, when the factory was at Warren, Ohio, and now is vice-president of the New York company.

N. A. D. A. ASSISTS IN TAX REPEAL MOVE

ST. LOUIS, Oct. 16—The National Automobile Dealers Association has joined with the National Automobile Chamber of Commerce in an effort to have the discriminatory war excise taxes of 1918 and 1921 repealed.

The N. A. D. A. has issued a letter to all its members urging that they give their united support to the Association's efforts and take a definite stand with the next Congress.

The letter asks that each dealer write to his congressman, senator and congressional candidates urging that the discriminatory taxes be removed. Copies of all letters and replies are asked for by the association, and from information gathered from these sources a campaign of action will be mapped out.

Business on Cash Basis Urged on Tire Dealers

CHICAGO, Oct. 17—Better times ahead for tire manufacturers in the midwestern group were predicted by W. W. Wuchter, president of the Midwest Rubber Manufacturers' Association, at the association's monthly meeting here. He declared that within six months companies able to continue operation will see improved conditions under which they will be able to make money.

The association voted to hold its November meeting at St. Louis, the place to be announced later.

Manufacturers were urged to advise their dealers to operate on a cash basis only, by Dr. R. P. Shepard, economist, representing the Chicago Association of Commerce. "The retailer who extends credit to his customers ceases to be a merchant and becomes a banker," he said. "It is not fair for the customers to ask the retailer to loan them a part of his capital. They should borrow the money at the bank and pay cash for their purchases." He advised the use of the trade acceptance.

Locomobile Creditors Approve Sale Proposal

BRIDGEPORT, CONN., Oct. 17—At a hearing before Referee John Keogh, creditors of the Locomobile Co. of America gave unanimous consent to the receiver's proposal to sell the plant and assets of the company at a private sale. Approval of the court is now the only step necessary to wind up the company's affairs.

Elmer Havens, the receiver, has indicated that W. C. Durant's offer of $1,750,000 would be accepted.

Interurbans May Be Kept Out of Detroit

If Plans Carry, Traffic Problems for Factories Will Be Increased

DETROIT, Oct. 17—Traffic problems in a number of factories here will be greatly accentuated if the plan of the Detroit Street Railway Commission to bar interurban cars from city streets is carried through. By using the interurban freight service, factories have been able to ship material from branch factories in the district and from Northern Ohio on overnight schedule. By railroad the same deliveries would take three to four days.

The railway freight service has also been used to a large extent by factory service departments in making deliveries throughout the area covered by interurban trolley service.

Would Need Fleets of Trucks

Elimination of the railway service will result in a boost for the truck business, but manufacturers who have been served by the trolleys are loath to give them up. Whole fleets of trucks would have to be bought to replace the cars, and the possibilities of trucks equalling the service are not regarded favorably.

In ruling the interurban cars from Detroit-owned lines, the city commission has taken the position that the heavier type car used in interurban service is too heavy for the city rails. The wheels designed for open rail travel are also declared destructive to the type of rail necessary in the city. Furthermore, it has been declared that much of the freight brought over the Detroit rails is shipped from out of the city to destinations outside the city, such as Toledo to Flint, and that city taxpayers should not support such service.

Chevrolet Takes Over G. M. Parts Companies

DETROIT, Oct. 17—The Central Products Co. and the Central Gear Co. of the inter-company parts group of General Motors Corp. have been taken over by the Chevrolet Motor Co. and will be operated as units of that company, manufacturing parts.

This marks a further step in the consolidation and unification of the many divisions and subsidiaries of General Motors, the subsidiaries having been reduced in number from 78 to 67 in the past year.

NEW WHITE BRANCH PLANT

NASHVILLE, TENN., Oct. 16—Howard C. Goss, manager of the White Motor Co. branch here, advises that the White company is planning the establishment shortly at Chattanooga, Tenn., of a branch plant for the manufacture of trucks.

Hispano Producing New 4-Cylinder Car

Speed Is 90 Kilometers Per Hour —Fiat Builds Own Bodies in Spain

WASHINGTON, Oct. 17 — Entirely equipped with American machinery and normally employing about 1000 men, the Hispano automobile factory at Guadalajara, Spain, subsidiary of the Hispano-Suiza Co., Barcelona, is manufacturing a new Hispano four-cylinder eight-horsepower passenger car, the real horsepower of which is estimated to be 20-30, according to a report made to the Department of Commerce by Commercial Attaché Charles H. Cunningham, Madrid.

This car has a maximum speed of 90 kilometers per hour and sells for about 16,000 pesetas. The factory has orders for 100 of these new cars. American electrical equipment undoubtedly will be used in them as in the past. Wages paid at the factory range from 7 to 9 pesetas a day, about 20 per cent less than those paid in Barcelona, where the unions are extremely strong.

The Fiat body plant at Alcala de Hernares is constructing bodies for most of the Fiat cars imported into Spain. The lumber used is entirely Spanish, and oak logs are brought into the factory and converted into lumber, dressed, planed and utilized for bodies in the same plant.

Considerable American machinery, such as lathes, radial drills and serpentine shears, is being used in this plant, and the factory is now considering the purchase of an American paint spray, as the advantage of painting a car by use of two men and a machine, as against 10 men by hand, is appealing to the Spanish manufacturer.

New Studebaker Sedan Has Added Equipment

SOUTH BEND, Oct. 17—Priced somewhat higher than the regular sedan mounted on this chassis, the Big-Six sedan (special) embraces many items of equipment not included on the regular model.

Included in the additions are nickel plated bumpers in front and rear, trunk with dust proof cover, two extra disk wheels complete with tires mounted on the front fenders, automatic windshield cleaner, Moto-Meter, ornamental radiator cap and rear view mirror. The radiator shell is nickel plated. Other features are the courtesy light, cowl ventilator and heater. The upholstery is mohair velvet plush with top lining and carpets to match.

CHANGE IN PACKARD

DETROIT, Oct. 16—A change recently made in the Packard single six coupe permits the carrying of a golf bag and sticks without projecting out from the luggage compartment or interfering with passengers. An opening has been cut through to the compartment under the driver's seat. The golf bag slips into this space and extends back into the rear luggage compartment. Cars with this change incorporated are promised for the latter part of October.

MEXICO PUTS DUTY ON IMPORTED CARS

MEXICO CITY, Oct. 16—The "Diario Official" has published a presidential decree to the effect that automobiles, which were previously exempt from import duties, will be subject to a 10 per cent ad valorem import tax.

Former President Carranza decreed the exemption of duties on automobiles in the belief that it would be of benefit to farmers and general business.

Hupp Now Turning Out Special Phaeton Model

DETROIT, Oct. 14—Hupp Motor Car Co. is now in production of a special phaeton model which will embody sport line features and sell at $1,250, f.o.b. Detroit. A roadster of similar type will be started in production in the near future. The car has nickled radiator, rails, lights, etc., aluminum steps, disk wheels and a genuine Burbank top. There is no change in chassis construction.

Australia to Assemble New "Eco" Next Month

WASHINGTON, Oct. 17—Australia's first automobile manufacturing company will begin operation on Nov. 1, with the production of an assembled car, composed of parts purchased, for the major part, in the United States.

The new car is to be known as the "Eco" and while "manufactured" in Melbourne, Australia, it will be almost entirely an American car, with the exception of the car body. The car will be produced by the G. Hamilton Grape Manufacturing Co. It is understood that Australia's first car will be along the lines of the most popular make of American low priced machine.

The company has established a purchasing agency in Detroit where, it is expected, the major portion of parts will be purchased.

ACCESSORY EXHIBITS

NEW YORK, Oct. 18—M. L. Heminway, general manager of the Motor and Accessory Manufacturers Association, announces that 125 members will exhibit in the national shows at New York and Chicago. Of these 82 will exhibit in both shows, 34 in New York only and nine in Chicago only.

Norma Has Hoffmann Rights in America

Company Will Erect Plant for Manufacture of Products of British Maker

NEW YORK, Oct. 18—The Norma Co. of America, of Long Island, has acquired the American patents and business of the Hoffmann Manufacturing Co. of Chelmsford, Essex, England, maker of Hoffmann roller, ball and thrust bearings. The line of Norma Precision ball bearings now will be supplemented by Hoffmann Precision roller bearings and other bearing products in the Hoffmann line, which have enjoyed abroad the same repute which high-precision standards have given the Norma bearing in America.

The Norma company will erect a new plant for the manufacture of Hoffmann products in America. Meantime, they are being imported and sold under the regular Norma engineering service.

Flat Tread Truck Tire Is Announced by India

AKRON, OHIO, Oct. 16 — A new double oversize extra-ply flat tread cord truck tire is announced by the India Tire & Rubber Co. The tread has been designed for conformity to road surfaces. The broad, flat face which comes in contact with the road, wears very slowly and evenly, and gives greater traction and non-skid qualities. Heavy ribs on both sides of the tread afford additional protection against rut and curbstone wear.

The tread stock has been brought well down over the sidewalls, giving added strength to the carcass. The bead has been extra-heavily re-inforced. A special cushion and breaker strip construction is incorporated which distributes road shocks to all parts of the tire, rather than allowing the shocks to be absorbed by just those portions which are struck.

"Royal Coach" Becomes Part of Lexington Line

CONNERSVILLE, IND., Oct. 18—An addition to the Lexington line is the Royal Coach listed at $2,145. It is a five-passenger body with ample room for three on the rear seat and with two individual Pullman type chairs in front. The body is of the two-door type, the vision being extremely wide by reason of the large glass area and the design of the slanting windshield with its glassed triangle.

PIERCE-ARROW BUSINESS

BUFFALO, Oct. 17 — Pierce-Arrow Motor Car Co. reports sales for September greater than for any September since 1915 and 150 per cent ahead of a year ago. September orders showed an increase of 10 per cent over August, the biggest month in the company's history.

Hardware Men Meet Accessory Makers

Greater Interest in Automotive Equipment Shown at Atlantic City Convention

ATLANTIC CITY, Oct. 20.—Approximately 50 manufacturers of automotive equipment staged exhibits in a hotel here during the conventions of the National Hardware Association and the Automobile Accessories Branch of that association, held throughout the week. The equipment manufacturers also took part in the discussions of the automobile accessories branch, making suggestions to the hardware jobbers for development of their own and their dealers' business in automotive products.

The discussions, participated in by hardware jobbers as well as automotive equipment manufacturers, indicated a growing interest on the part of the hardware trade in the profit making possibilities of automotive equipment. The hardware men generally claimed that hardware retailers were better merchants and better credit risks than the average automotive man but they admitted offsetting faults of the hardware trade, such as lack of mechanical automotive knowledge, failure to carry complete automotive equipment lines and lack of natural contact with automotive equipment purchasers, such as automobile dealers and garagemen have.

Representatives of the National Retail Hardware Association spoke, attributing sluggishness in the development of automotive equipment retailing in the hardware field to some extent to failure of hardware jobbers salesmen properly to sell it. They criticised hardware jobbers' travelers for lack of knowledge of the use and methods of retailing automobile products.

There were several attempts to estimate the volume of automotive equipment business done by the hardware trade. One jobber said that less than 10 per cent of his dealers handled accessories, while several others placed the figure considerably higher, though stating that the bulk of their wholesale sales of equipment were to automobile dealers and garagemen.

2,000,000 Output Year Now Assured for 1922

(*Continued from page 986*)

on its pre-show season when scattered closed car exhibits are having a stimulating effect on sales.

The problem confronting the industry in Detroit of securing its steel supply, due to the diversion of rail equipment for the shipment of coal, particularly to lake ports, and the transportation of farm produce, will probably be solved by the employment of motor trucks between Pittsburgh, the principal source of supply, and that city. This condition is expected to continue until the closing of lake navigation. The success of the plan will remove one of the chief obstacles in the way of sustaining production at a high figure. Materials are reaching Detroit with only slight interruption, not great enough to prove a serious deterrent.

Light duty trucks continue to gain in demand, due directly to the coal situation and the apportioning of supplies to householders in small quantities. These vehicles are showing a stronger growth than is noticeable in the heavier trucks, which, however, are more than holding their own.

TABLE SHOWING RANGE OF FORD PRICES

DETROIT, Oct. 17—The following table shows the range in Ford prices from Aug. 1, 1916, to the present time, when a reduction of $50 brings the models down to the lowest price level in the history of the company:

MODEL	Aug. 1, 1916	Aug. 1, 1917	Sept. 21, 1917	Oct. 16, 1917	Feb. 25, 1918	Aug. 16, 1918	Mar. 9, 1920	Jan. 1, 1921	June 1, 1921	Sept. 1, 1921	Jan. 1, 1922	Oct. 17, 1922
2-pass.	$345	$345	$350	$350	$435	$500	$550	$395	$370	$325	$319	$269
5-pass.	360	360	365	365	450	525	575	440	415	355	348	298
Coupe	...	...	...	...	...	...	*850	745	695	595	580	530
Sedan	640	645	650	695	695	775	*975	795	760	660	645	595

*Includes starter and demountable rims.

Toland Heads Thomart Distribution in East

NEWARK, N. J., Oct. 18—Distribution of the Thomart speed truck for the entire eastern portion of the United States has been taken over by Eastern Thomart, Inc., this city.

The new company is headed by William G. Toland, former vice-president of sales for Hare's Motors. Toland has taken with him several of his former Hare's Motors and Packard associates; W. S. Hill, vice-president, was formerly special representative for the Hare organization. William J. Foster, secretary and treasurer, was transportation engineer for both Hare's Motors and the Packard Motor Car Co. of New York. William Carl Chapman, advertising and sales production manager, was former advertising manager for Hare's Motors and previous to that was advertising manager for the Packard Motor Export Corp.

HUPP COMPLETES SCHEDULE

DETROIT, Oct. 17—The Hupp Motor Car Co. completed its schedule of 30,000 for 1922 Tuesday and reports that business will continue on a firm footing. President C. B. Hastings said there were no indications of a severe falling off in business at this time and expressed the belief that it would continue steady through the winter. Increased factory space will permit considerable expansion in 1923, he said. Hastings denied that the Hupp Motor Car Co. was considering the taking over of another car manufacturing company.

Ford Lowers Prices; Phaeton Is Now $298

(*Continued from page 787*)

Ford reduction has been expected in manufacturing circles for some time. Both Chevrolet and Overland in the low priced groups have recently made reductions, and the Ford reduction completes the revisions in the former low priced group. The recent Ford financial statement and declaration of price policy by Henry Ford indicated reductions would be forthcoming.

Ford Prices Cut in Canada

DETROIT, Oct. 18.—Ford Motor Co. of Canada, Ltd., followed the price cut of the United States company with a reduction ranging from $50 to $85 on all models. The phaeton is $445, roadster $405, coupe $695, and sedan $785. There is a price differential of $85 for self-starter and demountable rim equipment. The truck is $495 and chassis $345. The new prices are the lowest ever quoted on the Canadian car.

Orders covering several months operation were on hand when the new prices were put into effect, according to Ford officials. Production has been running in excess of 5000 cars daily but this was several hundred daily under retail sales at the former price. With the increased demand expected as a result of the reductions, the company will build production up to 6000 daily.

No Durant Comment

NEW YORK, Oct. 17—Will Star meet the Ford prices? was the question asked to-day when the new list of the Detroit manufacturer was announced. However, executives of Star Motors, Inc., refused to comment on the reduction.

MOON MODEL LOWERED

ST. LOUIS, Oct. 17—A reduction of $100 on the six-40 phaeton is announced by the Moon Motor Car Co., effective to-day. The drop was from $1,295 to $1,195. This model is the only one of the line affected.

CLEVELAND PHAETON REDUCED

CLEVELAND, Oct. 19—The Cleveland phaeton has been reduced from $1,095 to $995, and the four-door sedan from $1,585 to $1,495.

67 Cu. In. Salmson Sets World's Record

Four-Cylinder Water-Cooled Car Maintains Average Speed of 94 M.P.H.

PARIS, Sept. 28 (*by mail*)—An average speed of 94.9 m.p.h. for the flying kilometer is the world's record for 67 cubic inch cars established by Lombard in a four cylinder water-cooled Salmson. This performance was made in the Bois de Boulogne, Paris, and was electrically timed by the Automobile Club of France.

In accordance with international rules, the run was made in two directions and the average taken. On the outward run the single-seater Salmson covered the flying kilometer in 23 80/100 sec.; the return run was made in 23 35/100, giving an average for the kilometer of 23 57/100 sec. By this performance Lombard broke his own record of 80.93 miles an hour, set up a few weeks ago on Brooklands track, England.

A two-seater Salmson of the same piston displacement, driven by Benoist, averaged 82.82 miles an hour for the flying kilometer.

A 45-inch Senechal, driven by its maker, broke the world's record for this class by averaging 71.23 miles an hour as a two-seater and 72.14 miles as a single seater. This machine was fitted with a four cylinder overhead valve Ruby engine.

Pullin, riding a 750 cc. twin cylinder Douglas motorcycle averaged 97.76 miles an hour over the flying kilometer, thus establishing a world's record.

VELIE BUSY ALL WINTER

MOLINE, ILL., Oct. 17—Closed car business will keep Velie Motors Corp. in operation throughout the fall and winter, according to predictions by company officials. A force of approximately 600 men is employed and will probably be maintained. Twenty-five cars a day are now being completed and will be continued as long as prospects continue.

STATE RECOGNITION GIVEN MOTOR VEHICLE

ALBANY, N. Y., Oct. 16—The motor vehicle as a common carrier is recognized in an opinion handed down by Charles G. Blakeslee of the Public Service Commission, who passed on the application for the operation of a bus line between Norwich and Syracuse. Blakeslee favors the granting of the application and asserts that the motor vehicle as a common carrier is here to stay.

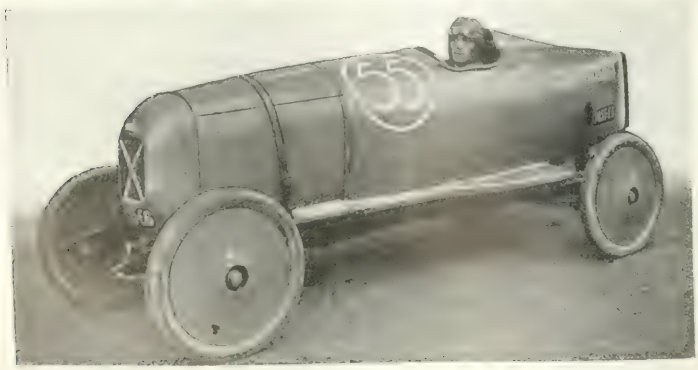
Trexler Co. Takes Over Factory in Wilmington

WILMINGTON, DEL., Oct. 16—The Trexler Co. of America, manufacturer of automobile accessories, with offices in Philadelphia, has taken over the local plant of the Artillery Fuse & Standard Arms Co., for manufacturing purposes.

The local plant, which covers 27 acres, and is located in South Wilmington, on the outskirts of the city proper, was used during the war for the manufacture of fuses and various other devices in connection with artillery equipment. It is fitted with much intricate machinery and has been idle for some time. It has an assessed valuation of $900,000.

M. J. Adair of Philadelphia is president and E. J. Flannery of the same city, vice-president of the Trexler Co. George A. Huhn & Sons of New York, Philadelphia and Chicago are underwriters of the securities.

Holder of World's Record for 67 cu. in. Cars



This four-cylinder water-cooled Salmson maintained an average speed of 94.9 m.p.h. over a course in the Bois de Boulogne. Following international rules, the run was made in two directions and the average taken. The previous high record, 80.93 m.p.h., was made in England a few weeks before by the same driver, Lombard

Government Makes Snow Removal Plans

Cannot Aid Financially But Will Offer Road Equipment Free to States

WASHINGTON, Oct. 18 — Winter travel by automobile in the central and northern states, heretofore hampered by snow-covered roads, will be made possible in the future, if plans of the Bureau of Public Roads of the Department of Agriculture can be consummated.

Through the co-operation of the state highway commissions the bureau hopes to utilize surplus war equipment, such as tractors and grading plows, to be employed in the removal of snow and sleet from the main arteries of the public highways, during winter, to the end that automobiles may have the use of the roads through the greater part, if not all, of the winter.

A canvass of the situation is now being made by the bureau with the state highway commissioners. Under the Federal laws none of the money appropriated by Congress for Federal-aid roads can be employed in maintenance of highways, this being solely up to the State. Once a road is built it is obligatory upon the State to keep it in repair, under a penalty of having all Federal funds withdrawn.

Co-operation Is Possible

So under the law, while it will not be possible for the Federal Government to aid financially in the snow removal program, the emergency can be met, it is believed, by the Federal Government, through the bureau of roads, donating gratis to the states the necessary equipment. It is expected that the states will furnish the labor for the operation of the equipment, and if this can be arranged with the State highway Commissions, it is certain that at least a great many of the northern states will be able to maintain automotive highway transportation service, which has heretofore suffered because of the snow-ladened roads.

The bureau of roads already has sufficient equipment of war-surplus material to supply the States for this purpose, provided the states themselves will man and operate it.

The work of making the survey is being carried on under the supervision of H. K. Bishop, chief of the division of construction of the bureau of roads.

INTERNATIONAL GAINING

AKRON, Oct. 17—The Akron plant of the International Harvester Co. has reached a production of 125 trucks a week, as compared to an output averaging only 40 trucks a week two months ago. The Akron factory now is employing between 800 and 1000 men and expects to increase truck production further.

Nation's Aviators Form Association

Howard E. Coffin Elected President at Organization Meeting in Detroit

DETROIT, Oct. 14—The National Aeronautic Association became a reality this week with the official filing of a charter under Connecticut laws and the adoption of a constitution and by-laws, by which it will function as a national organization whose primary aim is to make the United States "first in the air." The association will endeavor to promote civil and commercial aviation largely through the encouragement by the Government of private enterprise in the carrying of mails.

Coffin Well Known in Aviation

Howard E. Coffin, vice-president in charge of engineering of the Hudson Motor Car Co., was named first president of the association. Coffin is widely known for his interest in aviation and for his services to the Government during the war in the development of its air program. He acted as chairman of the executive committee of the advance committee on organization of the aeronautic bodies, and his selection as president is a special tribute to his energy and interest in the promotion of aviation.

The association plans a membership of 19,000 in its first year divided into eight classes. These are honorary, federal honorary, life, sustaining, regular, junior, organization and air board. The direction of the affairs of the organization will be vested in its officers and a board of governors numbering twenty-three, five of whom will be governors-at-large. The association will maintain a paid general manager, whose salary will be $5,000 annually, and will employ three paid field representatives whose work will be building up the membership.

Other Officers Elected

Other officers are B. M. Mulvihill, Pittsburgh, vice-president; B. F. Castle, New York, treasurer; John B. Coleman, Sioux City, Iowa, secretary. The board of governors are S. D. Walden, Detroit; P. H. Adams, Boston; G. L. Cabot, Cambridge, Mass.; John D. Larkin, Jr., Buffalo; Morris J. Cleary, New York; L. F. Sevier, Pittsburgh; R. F. Walters, Baltimore; A. S. Fliery, Birmingham; F. H. Burgin, Atlanta; Glenn L. Martin, Cleveland; D. M. Outcault, Cincinnati; C. S. Rieman, Chicago; Ralph Cram, Davenport, Iowa; Howard Wehrle, Kansas City; Edgar Tobin and William Long, San Antonio; P. G. Johnson, Seattle; C. E. Messer, Spokane.

The board will elect the governors at large and general manager.

An objection to the election of Martin as a governor on the ground that the association should not tie itself up too closely to aircraft manufacturers was overruled. There was some sentiment among delegates against the possibility of domination by manufacturers, but aside from the objection to Martin this did not materialize. The greater number of delegates were members of air clubs and ex-service men, with only a sprinkling of manufacturers or manufacturers' representatives.

Resolutions adopted favored the establishment of a Federal agency to govern aviation; requested Congress to authorize air mail contracts with private companies; urged adequate appropriations for aircraft experimentation by Federal departments; encouraged National Guard aviation units, and condemned circus stunts or freak flying stunts. A resolution congratulating the mail service on its successful air operation also was adopted. On the recommendation of Rear Admiral W. F. Fullam, chairman of the committee on policy and legislation, the convention voted against any action at this time on pending legislation affecting Federal aviation policies. A resolution creating an association trophy open to international competition was referred to the contest committee.

The locale of the next convention will go to the city awarded the 1923 Pulitzer trophy race.

Will Have Reserve Fund

The association plans to raise $57,419.38 during the coming year from membership and other sources, which will carry it through its first year of organization and create a reserve of $37,219.37 for the inauguration of its second year's program. The Chamber of Commerce of Davenport, Iowa, was the first to file application for an organization membership. In its plan to promote commercial aviation, the association will seek to enroll trade bodies in each city in the United States in this class of membership.

AUSTRIAN AIRPLANE WING DESIGNS HERE

WASHINGTON, Oct. 17—Plans describing the invention of pneumatic, pulsating wings for airplanes, invented by an Austrian, have been received by the automotive division of the Department of Commerce from Foreign Trade Commissioner William Ford Upson at Vienna.

The invention has been commented upon by various newspapers of Europe as being "Revolutionary in airplane construction." Airplanes with fixed wings and an engine driven propeller, according to the inventor's line of research, can be shown vastly inferior in relative performance to one constructed with these wings, which are comparable to those of a soaring bird or insect.

Manufacturers of airplanes, or others interested, may secure the loan of the plans upon application to the bureau, requesting exhibit 269.

Air Records Broken by American Flyers

Aviator in Curtiss Army Biplane Averages 229 M.P.H. at Mount Clemens

MOUNT CLEMENS, MICH., Oct. 18—Flying a Curtiss army biplane powered with a Curtiss 400 hp. engine, Lieut. R. L. Maughan established an unofficial airplane speed record by covering a one-kilometer course at the rate of 248.5 miles per hour.

This record was made by the same plane that won the Pulitzer Trophy Race and was timed by officers from McCook Field during official Government tests of speed planes that participated in the National Air Races at Selfridge Field.

Lieut. Maughan proved that this tremendous speed could be maintained by continuing flying after the record was broken and doing four laps at the rate of 232.22 miles per hour and averaging 229 miles per hour for eight laps.

In the same plane to-day Brig. Gen. William Mitchell made an official one kilometer trial at Selfridge Field in which he made an average speed of 224.5 m.p.h. in four heats, which will stand as record.

Heavier-Than-Air Flight

NEW YORK, Oct. 17—All records for sustained flight in a heavier-than-air flying machine have been broken by Lieuts. John A. Macready and Oakley Kelly by a flight lasting 35 hours, 18 minutes, 30 seconds. The previous record was made by Stinson and Berthaud last December when they stayed aloft 26 hours, 19 minutes, 35 seconds.

The new record was made with an Air Service transport T-2 monoplane weighing on this flight 10,700 pounds, of which 1000 pounds consisted of gasoline and oil. Air Service officials regard the flight as a wonderful demonstration of the Liberty engine with which the plane was powered.

NEW YORK, Oct. 17—Two French airmen, Bossoutrot and Drouhin, have beaten the official world's record for sustained flight made by Stinson and Berthaud, by a flight lasting 34 hours, 14 minutes, 7 seconds.

They hoped when starting on their flight to break the uncontrolled record of Lieuts. Macready and Kelly, but were forced down within an hour of achieving this goal by a shortage of gasoline.

The flight was made over a triangular course, but the distance covered is exactly equal to the distance from Paris to New York.

FRANK H. PARKER DIES

MILWAUKEE, Oct. 18—Frank H. Parker, president of the Parker Motor Truck Co., Milwaukee, and guiding head of several other large manufacturing industries, died at Columbia Hospital after a brief illness, at the age of 66 years.

FINANCIAL NOTES

Packard Motor Car Co. reports earnings of $900,000 in September and $16,000,000 on hand in cash and marketable securities. Resumption of common stock dividends, believed immiment, has not been discussed by the directorate. Outstanding notes may be retired on April 15 next if conditions warrant. Single six inventory is being turned over every 60 days due to increased production and improved factory efficiency.

Stewart-Warner Speedometer Corp. may increase dividends to $1 a share at the meeting Oct. 20. In April, 1921, dividends were reduced from $1 to 50 cents, and increased to 75 cents in April, 1922. Net profits before taxes in the third quarter will be about $1,500,000. In the first half they were $2,121,686, with total annual dividend requirements $1,899,200 on the 474,800 shares outstanding at the rate of $4 a year.

Allis-Chalmers Manufacturing Co. for the quarter ending June 30 reports net profits of $299,796, after Federal taxes. This is equivalent to 4 cents a share on its $25,770,750 common stock, contrasted with $278,733, or $1.69 a share on the preferred stock in the preceding quarter, and $635,880 or $1.34 a share after preferred dividends in the corresponding quarter of 1921.

General Electric Co. stockholders have been notified that orders for the three months ended Sept. 30 show an increase of 42 per cent over the same period in 1921, the totals being $58,914,629 in 1922 as against $41,608,332 in 1921. For the nine months ended Sept. 30 there has been a 30 per cent increase, with $176,171,194 in 1922, as against $135,256,462 in 1921.

Seiberling Rubber Co. in a statement issued to stockholders announces that sales for the past four months have averaged in excess of $500,000 a month and that a profit on all sales has been shown. The company has taken no dividend action this year, but it is understood a dividend adjustment will come in December or soon after the first of the year.

B. F. Goodrich Co.'s consolidated balance sheet as of June 30 shows cash in banks and on hand of $5,394,581; trade accounts receivable, $17,337,015; other accounts receivable and sundry advances, $2,913,000; raw materials and supplies, $24,145,625; accounts payable, $2,161,683; sundry accrued liabilities, $1,271,981, and earned surplus, $10,203,816.

A. O. Smith Corp. announces that on Nov. 15 it will redeem out of a sinking fund of $83,346 preferred stock at not to exceed $110 a share. Holders of that issue are invited to make sealed offerings to the Columbia Trust Co. of New York on or before Oct. 23.

Hood Rubber Co. for the first half of the current fiscal year ending Sept. 30 has earned approximately $5 a share on the 110,000 shares of common after interest charges and preferred dividend requirements.

Indiana Truck Corp., Marion, Ind., has declared its regular quarterly dividend No. 23 of 1¾ per cent on the preferred stock payable Oct. 1 to stockholders of record Sept. 30.

Ford Motor Co. of Canada has declared a cash dividend of 15 per cent, payable Oct. 20 to stock of record Oct. 13.

TO SELL SEARS TIRE PLANT

DAVENPORT, IOWA, Oct. 14—District Judge A. P. Barker has entered an order directing the sale of the Sears Tire Equipment Co. plant here to satisfy a judgment of $23,710.63 awarded the Scott County Savings Bank on a promissory note. The bank sued Otis Gilbrech, trustee in bankruptcy proceedings, Ernest & Jansen and the Whiting Corp., two contractors who held claims against the plant, and all defaulted. Judgment was not contested.

"Dalco" Makers to Start Operations in New Plant

CLEVELAND, Oct. 18—The Dall Parts Co. will start production in its new factory in this city on Nov. 15, according to W. D. Smith, secretary.

The company was organized in 1916, has been situated in Vermilion, Ohio, which is west of this city. The business has grown to such an extent that larger quarters are needed to keep up with the demand. Better shipping facilities also are necessary.

The company manufactures replacement pistons, and the layout in the new factory will be complete not only for making the product, but for selling it. The foundry and machine shop will be closely connected, and the stock room has been laid out with a view to expediting the handling of orders. The transfer from Vermilion to this city will be done without interrupting the delivery of products from the company to the dealers.

BUICK EXCEEDING SEPTEMBER

DETROIT, Oct. 17—Buick sales for October will exceed the total of 16,842, set up in September, according to President H. H. Bassett. The September total, which includes the output of the Canadian plant, averaged 748 daily. The daily high production mark for the Detroit and Flint plants combined was set Oct. 12 at 775.

Sales reports from Leishman & Co., Mexican distributor for Buick, show 43 cars delivered at retail within 25 days. Business is continuing to grow, the report adds, and an increased distribution in October is looked for.

OLDS SERVICE MEETING

DETROIT, Oct. 17—Seventy service men representing the larger distributors and dealers of the Olds Motor Works attended the annual factory conference and demonstration this week. R. K. Jack, head of the engineering department, talked to the service men on engineering features, and President A. B. C. Hardy spoke on Olds organization and workmanship.

AC SPARK PLUG ABROAD

FLINT, MICH., Oct. 16—As a result of the recent visit to Europe of Albert Champion, it is announced that AC spark plugs for England and its colonies will be made in the plant of the Sphinx Manufacturing Co. of England, while the French trade will be cared for through similar negotiations made with the Oleo Co., which will manufacture the American product.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Last week call loans ranged between 4½ per cent and 6 per cent as compared with 4 per cent and 5 per cent in the previous week. The firmer tendency noted during the first part of the week was occasioned, undoubtedly, by the calling of loans by banking institutions in anticipation of the new Government bond issue.

On Friday, after the intervening holiday, a slightly easier tone was noted. Fractional advances for fixed date maturities were noted. Sixty days' maturities were quoted at 4¾ per cent, 90 days', four, five and six months' at 4¾ per cent to 5 per cent as against 4½ per cent to 4¾ per cent for 60 and 90 days', and 4¾ per cent for four, five and six months' the week before. The prime commercial rate remained unchanged at 4¼ per cent to 4½ per cent.

As of Sept. 30 the unfilled orders on the books of the United States Steel Corp. totaled 6,692,000 tons which was an increase of 742,000 tons over the total at the end of August and is the largest gain reported for any one month since January, 1920.

The cumulative effects of the coal and railway strikes together with the 10 per cent reduction in freight rates, effective July 1, were finally shown in railway earnings for August. The Class I carriers reported net operating income at $52,580,000 which represents an annual return of only 2.65 per cent on the tentative property valuation.

With a marked gain in the loadings of merchandise and miscellaneous products, the total car loadings for the week ending Sept. 30 totaled 988,381, the largest number since the week ending Oct. 22, 1920.

Bank Circles Troubled by Price Fluctuations

DETROIT, Oct. 16—Fluctuations in automobile prices are being viewed with considerable disquiet in banking circles, according to a factory executive of one of the largest companies in Detroit, and some little difficulty may be experienced in financing dealer shipments during the fall and winter unless some sort of guarantees are given that further revisions are not contemplated. This condition applies particularly in the East, where this executive has been in touch with banking officials.

New prices and new models have practically wiped out used car valuations, he said, and many dealers are liquidating used car stocks at prices which must be made up on new car profits. Too little consideration has been given the condition of dealers' stocks in bringing out new models and cutting prices. In no case where price cuts are made, he said, should they exceed the amount of dealer discount, leaving always some margin of profit on sales.

Six States Discuss Uniform Road Laws

British Columbia Also Represented at Coast Meeting—Plans Move Forward

PORTLAND, ORE., Oct. 16—Uniformity of traffic laws for the Pacific Coast and Rocky Mountain States, together with British Columbia, appears as a possibility on the horizon as a result of a conference held here this week, in which motor vehicle administrative officials of the various states, judges and enforcing officers participated.

After two days of discussion of the various subjects relative to motor vehicle legislation and law enforcement, the session closed with the formation of an executive committee empowered to aid in drafting possible new legislation relating to traffic in the six western states and British Columbia, and to assist lawmakers of the various states in the study of the traffic problem and the passage of desirable codes.

Kozer Named Chairman

Sam A. Kozer, secretary of state for Oregon, who called the Pacific Coast traffic conference, was elected chairman of this committee, and other members are: L. D. McArdle, director of the department of efficiency of the State of Washington; Fred J. Dribble, director of licenses for Washington; Robert O. Jones, secretary of state of Idaho; H. E. Crockett, secretary of state of Utah, and Charles J. Chanu, chief of the division of motor vehicles for California.

The committee is empowered to meet at the call of the chairman or of any two members, and its first business will be to hold meetings at which a uniform law governing interstate and intra-state traffic will be worked out, to be submitted to the law governing bodies of the western states and British Columbia.

Expect National Uniformity

Desirability of uniform regulations and uniform law enforcement in the various states was expressed by several speakers at the sessions, and the belief was expressed by several that nation-wide traffic control, or at least nation-wide uniformity, will be the eventual necessity. Until that time, however, it was stressed, uniformity of laws for the Pacific Coast section will be extremely desirable. The session at this time was really the outgrowth of a meeting held two years ago in Portland, the result of which was the virtual uniformity of Oregon and Washington laws.

The session was called to order by Governor Olcott of Oregon, and among the speakers were the following: Robert O. Jones, secretary of state for Idaho; L. D. McArdle of the bureau of efficiency of Washington; Charles J. Chenu, chief of the division of motor vehicles of California; Secretary of State Kozer of Oregon, Douglas A. Shelor, manager of the automobile club of Western Washington, and a number of municipal judges and traffic enforcement officials of the various Pacific Coast cities.

INDUSTRIAL NOTES

Burdick-Atkinson Corp. has been established at Hamburg, N. Y., to manufacture steel wire springs for use in automobile coach work upholstery. John S. Burdick, formerly vice-president and general manager of the Buffalo Body Corp., is the incorporator of the company. Associated with Burdick, who is president and general manager, are Frederic R. Atkinson as vice-president and factory manager, Franklin R. Brown, treasurer and Harry Burdick, secretary.

G & J Tire Co. of Indianapolis is adding a night force of 250 men and increasing the regular force 30 per cent, according to President W. B. Harding. The normal force is about 1700 men and the production is between 30,000 and 35,000 tubes a day. The factory consumes 1,500,000 pounds of raw rubber a month and the demand for its product is rapidly increasing. Production schedules for October and November are the largest in the history of the company.

Doss Tire & Rubber Co. has added a new unit to its plant at Atlanta increasing the former capacity of the plant by approximately 50 per cent, according to C. C. Harper, president. The company further advises that due to rapid betterment in business conditions over the South of recent months its entire output is sold for several months ahead. The plant has been operating day and night during all of 1922.

Parsons Manufacturing Co., manufacturer of automobile hardware, has opened an office in Chicago in the Mallers Building in charge of C. P. Knisely and W. M. Townsend. The Chicago office will serve the territory of Wisconsin, Illinois, Indiana, St. Louis and Ohio, not including Cleveland and Toledo. Plans are under way for plant expansion in Detroit due to rapidly increasing business

Kohler Co. of Kohler, Sheboygan County, Wis., which has been carrying forward an important plant enlargement program for more than three years, has ordered plans for another four-story building, 160 x 170 ft., costing about $350,000 complete. The company manufactures a farm lighting plant.

Firestone Tire & Rubber Co. has commenced operations at its plant at Hamilton. About 300 men are being employed at the outset. This force will be increased to 500 within a few weeks. The opening of the plant was delayed by the non-arrival of machinery expected last month.

New Addition by Holley Will Double Floor Space

DETROIT, Oct. 18—Holley Carburetor Co. will complete this month an addition to its factory here which will about double its floor space. Production in 1922 will double the output of 1919 when the present factory building was erected and will be the high production record for the company for any one year.

The new factory addition will cost $60,000. Much of the equipment which will be installed represents the special design of officials of the company.

METAL MARKETS

Diminishment of the bulge in steel prices for prompt shipment continues apace, odd distress lots of sheets being the only exception. Obviously premiums on early deliveries must disappear before any readjustment in base prices will make itself felt. The gratifying feature of the situation is that the very interests who are optimistic as to a continuance of a fair volume of business in the steel industry are firm believers in the resumption of the downward readjustment of price levels as an inevitable concomitant of a broadening in the demand. One of the causes responsible for much distorted vision in the steel market is that there are many producers and consumers who have their noses too close to the grindstone.

They follow religiously every change that takes place from day to day and as each one of these changes is naturally of a minor character they reach the erroneous conclusion that the market is of a stationary character. Slight, however, as the day-to-day changes may be, those who sound the market after an absence from it of a few weeks notice that its tone has undergone a complete change. Nominal price quotations may be unaltered and yet the keen judge of market conditions will instantly recognize an altered state of affairs. Such a change in the market's atmosphere appears to be in progress at this very moment.

Although quotations undergo but little revision from day to day and although here and there when a small tonnage of this or that steel product is urgently needed premium prices may still be paid, the market's undertone clearly reveals the gradual change from an out-and-out sellers' affair to one in which buyers' views will have more and more influence on prices. Those who follow the market from day to day would also do well to study occasionally the monthly statistical resumes of production and prices and note how frequently these are at variance with the day-to-day information that precedes it from Pittsburgh and Youngstown. A case in point was the September report of steel ingot production by the American Iron and Steel Institute the official figures in which showed conclusively that the many alarmist reports of sharp contraction in steel production during September were not well founded. The same discrepancy between daily press reports and actual statistics holds true of pig iron production in September.

Pig Iron. Easier conditions are in evidence and the market seems to have turned definitely although prices are not yet such as to make it attractive to automotive foundries for any but their immediate requirements. Some of the steel works have turned sellers of iron which helps in the downward readjustment of the market.

Aluminum.—European producers are offering virgin ingot aluminum, 98 to 99 per cent and 99 per cent plus, for November—December shipment at 15½ @ 15¾c., f.o.b. New York, duty to be paid by the buyer, which is the equivalent of about 21 @ 21¼c., delivered Middle West consuming point. Meanwhile there are still occasional sellers of warehouse metal at 20c., duty paid. One importer claims to have made a 50 ton sale for delivery over several months at an advance over what is commonly said to be domestic producer's price. Sheets are in active demand and the domestic producer is said to be behind on deliveries.

Copper.—The market is easy to feeble.

Calendar

SHOWS

Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8 - 13 — New York, Second National Automobile Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 9 - 19 — Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show, British Cycle Motors, The Tower, Warwick Road, Coventry.

Dec. 15-Jan. 2 — Paris, Aeronautical Salon, Grand Palace. Chambre Syndicale des Industries Aeronautiques, 9 Rue Anatole de la Forge.

Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

May - July, 1923 — Gothenburg, Sweden, International Automobile Exhibition. Sponsored by the Royal Automobile Club of Sweden.

CONVENTIONS

Oct. 18-20—Chicago, National Association of Farm Equipment Manufacturers, Congress Hotel.

Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

Nov. 14 - 15 — Chicago, Semi-Annual Convention, Factory Service Managers, National Automobile Chamber of Commerce, La Salle Hotel.

Jan. 15-19—Chicago, Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show.

Jan. 29 - 31 — Chicago, Annual Meeting, Automobile Electric Association, Congress Hotel.

S. A. E. MEETINGS

Oct. 26-27 — Detroit, General Motors Building.

Jan. 9-12—New York, Annual Meeting.

Midgley Addresses S. A. E. Meeting in Indianapolis

INDIANAPOLIS, Oct. 16—The Indiana Section of the Society of Automotive Engineers held its first fall meeting last night and was addressed by Thomas Midgley, Jr., of the Dayton Engineering Laboratories, on the subject of combustion in automotive engines. Many automotive engineering men from over the State, as well as representatives of the local industries, were present.

With this first meeting of the fall series the Indiana section inaugurated a custom of inviting members of other engineering societies to the dinners and talks it schedules regularly. Members of the Heat Treating Society, of the Scientech Club, of the American Society of Mechanical Engineers and of the American Institute of Electrical Engineers were present.

Charles F. Kettering, who had been originally billed for the first meeting, being unable to attend, changed places with Midgley, who was scheduled for a later meeting.

Sales on Time Increase 100 Per Cent in Chicago

CHICAGO, Oct. 16—Increase of more than 100 per cent in the volume of business handled by the members of the Central Automobile Financing Association in the first ten months of this year as compared with the corresponding period last year was shown by the annual report submitted at the association's annual meeting.

In the first ten months of last year the number of motor vehicles financed was 17,591, and in the first ten months of this year the number was 39,308, an increase of 21,717. The association now has records of 99,000 motor vehicles financed by firms which are members of the association.

At the annual election Walter E. Heller of Walter E. Heller & Co. was re-elected president and C. L. Wolf of the Hamilton Investment Co. was re-elected secretary. Other officers chosen are: First vice-president, H. M. Hurst of Monroe Trust Co., Chicago; second vice-president, A. D. Barnes of American Banking Co., Springfield, Ill.; and treasurer, J. D. Purlee of Commercial Acceptance Trust.

New Car Registrations Total 5103 in New York

NEW YORK, Oct. 18—The seasonal decline in the metropolitan district is apparent in the registration figures for September as compiled by Sherlock & Arnold, publisher of the Automobile Sales Analysis, for the 10 counties in and around New York City. Total registrations for the month were 5103, as compared with 6438 in August and 8494 in July. For the first nine months of the year, registrations aggregated 59,613, as against 39,366 for the same period a year ago.

Four makes lead in the low and medium priced class field, with five falling not far behind and showing sales substantially greater than the remainder of this class. Ten cars in the high priced class are well ahead in the field.

A summary of registrations for the first nine months in the high, medium and low priced classes is as follows:

	High Price	Medium and Low Price
January	283	2016
February	273	2231
March	632	6354
April	862	8428
May	961	8470
June	865	8203
July	678	7816
August	516	5922
September	511	4592

PACKARD SERVICE CONFERENCE

DETROIT, Oct. 17—Packard service managers held a quarterly conference at the factory this week. Those attending were C. G. Culver and J. Minsenberger of Philadelphia, J. W. Floriday, Baltimore; B. R. Teckham, H. W. Ward, N. C. Rogers, J. E. Mills, Knox Brown, A. Mattison, F. E. Bishop and R. E. Rosen.

Business Paper Editors Confer in Joint Session

NEW YORK, Oct. 16—The National Conference of Business Paper Editors has held its annual meeting in this city in a joint session with the Associated Business Papers. Both organizations are national in scope and include in their membership all of the prominent business papers, among them AUTOMOTIVE INDUSTRIES.

The convention attracted international attention, England sending over five of her publishers and editors who were guests of the A. B. P. The visitors included F. E. Hamer of Benn Bros., Ltd., London; R. Child Bayley of Iliffe & Sons, Ltd., London; Ronald E. Dangerfield of Temple Press, London; Alfred Dawson of Percival Marshall & Co., London, and James Selkirk Allan of *Engineering* of London.

At the banquet of the A. B. P. international friendship was cemented when congratulatory letters were read from A. J. Balfour, Lord Riddle and half a dozen other British publishers.

Neal G. Adair, editor of *Motor World*, was elected a member of the executive board of the National Conference of Business Paper Editors.

Stewart-Warner Plants Employed to Capacity

CHICAGO, Oct. 17—Plants of the Stewart-Warner Speedometer Corp. are reported working at capacity with no accumulation of finished products. Orders which have been taken for two months in advance indicate that business will continue to be large. Railroad car shortage has not been felt because practically all requirements were anticipated and material was bought before the situation became severe and prices were advanced.

The company reports that the sale of bumpers has increased steadily and part of the plating work has had to be let to outside concerns. Carburetors are being manufactured in a small way as an experiment.

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Sales Methods Must Be Improved to Meet Competition

Economies in production and betterment of design will not go far unless backed by efficient selling force. Present efforts of manufacturers to expand dealer organizations are all directed at practically the same men.

By James Dalton

COMPETITION in the sale of automotive products has become exceedingly keen and there is every reason to believe that it will rage even more furiously in future, but there are no indications that any one expects to resort to the use of poison gas or any other "cut-throat" practices. Up to this time, at least, the battle has been fought in the open and only legitimate tactics have been employed.

The first line of defense in this conflict is the sales organization. Those which are well intrenched are in the best position to repel attacks. There will be constant need for reinforcements, however, and every company engaged will be forehanded if it opens a training camp for recruits. It will be unwise to depend entirely upon deserters from other companies for replacement purposes. These men will fight heroically but there naturally will be many casualties and the forces in line eventually will be exterminated unless new blood is enlisted.

Company executive staffs may work out the strategy for this battle, but the responsibility for executing the orders and seizing opportunities which may arise unexpectedly, will rest upon the sales manager. He must be a resourceful person or he will be forced to retreat. The plans he works out for augmenting the forces under his command and converting them into shock troops will determine, in most cases, whether his company is to advance or retreat.

This general condition applies not only to the sale of passenger cars and trucks, but also to those parts and accessories which are handled through dealers and jobbers. A good many thousand men are engaged in the sales armies, but there aren't nearly enough if the fight is to be carried to the door of every family in America, as it seems likely to be.

There is no such thing as plumbing the depth of the automotive market. Next to the necessities of life—food, fuel, clothing and shelter—there is a greater market for automotive products than for anything else. Even to-day one person in every ten is a potential purchaser.

In the lowest price class, at least, even the motor vehicle has ceased to be a specialty and has become a commodity. Almost every kind of automotive equipment is in the same category. One of the wise men of the industry is authority for the statement that the time has come when these products must be handled on a commodity rather than a specialty basis and that profits must be measured accordingly. He meant that the success or failure of the dealer must be determined, not by the size of his profit on each unit, but by the number of units he sells. In other

words, he must carry on his merchandising along the same lines as the grocer or the hardware dealer and depend upon the frequency of his turnover for his profits.

IF this is true, and the opinion seems to be shared by many of the thinkers of the industry, it means the revolutionizing of production and sales methods. No less an authority than W. C. Durant said in a recent interview with Automotive Industries:

"Out of the present chaotic situation will emerge a completely new character of motor production and distribution with old methods ruthlessly cast aside and replaced by a system based upon competency, experience and sound judgment."

While he did not say so in so many words, it was evident Durant had in mind a survival of the fittest and the failure of those who have shared, up to this time, in the general prosperity of the industry because of a demand which made possible the sale of anything that would run on four wheels with gasoline motive power.

Of similar tenor is the statement of F. E. Moskovics that "the day is rapidly approaching when the fundamental economics of production and design will dictate which concerns shall survive."

The most profound research and the longest possible strides forward in the way of economical production will mean nothing, however, unless they are backed up by a competent sales organization. It is these men on the firing line who will determine the volume of business. If they simply are order takers who don't know how to sell, if they can't make two prospects sprout where only one grew before, if they don't know how to handle trades or time sales so there's a profit in them, then the companies which they represent will have to fall back in the battle for business.

Dealer organizations are the very life blood of the industry. A good dealer can't sell a poor product as successfully as a poor dealer can sell a good product, but with two products of equal value the able merchandiser can quickly leave his competitor in the ruck and he'll get a lot of business even with his second-rate proposition.

It undoubtedly is true, however, that the companies turning out the most popular automotive products have the least difficulty in attracting the ablest merchandisers. When they go out after recruits they seldom have much difficulty in getting them. This puts them in a strong strategic position to move ahead in the fight for business. If there were an abundance of good dealers these companies would have no trouble in getting all they wanted, but competition among these strong companies is becoming hotter every day and all of them are expanding their sales organizations as rapidly as possible. This means that they, too, will have to train recruits if they are going to keep their shock forces up to battle strength.

Practically every passenger car and truck company in the field is striving to strengthen its dealer corps. Some of them are seeking hundreds of additional representatives. The sales manager of one passenger car is making up a card index showing all the essential data about every town in the country with a population of 1000 or more. These cards tell about the banking, business, agricultural and industrial resources of all these places and in addition they will give the names and present connections of the most successful dealers. All these dealers will be given invitations to switch over to the company which is compiling the data. Other companies also are getting dealer lists from every possible source and will sign up as many of them as possible.

The trouble with these efforts to enlarge sales forces is that they are directed at practically the same men, which means that there is a constant shifting about, although a small army of camp followers have drifted into the industry as the result of the enormous business of the past few months.

Many of those dealers who failed to weather the storm of depression which began in 1920 and fell by the wayside because they were weak financially or because they were simply order takers and did not know how to sell when business was slack, are coming back. Some of them have picked up a shoe string of capital and they are getting franchises because they profess to know all about the retail sales of automobiles. They may be able to ride along on the tide so long as business is good but if there is another slump they will blow up again.

It should not be assumed, however, that all the dealers who failed during the period of depression lost out because of lack of ability. Hundreds of them were confronted with difficulties which were absolutely insuperable and were beaten only after a gallant fight. Such men as these are entitled to another trial and another chance.

THE contest for sales is going to be literally heart breaking. The victory will go to those concerns which can turn out the best product at the lowest price by dint of manufacturing efficiency and economy plus the devoted efforts of a loyal, capable and energetic sales organization.

* * *

The most profound research and the longest possible strides forward in the way of economical production will mean nothing, unless they are backed up by a competent sales organization. It is the men on the firing line who will determine the volume of business.

There are some other recruits who have been successful in other lines of merchandising but who know little or nothing of motor vehicles. They are the ones, nevertheless, who must furnish the new blood for the sales organizations of the industry. The sales manager who selects such men with care and trains them painstakingly will be doing his company a genuine service.

If a man has made a real success of retailing in almost any line, if he is well grounded in the fundamentals of merchandising and if he is adaptable, the chances are that he will make a successful automobile dealer if he has a reasonable amount of capital and if he is given a few weeks' careful training.

THE smaller production companies which cannot offer their dealers a large demand before they start might recruit largely from these two classes. As it stands now about the only bait they have to offer successful salesmen is a long discount and this cuts deeply into their profits.

There probably are a good many companies to-day which are striving for national distribution which would be doing vastly better if they were concentrating their sales efforts on a comparatively small territory. This would enable them to intensify their sales effort, keep a closer check on the operations of their sales organizations, give dealers much practical help and assure the

purchasers of their products more satisfactory service.

Some of these concerns have spread themselves out too thin. They have strained their resources to the breaking point by trying desperately to increase their production when they would have been far better off with a more substantial profit on a smaller output. They might have done better if they had expanded their sales territory only when they encountered a spontaneous demand for their products instead of trying to force a demand.

THIS applies not only to motor vehicles but to accessories and equipment. A considerable proportion of the dealers who handle equipment are garage men who are primarily mechanics and mighty good mechanics at that. Circumstances have led them into retailing, however, and they know little of merchandising. If they are left to their own resources they won't progress very fast, but it is entirely possible to educate a good many of them if intelligent effort is put forth. On the other hand, a good many of them never will be anything but mechanics. This problem has arisen because the automobile and most of the things which go with it are mechanical devices and have been considered in the past almost exclusively as specialties.

With the present enormous production of motor cars, especially in the price classes under $1000, it is quite logical to class them as commodities. The success or failure of these companies in future will be almost entirely dependent on their ability to turn over a huge volume of sales in a year. The contest among them for sales will be literally heart breaking. The victory will go to those which can turn out the best product at the lowest price by dint of manufacturing efficiency and economy plus the devoted efforts of a loyal, capable and energetic sales organization.

The profit per unit must be small both for the manufacturer and the dealer. The individual dealer cannot live unless he is able to turn his capital over several times a year. It is absolutely essential, therefore, that he should be a sound merchandiser. If the factory has many men in its organization who are not, it will suffer seriously. No further argument should be needed to emphasize the importance of selecting dealers cautiously and educating them carefully. They must sell in large quantities, but they must sell at a profit. They can't afford to trade recklessly, for example, and the factory can't afford to have them.

In the medium motor car price class competition will be almost as keen, but these automobiles will not be handled so much on a commodity as a specialty basis and the profits on each unit will be somewhat longer. By the same token the dealer discount will have to be a little larger. There will be a fierce battle for sales, nevertheless, and it is equally important that these companies should have real merchandisers as dealers for they will have a greater temptation to ruin themselves by overallowances in trading.

What applies to passenger cars applies with equal or greater force to trucks. The volume of sales at present is only about one-tenth as large and for that reason it is even more difficult to get competent dealers. Trading is an even greater curse and it must be confessed that the factories themselves are fully as serious offenders as the individual dealers. Education of dealers is even more essential in the truck than in the passenger car field and the well known psychological moment has arrived to undertake it for the surface of the truck market has scarcely been scratched. Compared with present output, demand will increase much more rapidly than for passenger cars. Those companies best fortified with strong dealer organizations will be the ones which will profit most from this enlarged volume of business.

THE same situation exists to a greater or less degree in all branches of the parts and accessory business. Those companies turning out products for which there is the largest and most insistent demand will have to put themselves on a commodity basis and be content with a small profit per unit. They will have to expand and strengthen their dealer organizations and they will have to seek constantly for new outlets for their goods. They must devote more and more attention to the replacement market, either through the jobbers or their own dealers. They, too, must learn how to educate their dealers and their problem in this respect is even greater than that of the motor vehicle manufacturer for they are dependent to a greater extent upon the good-will and the selling ability of the man in the service station who is primarily a mechanic.

A Packard Dirigible Engine

IN the construction of the type ZR-1 rigid airship, the Bureau of Aeronautics of the Navy Department has insisted on maximum durability and fuel economy. This is necessary because of the desire to secure the ability for a long stay in the air and long cruising periods for this ship. The equipment for this airship will be six engines of 300 hp., giving a total of 1800 hp. A contract has been entered with Packard Motor Car Co. to manufacture the engines of this class. They are to be known as Packard model 1A-1551, and are of the six-cylinder, water-cooled type. These engines have a bore of 6⅜ in. and a stroke of 7½ in., with a rated hp. of 300 at 1400 r.p.m.

The reduction and reverse gear is made by the Allison Engineering Co. This gear is a combined clutch and reduction gear, the clutch being a multiple disk type and the reduction gear planetary. The gear reduction permits a propeller speed of 550 r.p.m. when the engine is turning 1400 r.p.m. The use of the clutch is to permit the engine to be cranked in the hangar without turning the propeller. The gear is fitted with a brake which holds the propeller when the clutch is disengaged.

To determine the durability characteristics of this engine, an endurance test of 300 hr. has recently been successfully conducted. The engine was mounted on a torque stand under a shed, open at both ends. Driving a calibrated pitch club it was run at power corresponding to that necessary for cruising speeds; that is, 250 b.h.p. at 1400 r.p.m., at normal cruising altitudes, 6000 ft. At the end of the 110th hour, the engine was given a wide open throttle run and developed 350 b.h.p. at 1555 r.p.m. In order to determine whether any power loss had resulted the engine was again opened up at the 300th hour and developed 365 b.h.p. at 1577 r.p.m. The fuel consumption for the entire 300 hours was .436 lb. per b.h.p.

Tractor Makers Assert They Can't Cut Their Prices Now

Declare increased cost of raw materials makes reductions at this time impossible. Manufacturers assert at Chicago convention they don't expect highly profitable business before 1924. Hold farm products prices are still too low.

By David Beecroft

CHICAGO, Oct. 20.

MANUFACTURERS of farm equipment machinery do not believe that there will be a return of highly profitable business for them before 1924, according to predictions made at the twenty-ninth annual convention of the National Association of Farm Equipment Manufacturers which closed here to-day.

They base their contention upon the assertion that recent increases in the cost of raw materials have made impossible any price reduction to purchasers and that the farmer is not yet ready to come into the market in large numbers because the prices he is receiving for his crops are not commensurate with what he has to pay for the commodities he must buy.

The views of the manufacturers were voiced by F. R. Todd, vice-president of Deere & Co., who declared that the farm equipment business had approximated only about 33 per cent of normal since the depression began two years ago. The present demand from the farmer is scarcely 50 per cent of normal, although there has been a substantial increase in sales in the past three months.

The farmer is still out of step with the rest of the world in prices received for his products in comparison with what he has to pay for his necessities. The profits which should have been his because of the increase in grain prices in the last two months have been lost in part through a lack of transportation to get his grain on the market. The higher prices have gone very largely into increased water rates or to brokers, elevator proprietors or others in direct control of the grain supplies.

The farmer's dollar is only a 64 cent dollar compared with its pre-war buying power and the increase in the price of raw materials entering into farm machinery from 61.5 per cent above pre-war levels on March 1, 1922, to 99.9 per cent above the 1914 level on Oct. 6, 1922, indicates that 1923 has little chance of being a profitable year for them and that the farmer can look for little in the way of price reductions. An increase of 10 to 20 per cent in prices would normally be the answer to the recent rise in raw material prices.

NONE of the manufacturers attending the convention would subscribe to a price increase, however, and this view was shared by the representatives of sixteen farm machinery dealer associations who have been meeting of their own annual convention in Chicago. During 1922 these manufacturers and dealers have written off losses, their inventories are not all completely liquidated and they have set their backs to the wall to face another season of exceedingly lean profits before the opening of 1924, when they believe the farmer must buy, even if unusual financing must be resorted to in assisting him, because stocks of machinery in warehouses and factories are running low and what the farmer has is wearing out. He has been repairing and borrowing from his neighbor for two years, a program which it would seem cannot continue more than one year longer.

The farmer has been a lean buyer of equipment since 1913. A carefully conducted survey shows that in no year since then has the tonnage of implements consumed exceeded that pre-war year and with the single exception of 1920 each year has shown a decrease compared with 1913. The one outstanding exception in the farm machinery classification has been farm tractors.

TODD is of the opinion that the farmer has yet ahead of him days in which he must use still greater discrimination in purchases than he has during the past season and that before he gets back to a prosperity standard he must buy farm machinery so as to make his land cultivation more profitable. To do this he will have to discontinue the purchase of other products that may be less essential to this end. He said.

"It is a notable fact that during the last two years the farmer has tended to curtail his implement buying to a larger extent than he has his purchase of many less essential commodities. As the expenditures of the farmer must come either from his savings of the past or his earnings in the present, and as expenditure for luxuries, in the majority of cases, will soon exceed the accumulations from past effort, we must inevitably reach the conclusion that, with his curtailed buying power he is soon going to find it necessary to use such resources as he has to buy the equipment essential to farm operation.

"It also is beyond question that, with the decreased value of a unit of crop, he must make every effort to increase production and at a decreased cost; in other words, when the farmer comes to calmly view the problems which are facing him, he is going to find that the maintenance of a satisfactory implement equipment is essential to his continued operation, and that labor-saving tools are more necessary with corn selling at 50 cents a bushel than when the price was $1, because in his competition in the markets of the world he must be in position, from a cost standpoint, to produce every unit of his crop so that he can sell it at a profit."

As a result of this greater discrimination in purchases, Todd predicts that some industries, and he did not mention any of them, still have liquidation problems to face if they sell much of their products to farmers as the farmer will not have enough dollars to go around and must perforce become a discriminating buyer seeking only those products constituting the first line of necessity. Greater discrimination in this respect may be needed for 1923 than for 1922.

During the year farm implement prices have fallen from 50 per cent above pre-war levels on Jan. 1 to 42 per cent above at present. To-day farm products average 31 per cent above the 1914 level.

IT might be added here that a week ago Julius Barnes, president of the United States Chamber of Commerce, in addressing editors of business papers, commented on the fact that while grain prices have risen 15 cents per bushel in the past six weeks, most of this has been absorbed in increased freight rates on the Great Lakes, where some rates, Mr. Barnes stated, have risen from 2 to 15½ cents per bushel on travel west of Buffalo. By not participating directly in these grain price increases, the farmer has suffered a loss of $400,000,000. Not only are the elevators of the country stocked but the railroads are inadequate to handle what is offered to them.

Samuel O. Dunn, editor of *Railway Age*, and a national authority on railroad affairs, declares that if all of the locomotives were in normal condition, the railroads still would not be in a position to handle anything like the quantities of freight offered.

Further, never in railroad history in America has there been a business improvement period where the railroads were not well prepared to more than care for the return of business, but to-day they are not, and the influence of this will be reflected through industries during the coming year. Not only is the farmer's return to purchasing normalcy being retarded by lack of railroad facilities but the crop value of 1921 was $6,000,000,000 below that of 1920. When the 1922 crop value is fairly definitely computed, a more correct interpretation of the 1923 buying capacity can be made.

The extent to which increased freight rates are working against the farmer both in the purchase of farm equipment and in the price he receives for his grain can be illustrated by many specific examples.

A typical illustration, and a specific one also, relates to four essential pieces of farm machinery used by the Nebraska farmer and supplied by the Mississippi Valley manufacturer. In 1914, to transport a grain binder, a corn binder, a wagon and a disk plow from the maker to the farmer cost $485, as compared with $738 to-day. A year ago the cost was considerably more.

Referring to increased freight costs on many, if not on most, products furnished by the industry, Donald D. Conn, of the American Railway Association, in addressing the convention, declared that the distance all products have to be hauled has very greatly increased since pre-war days. In 1911 the average haul of all commodities on American railways was 258 miles. By October, 1921, it had jumped to 326 miles. Changes in producing areas were largely responsible for this increase. A specific instance showed how 10,000 carloads of vegetables and fresh fruits had an average transportation distance to market of 1400 miles.

THE ranks of the National Association of Farm Equipment Manufacturers are divided on the all-absorbing topic of prices advertised.

During and since the war few, if any, of the manufacturers have advertised f.o.b. factory prices, and to-day the dealers are demanding a return to them for the purpose of reducing price cutting among their members. Few of the manufacturers seem ready to take the step, although some of the leaders are. The evils of not quoting an f.o.b. factory price were presented by Guy H. Hall, director of the National Institute of Progressive Farming, a publicity bureau maintained by the farm equipment manufacturers. Referring to this price question, Mr. Hall said:

"Some of our correspondents insist it is time for the farm implement and tractor men to put retail prices on their implements and advertise them, so that everybody knows what a cultivator, manure spreader or tractor costs the farmer. The dealer then can visualize a clear profit, and in canvassing his prospects for the coming year, work for the sale of all farming equipment needed in his territory. The mystery is eliminated for the farmer, and he gets away from the idea that he is paying for a piece of farm machinery, plus the freight from factory to farm, plus a profit for the dealer, plus so on and on. The farmer's products are priced each day. Why not his implements?

"To illustrate this point: A farmer goes in to buy a Ford car. The price, he knows, is, let us say, $525 f.o.b. Detroit. He knows he must pay the freight, which is perhaps $20 additional. Then there is a little more for war tax. The deal is completed because the farmer knows the advertised price of the car and he also knows that he could go to every other dealer in his territory and the price would be the same.

"Suppose he wants a spreader. He asks his implement dealer what it costs and gets his answer after the dealer has figured it out from his old invoices. But he doesn't buy, simply because he doesn't have confidence that the quoted price is a fair one. He goes to another dealer; the price is a little different, because no two dealers, without an established price, figure their selling prices and overhead in the same way.

"THAT experience encourages him to shop around a little more. He comes back to the first dealer and tells him how much lower prices he can get some place else. Or, all the time he is comparing these various prices with mail order prices, which are the only prices printed in the catalog. This encourages price cutting. Price cutting is unprofitable and much of the dealer failures originate from this very cause."

The dealers not only request a factory f.o.b. price, but insist that no increase in prices must be made by manufacturers.

The farm equipment manufacturer has, by varying cash discounts to dealers, achieved what is equivalent to a 5 per cent increase in price. Some time ago the cash discount to dealers was changed from 5 to 10 per cent, equivalent to a 5 per cent price reduction. This discount has now been changed back to 5 per cent and is, from the factory viewpoint, equivalent to a 5 per cent price increase.

Discussing the lack of aggressive selling methods which he seemed to feel might be partly responsible for the present scarcity of business, Hall said:

"Those who have watched the industrial and financial developments of the past year know of the wonderful recovery of the automobile industry. These automobiles were sold largely to farmers, the same farmers that are supposed to be without buying power this year. The equipment that goes on those automobiles also have a record sale, and the stocks of the companies whose products sell largely to farmers are the sensation of the stock market.

"How come? Simple enough! The automobile people

had developed their dealers and the dealers had been made prosperous enough to give service. Hence, they were going out looking for the business, *'asking 'em to buy!'* if you please. You say the automobile has a universal appeal to every member of the family, women and children first. Right enough, but the tractor has, too, if it is presented right. In fact, the tractor should be sold as a means by which the farmer can own a *better* automobile, and in saving the time, inside and outside the house, not to mention the labor and feed saved that could be put into higher class live stock that would bring *bigger* returns per acre of farm, so that the automobile could be bought and used in a *more* prosperous farm life.

"Why 'pan' the automobile as a deterrent to the buying of the farm machinery and tractors? The automobile has been a teacher of engineering to the farm boy, so that he demands the speediest and newest farm machinery for saving time in the field. It has blazed the path of the farmer to a new level of farm civilization, building the roads for trucks and revolutionizing farm life. Let 'em buy automobiles, better and better ones as they become more prosperous."

New Small Farm Tractor Has Air-Cooled Engine

A NEW small tractor is being produced by the Cameron Motors Corp. It is fitted with a Cameron four-cylinder air-cooled engine of 3¼-in. bore by 4½-in. stroke, rated at 12 hp. at 1000 r.p.m A feature of the engine is the large sized crankshaft which is of the three-bearing type and measures 2 in. in diameter at every bearing. The cooling fan is driven by an inclosed silent chain and every part of the engine is automatically lubricated from the crankcase. Ignition is by a Splitdorf high tension magneto. A governor is built into the engine for speed control. The transmission case and lower part of the crankcase are in one casting, this tending to give a more rigid construction and to reduce the machining cost.

The tractor has two forward speeds and one reverse. All gears and shafts are of chrome nickel steel, heat-treated and mounted on annular ball bearings. The final drive is through large ring gears riveted to the two driving wheels and inclosed in a dust proof case containing an oil bath. The large wheel bearings are of the flexible roller type. The rims on the drive wheels can be demounted after removing six nuts, and a variety of rims can be furnished to suit different working conditions. The tractor can also be fitted with different tires for road work.

A power take-off pulley is provided at the rear, so that by disengaging the clutch the engine can be operated without load when the belt is on, and the belt load thrown on by engaging the clutch. It is stated that in belt work the governor closely regulates the engine speed, and a small hand lever is provided for increasing the tension on the governor springs to increase the speed range if necessary.

In the photograph the tractor is shown equipped with a riding attachment which is standard equipment, but caster wheels and handles can also be furnished, which convert it into a walking tractor. The machine steers by the rear wheels and will turn in an 8-ft. circle. The fuel tank is of welded steel and holds 10 gals. It is mounted at the rear end of the hood and can be dismounted after taking out four bolts.

The total width of the machine here shown is 32 in., but when fitted with 5-in. rims for cultivating the total width is only 26 in. The height is 41 in. and the weight of the machine complete ready to operate, 1500 lb. Of this weight 1400 lb. rests on the front wheels when the machine is at rest, so that almost the whole weight is available for traction purposes.

The Cameron Motors Corp. also builds a 12-in. plow which attaches to the rear of the tractor and can be raised and lowered by a pedal. Provision is made for adjusting the depth of plowing. A mowing machine attachment for a 5-ft. cutter bar, and a line of cultivator tools and a spraying outfit are also made. The tractor alone sells for $350.



Cameron tractor powered with four-cylinder air-cooled engine

SPARK PLUG manufacturers in the United States who would seek export business in the United Kingdom must make several minor changes in their product, if they are to compete successfully with the British manufacturer of plugs, according to advices to the automotive division of the U. S. Department of Commerce.

Practically all automobiles manufactured in the United Kingdom use metric thread spark plugs. The only demand for inch thread plugs is on American-made cars. But one American car has, as yet, appeared on the British market equipped with metric thread plugs. An 18-millimeter thread spark plug is generally accepted as standard in the British Isles.

The American exporter is also handicapped with a duty of 33⅓ per cent on his product. Despite this, practically all makes of plugs—American and British—sell at 5 shillings, or about $1.10. In the case of wholesale prices British manufacturers give a larger discount than American manufacturers, the former allowing a discount of 50 per cent to jobbers and 40 per cent to dealers, against the American manufacturers' discount of 40 and 30 per cent respectively.

The British manufacturer's method of "putting up" his product is also considered superior. All plugs made in England are wrapped in paraffin paper and packed in a tin box sealed with a lead seal, which appeals to the buying public.

Continental Design Features Small Overhead Valve Engines

Paris Show finds European engineers seeking mechanical efficiency and low operating costs. Little attempt to reduce production costs through simplification of design. "Clean" engines noticeable. Four-wheel brakes on cars of all sizes.

By W. F. Bradley

UNDER the Continental definition an automobile is a vehicle having an engine with a piston displacement of more than 67 cu. in. Below this figure the vehicle is considered a cycle car, whatever its technical characteristics. It was on this basis that the Paris show this year was divided into two sections, automobiles being admitted into the Grand Palais and the cycle car displayed in the overflow section on the Esplanade des Invalides.

Considering the car section only, 185 Continental models were represented in the main hall of this year's Paris show. This number excludes British and American cars. There were only three of the former and General Motors were the only representatives of the American industry. Out of the 185 models there were 140 with four cylinder engines, 36 with six cylinders, 8 with eight cylinders and one with 12 cylinders. Makers of six cylinder engines were Alfa-Romeo, Ansaldo, Leon Bollee, Delage, Delahaye, Delaugere-Clayette, Delaunay-Belleville, Excelsior, Farman, Fiat, Hispano-Suiza, Laine, Lorraine-Dietrich, Mathis, Minerva, Omega, Paulet, Peugeot, Renault, Rochet-Schneider, Spa. The makers of eight cylinder engines are Bugatti, Dewald, Isotta-Fraschini, and Panhard-Levassor with all-in-line types, De Dion Bouton and Talbot-Darracq with V-type and Lancia with a narrow angle V-type. Fiat has the only 12-cylinder engine in the show, this being a very high grade product which made its first appearance a year ago and is about to go into production on a limited scale. Voisin has withdrawn his twelve. With the exception of the Lancia 20 degree V-type, all the fours and the sixes are vertical engines.

The average displacement of Continental engines is in the neighborhood of 160 cu. in. A wrong impression is obtained, however, if cars with engines of less than 67 cu. in. are ignored, for the majority of these are not cycle cars but small two-seater automobiles which are coming more and more into competition with bigger machines.

Putting the 67 cu. in. machines on one side, the tendency is towards a slight increase in engine size. Whereas a bore of 2½ in. was the generally accepted size for popular four seater cars, there is now a tendency to increase this to 2.7 or 2.9 in. The desire for economy is as strong as ever, but there is a feeling that better all round results can be obtained by carrying the piston displacement of a four passenger car from 91 in. to about 122 in. With the smaller figure, track and wheelbase have to be cut down to a point which somewhat restricts the space for four passengers.

There is no change in the relative positions of sleeve valve and poppet valve engines. Although Knight patents are no longer valid in France, only one new sleeve valve engine, a Peugeot, has made its appearance. Makers who continue to use the sleeve valve engine are Minerva, Mors, Panhard-Levassor and Voisin.

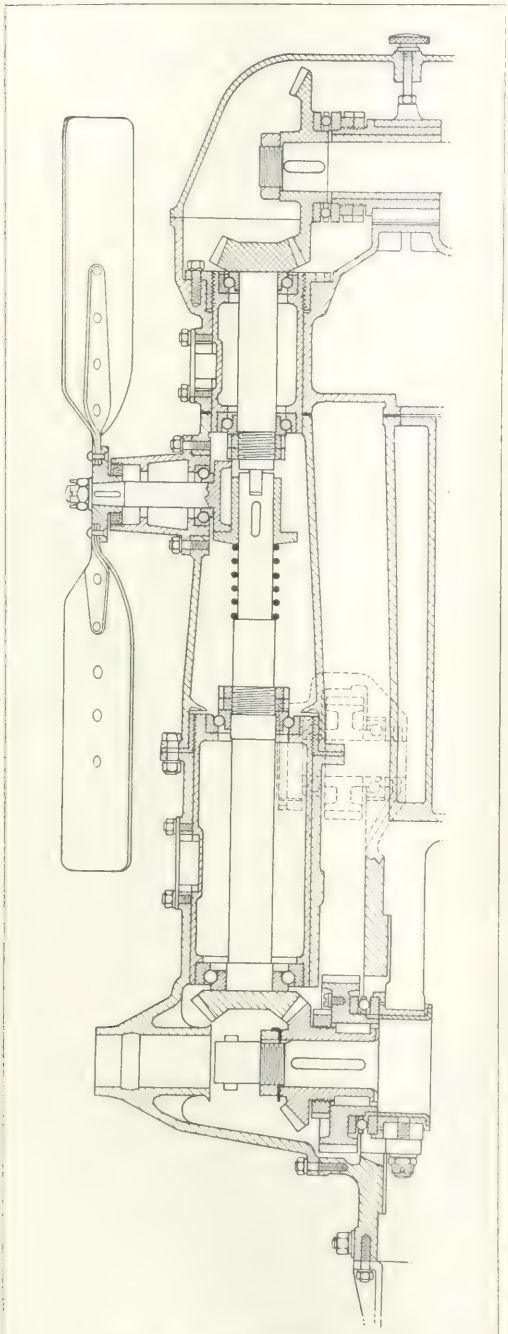
Peugeot has just put on the market its two-cylinder two-stroke crude oil engine for passenger vehicles built according to Tartrais patents. This engine has been in use for truck and stationary work for about a year with such results that Peugeot feels justified in offering it as a passenger car model. Probably its immediate application will be for colonial work, where it has the advantage of being able to consume any local liquid fuel.

There are no two-stroke engines for passenger car service. Air cooling has received no attention above 67 cu. in. and below this size the only example is a four cylinder S.A.R.A. with centrifugal blower.

Valve in head engines are one of the features of the show, there being 72 of this type, of which 34 have overhead camshafts and 38 have camshafts in the base chamber. Although the two types are almost equal numerically, all the tendency seems to be toward the location of the camshaft in the base chamber, as being a cheaper and more satisfactory type except where super efficiency is desired. Generally speaking, where new engines have been brought out they are of the type with camshaft in the base chamber, although there are exceptions, such as the new light six Ansaldo, a new 122-in. Ballot, a 122-in. six cylinder Omega, a high grade six-cylinder Excelsior and a six cylinder Mathis of 2.3 by 2.7 in. bore and stroke.

IN this article W. F. Bradley reviews the Paris automobile show. He describes in detail engineering features appearing for the first time at this exhibition and points out the trend in Continental design.

Continental engineers have concentrated their attention on securing mechanical efficiency and low operating costs and the author tells what steps have been taken to obtain these advantages.



Sectional view of Excelsior overhead camshaft drive. Spiral bevel gears are used

On the other side is a high grade six cylinder Fiat, which has its camshaft in the basechamber, camshaft drive by chain at the rear, a detachable head, pushrods and rocker arms. Another important example is De Dion Bouton which has changed from L-head type to overhead valves, with a detachable head, pushrods and rockers. On this model De Dion Bouton has forked end rocker arms with rollers in contact with the hardened caps on the end of the valve stems. Adjustment is at the opposite end where there is a ball headed pinch bolt received in the hollow end of the push rod. Oil running down the rocker arm collects in the socket. Two concentric coil springs are used for each valve. There are a few cases where this change has been made because of the manufacturing facility of a crankcase location compared with the overhead position. A six cylinder sporting type Delage is an example of this; one of the small De Dion Boutons, too, has been produced on these lines so that the same basechamber, camshaft and other parts could be used. In a few cases where new L-head engines have been produced the valves are inclined not only in relation to the cylinder barrel, but in relation to one another. The 11 hp. Delage is an example of this, and another of the same type is the new 12 hp. Hotchkiss.

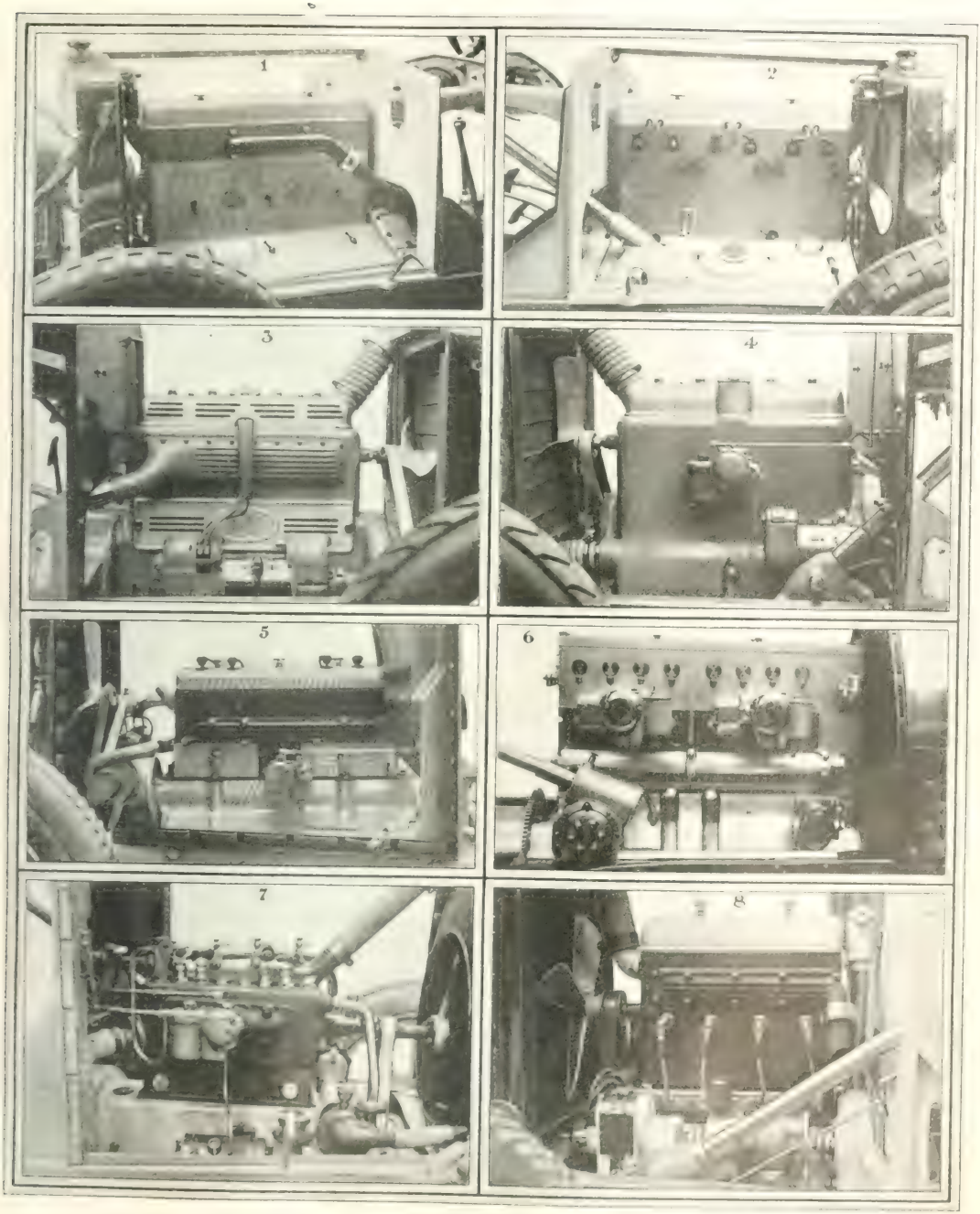
Use of Aluminum Pistons Increases

Aluminum pistons are used on 50.8 per cent of cars in the Paris show, and 49.2 per cent have either cast iron or steel pistons. Among the firms making use of iron pistons for their standard production are several who produce a modified type with aluminum pistons, an example being a sporting type Citroen, which is merely the normal car with lighter reciprocating parts, higher compression and special camshaft. Fiat adopts the same practice for its 10 hp. model, the normal car having iron pistons and the sporting models aluminum. This Italian firm, together with a few French makes, employs on certain models, aluminum pistons with a thin cast iron ring on the skirt, this ring alone bearing when the engine is cold and the whole length of the skirt when the aluminum has dilated. The feature of this development is that firms with a reputation for conservatism now announce a definite adoption of aluminum pistons in place of cast iron. These users comprise De Dion Bouton, Lancia, Panhard-Levassor, Unic and Voisin.

The latest development in pistons is the use of magnesium, which has a density of 1.75 compared with 2.5 for aluminum. Up to the present only three firms announce the use of this type of piston, and then only for sporting models. They are Voisin, Bignan, and Benjamin. The pistons are cast by the Montupet Co. according to the German process known as Elektron. Voisin and Bignan announce that results have been satisfactory and that cost alone prevents a more general use of magnesium pistons.

Cleaning Up Engines

The effort made to clean up still further the external lines of engines is a remarkable feature of this year's exhibits. Fiat has set an example in this respect on a new 3.3 by 5.9 in. six. Instead of a transverse shaft drive for magneto and water pump, the timing gear has been moved to the rear, and water pump, electric generator and magneto are in line on the left side of the engine between the crankcase hangers. A detachable aluminum plate covers up the whole of the space between the base of the cylinder casting and the frame member and gives a box like appearance to the engine. On the opposite side there is a similar arrangement for the carbureter and the steering gear, which are in the well formed by the



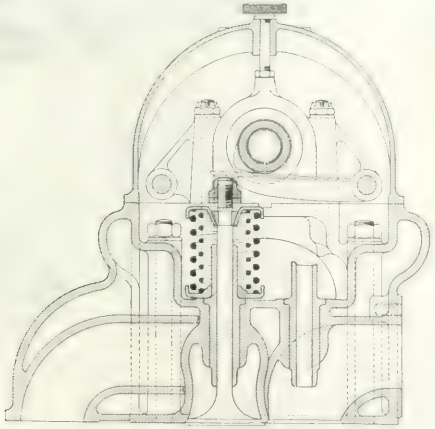
1—Fiat six-cylinder overhead valve engine, exhaust side. 2—Fiat engine, ignition side. 3—F. N. L-head engine with hinged cover over spark plugs. 4—F. N. engine showing oil filler on top. 5—Motorbloc engine with aluminum cover over spark plugs. 6—Bugatti eight-cylinder-in-line engine. 7—Delahaye engine with water jacket cover and inlet manifold in one casting. 8—Peugeot 11-hp. overhead valve engine

crankcase arms and enclosed by an aluminum cover with a wire gauze breather for the carbureter air intake.

Even on the cheap and moderate priced machines this practice can also be found to a certain extent, for if the design is laid out with this feature in view it adds little if anything to the cost. Among the many examples may be mentioned a new four cylinder Cottin-Desgouttes with battery ignition, the generator being mounted fore and aft between the crankcase hangers and covered by a sheet aluminum plate with an opening for the distributor and the wires.

As an example of how a normal L-head engine can be cleaned up no better example could be found than the new F.N. This engine has cylinders and crankcase in one casting with a straight ribbed exhaust manifold on the valve side, and above it a hinged cast aluminum cover enclosing the spark plugs and being symmetrical with the water outlet collector.

Another good example is a four cylinder Motobloc of the detachable L-head type which has a detachable aluminum cover over the engine head so as to enclose the plugs. On this engine the ignition wiring is external, for there is an extension from each plug passing through the aluminum cover, with a fibre bushing let into the holes to prevent short circuiting the current. The very general practice of internal intake manifold heated by the circulating water with a carbureter bolted up directly to the cylinder block tends towards clean external lines of engines. There are very few examples of direct use of the exhaust heat



Sectional view of Excelsior overhead valve gear

for the carbureter, and not many cases where the main air inlet is heated.

Hotchkiss shows an entirely new four cylinder model in which the intake manifold is immediately below the exhaust manifold and receives some heat from this latter, but before going into production it has been decided to change over the carbureter to the opposite side of the engine, with all the manifold going through the cylinder block. Note should be made of the practice on a certain number of cars of mounting the carbureter at the extremity of a straight intake manifold, instead of on the center.

The practice inaugurated by Hispano-Suiza of making the dashboard a close fit with the engine base chamber and the clutch housing and of fitting sheet aluminum extension pieces from the crankcase to beyond the edge of the frame members, and fastening the hold down to these plates has found a certain following. There is a good example on a 122 in. six-cylinder Omega, built by engineers who were formerly with the Hispano-Suiza Co.

The most general method of lubrication of the overhead valve gear is by means of a direct supply of oil under pressure through the hollow rocker arm shaft, usually without any direct feed to the ends of the rocker in contact with the valve stem and the push rods. Excelsior on a high-class type, with overhead camshaft, takes the oil supply under pressure through the hollow camshaft and provides an outlet through the face of each cam and the follower just before the cam begins to open the valve.

Positive Valve Operation

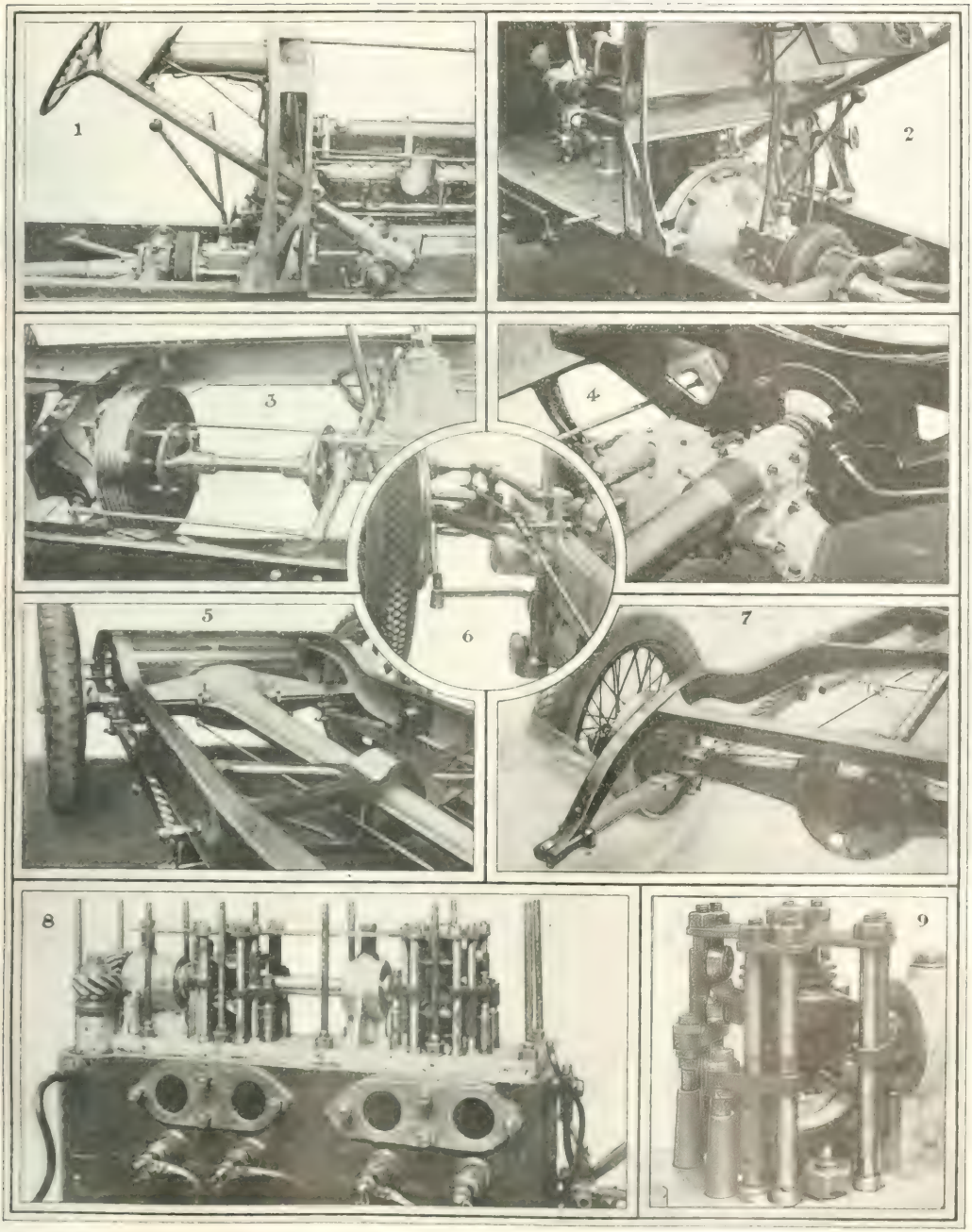
Probably the most original of the valve gears seen at the Paris show is the positive opening and closing type used on the Bignan cars. In this design the valves are mounted vertically in a detachable cylinder head and are spaced out in the form of a square. The cams, two for each group of four valves, are one above the other, mounted on a vertical shaft in the center of the square formed by the four valves. A horizontal shaft with bevel gearing drives the two cams in opposite directions.

The method of operating the valves is by means of a T-piece with a hollow stem, this latter having a couple of horizontal studs each receiving a conical roller. The cross member of the T-piece is drilled at each extremity, one of these holes receiving the end of the valve stem, which is locked to it by a nut above and below, and the other being a guide. The T member is mounted on a stud screwed into the cylinder head. There are two of these studs for each valve, one receiving the central stem of the T-piece and the other the cross member of the T. The eight studs are united at their upper ends by a flat start piece bolted on the top of the vertical shaft carrying the bevel gearing. As no springs at all are used, it is possible to make the reciprocating parts very light, the valve stems being much smaller in diameter than is usual for spring controlled valves. It has been found that with this mechanism it is necessary to leave a certain amount of play between cam and rollers, for if the adjustment is so close that the valve is brought positively down onto its seat the stem breaks after running a short time. Others have attempted to overcome this difficulty by interposing a light coil spring for the final closing, but the Bignan engineers declare that they get very satisfactory results by leaving a small amount of play between the cam and the rollers, the inertia of the valve being sufficient to assure its final seating. When turned over slowly by hand there is a decided lack of compression, but when the engine is turned fast by hand full compression is secured. This engine has been run satisfactorily at more than 5000 r.p.m.

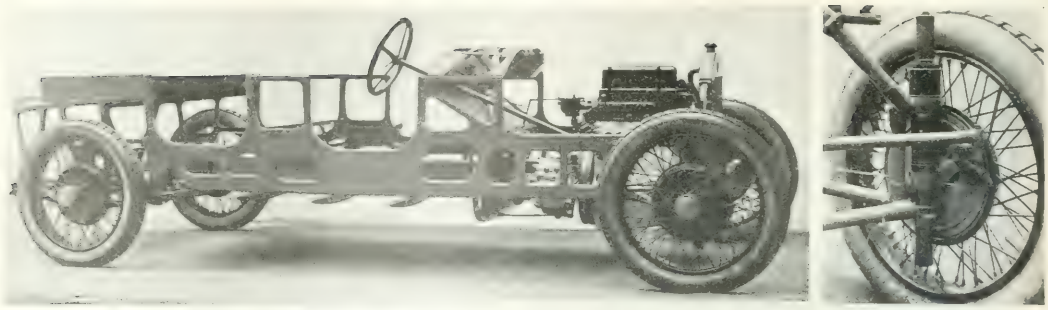
Benjamin Overhead Valve Gear

Another unusual type of overhead valve gear is that used on the Benjamin cars. A vertical shaft going through the cylinder block between the second and third cylinders drives by means of bevel gearing a horizontal shaft carried in two bearings on the top of the cylinder head. This lay shaft drives the camshaft through spur gears, and the valves are opened by means of single arm rockers between the cams and the valve stems. On this engine the water pump is mounted on the front end of the detachable cylinder head and is driven by an intermediate pinion from the camshaft. There is no general type of drive for overhead camshafts. Delaunay-Belleville uses straight bevel; Excelsior has spiral bevel gears; Bignan uses helical gears, and on the small Majola there is a silent chain drive from crankshaft to camshaft.

Three point and four point attachment of engine to frame members are about equally represented. Fiat, on



1—Omega 122 cu. in. light six, showing central portion of chassis. 2—Omega light six showing rear view of forward part of chassis. 3—Hallot type servo brake on Chenard-Walcker. 4—Servo brake mechanism used on the Renault alpine bus. 5—Fiat six-cylinder car, showing cantilever rear suspension. 6—Bignan hydraulic and coil front suspension. 7—Salmson rear suspension consisting of two independent quarter elliptic springs. 8—Bignan positive overhead valve gear. 9—Bignan overhead valve gear with positive opening and closing. The two cams shown operate four valves



The frameless Lancia. Body is designed to fulfill the functions of the frame members. A combination of hydraulic and coil spring serves for front suspension

the new six, has made use of the engine base chamber to stiffen the frame and has eliminated the front cross member. The radiator is mounted directly on the engine base chamber, quite independent of the frame. On the new Omega Six an elastic three point attachment of a rather unusual type is to be found. To left and right of the rear end of the engine are a couple of big diameter steel tubes bolted to the crankcase by flanges. These tubes are received in rubber lined trunnions in the frame members. At the front end of the group there is another trunnion attachment to a very heavy cross frame member.

Unit construction of engine and gear box is now found on 85 per cent of Continental cars. The only maker of importance who adheres to separate construction of these units for all his cars is Renault. Plate clutches are now the most numerous, followed by multiple discs, with cone clutches a poor third. Ferodo and similar linings are being used extensively in place of leather on cone clutches.

While there is an increased use of fabric universal joints, generally combined with open propeller shaft and Hotchkiss drive, on the majority of Continental cars the drive and torque are not transmitted through the springs. An enclosed propeller shaft with a sphere on its forward end received in a corresponding housing on the rear face of the gearbox is the most generally adopted practice. An interesting modification of this system is found on the new Omega, where the ball head on the propeller shaft housing is received in a heavy tubular cross member with diagonal stays to the frame members, just back of the gearbox. This design permits the use of a brake drum back of the gear box.

Four Wheel Brakes Common

Last year four wheel brakes on big cars were a feature of the Paris show. This year the outstanding feature is the use of brakes on all wheels for cars of all sizes, and by makers with a reputation for conservatism. Notable examples are Delauney-Belleville, Renault, Panhard, Unic, and De Dion-Bouton. Perrot type brakes are the most extensively used, these having been adopted by 35 Continental makers. Other well known systems are the Adex, designed by the chief engineer of the Belgian Excelsior Co., and the Isotta-Fraschini type found on this make of machine and on a number of Italian makes. In addition to these there are probably a score of individual systems, comprising a few of the hydraulic type.

Generally speaking, the tendency for the leading makers is to adopt a well-tried system rather than to experiment with their own designs. This was done by De Dion-Bouton who, after carrying out some experiments according to their own designs, took up the Perrot system and got satisfactory results on the first application. Other similar cases are Renault and Peugeot, both of which firms experimented with their own designs and finally adopted the Perrot.

The Voisin company first used front wheel brakes on competition cars and purchased all the parts from another firm which was working under a Perrot license. This company has now fitted all its cars, including a small model with 10 hp. sleeve valve engine, with the Perrot type front brakes built in its own shops.

Variation in Brake Details

This tendency to build under license brings about a general uniformity in design, but leaves room for plenty of original detail work. There is a neat arrangement on the new De Dion-Boutons. Instead of direct connection by one rod or cable from the lever on the front brake camshaft to a second lever mounted on a shaft carried in or on the gearbox, which arrangement gives a very long rod requiring a central support, De Dion-Bouton connects from the first lever to a second one on a shaft coming through the frame a short distance back of the radiator. Ball and socket connections are used for this short connecting rod. The cross shaft under the hood carries a couple of levers with equalizing gear, and single rod connection from this to the lever on the main shaft. For the rear brakes there is a single rod carried directly under the propeller shaft housing. The rear wheel brake camshafts are extended right across the axle and have their levers close up to the differential housing. In this connection should be mentioned the Lancia practice of mounting the brake camshaft on ball bearings to avoid the necessity of lubrication, for this is one of the most neglected parts of a car.

Fiat has applied front wheel brakes for the first time to a stock car on a new six-cylinder model known as Type 519. The design is of the Isotta-Fraschini type, with the brake camshafts carried in the axle, the cam being in the lowest part of the brake drum. The influence of racing is seen in this design, for the axle is half moon shape between the spring seats and of circular section from the spring to the steering head. On the racing cars the axle was circular section throughout, bored out for lightness. With this design an axle is secured capable of resisting the torsional stresses of front brakes, and the concave portion of the axle provides a housing for the brake camshafts.

Where front wheel brakes are used they are invariably of the internal expanding type and are nearly always applied by foot simultaneously with the brakes on the rear wheels. In most cases the transmission brake is aban-

doned, or if retained it becomes an emergency brake, hand operated, used to hold the car in a standing position. To comply with the law which requires two independent sets of brakes there is a separate control by hand for the rear wheel brakes only. There is a tendency, however, to remove all brakes from the rear wheels and to fit transmission and front wheel brakes operated simultaneously by pedal. This has been tried out on several competition cars during the past season and is now fitted as standard by Chenard-Walcker and Bignan. The Rolland-Pilain Co. has also used this system for competition cars. On the Chenard-Walcker the engine and gearbox are a unit construction. The spherical ended propeller shaft housing is carried in a heavy cross frame member, and immediately in front of this is the brake drum and Hallot servo mechanism. Connection between the drum and the gearbox is made by an open shaft with a couple of fabric universals.

New Types of Servo Brake Mechanism

In addition to the Hispano-Suiza, mounting the first servo brake on a standard car, there are now several other devices of this nature. On the new six-cylinder Fiat the servo-mechanism is of the hydraulic type housed in the base of the gearbox and making use of the gearbox lubricant. Should the gears be left dry, the brakes are applied directly through the levers and rods. Renault has applied a friction type servo-mechanism to a pneumatic tired bus designed for service in the French Alps.

On the 12 hp. De Dion-Bouton a simple type of servo-mechanism originally applied to Farman cars is made use of. The two internal brake shoes are forked one to the other and form a continuous band. The brake cam comes in contact with the extremity of one shoe only, the other end being a fixed point. The first shoe, when brought in contact with the revolving drum, is carried forward by it and pushes the second shoe into contact. A somewhat similar system, but with a wedge instead of a cam, is made use of on the new model Sizaire-Berwick.

While a lot of work has been done on suspension, there is no dominant line of development. The most important convert to the cantilever is Renault, who uses this type of spring for all his models above 12 hp. and mounts the pair diagonally, the forward ends being brought as close as possible to the center line of the chassis. On the smaller and cheaper models Renault uses a transverse spring of the Ford type. Quarter elliptic springs are confined to very small cars, and even in this class there is a tendency to use half elliptic at the front.

Fiat Cantilever Suspension

Fiat has brought out a new type of cantilever originally seen on an experimental Lancia, but which was never marketed. The long cantilever is mounted directly under the frame member and is shackled below the axle housing. The second leaf of this spring is extended rearwards through the branches of the shackle to the rear end of the frame, to which it is shackled. It is claimed that this extension leaf eliminates all tendency for the rear end of the car to roll at high speeds, which is one of the main objections raised on the Continent against the cantilever.

Last year Unic produced a double cantilever, one being above and the other below the axle. On a new 10 hp. model use is made of a full cantilever secured above the axle and of a three-leaf quarter-elliptic, the leaves of which are of uniform thickness, attached below the axle housing. On a new light weight 10 hp. Salmson quarter elliptic rear springs are used, with the ends of the two main leaves secured between a couple of semi-circular blocks on the front of the axle housing. From the rear of the axle to the extremity of the frame member a flat four-leaf quarter elliptic is used, its rear extremity being rigidly bolted to the frame, and the front end received, as in the case of the main spring, between semi-circular rollers.

De Ram Hydraulic and Coil Spring

Bignan has adopted the De Ram system, which is a combination of both the hydraulic and coil springs, and is used both front and rear. Another suspension of the same general class is to be found on the original frameless car produced by the Lancia company. Oilless bushings for shackle bolts have not caught on. The Alemite system of lubrication, which has been incorporated with another American system and is marketed in France under the name Tecalemite, is found on a very large majority of cars in the Grand Palais. On a new high-grade 22 hp. car Berliet has screw-down greasers of nearly 2 in. diameter, but which are not at all clumsy, for they are symmetrical with the spring eye or with the shackle, and at first sight appear to be an extension of these parts.

There is a remarkable increase in the number of pressed steel welded rear axle housings, this type being found on 65 to 70 per cent of Continental cars at the present time. The only change with regard to final drive is a still further increase in the use of spiral bevel gears.

Simplification of Design Neglected

While there has been a decided improvement in the general quality of automobiles as represented by the Paris Salon, there has been comparatively little attempt to reduce initial cost by simplified design from a production standpoint. Lorraine-Dietrich has given this matter attention in a light six and in a four of the same bore and stroke which now supplements it, and big production has been considered in laying out the Citroen and the Berliet. Generally, however, Continental engineers have been much more concerned in seeking mechanical efficiency and low operating costs than in reducing production costs. Fuel economy has been sought in the design of small, high efficiency overhead valve engines running at comparatively high speeds. An important number of the engines put on the market this year reach the peak of their power at 2700 to 3000 r.p.m.

The most important development in the class of car with an engine of less than 67 cu. in. is the appearance of the new Renault. This has four 2.28 x 3.54 in. cylinders and a wheelbase of 96 in. It is produced both as a two and a three-seater, and follows the same general lines of construction as the big production 12 hp. Renault. The only change of any importance is the adoption of a detachable in place of a fixed cylinder head. Citroen, who makes a similar car, claims that his production of this small model is 75 a day, and that his total output is 125 cars a day.

While the Paris show was in progress Citroen made demonstrations of his rubber creeper band machine for passenger service in the city. With the normal 10 hp. engine as used on his stock car, the rubber creeper band machines carried eight passengers, and were capable of maintaining the same average speed under city traffic conditions as pneumatic tired passenger cars.

REPORTS received by the Automotive Division of the Department of Commerce from Assistant Trade Commissioner William H. Park, at London, shows that the British motor production continues on a restricted scale. The foreign trade of the British manufacturers is falling off and the importation of American cars continues to increase.

New 20 H.P. Rolls Royce Has Overhead Valves and Unit Powerplant

Design differs widely from old 40-50 h.p. chassis. New model has block cylinders with detachable head, battery ignition, cooling control, and semi-elliptic springs. Marks departure from one-model policy adhered to for past fifteen years.

By M. W. Bourdon

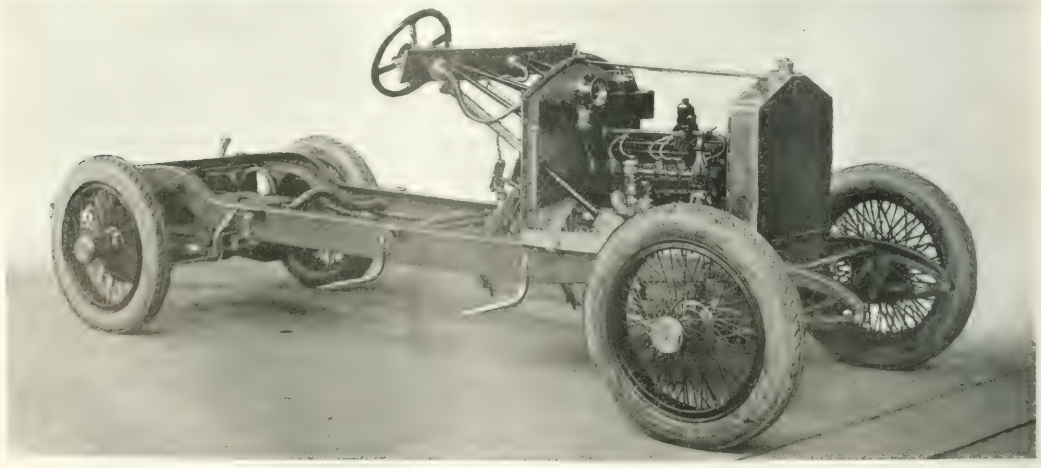
THE introduction of a supplementary and smaller model by the Rolls Royce Company in England is the outstanding item of interest concerning British manufacturers' plans for 1923. It represents a departure from a one-model policy maintained for fifteen years past, and has obviously been brought about by the increased competition in the luxury car field coupled with the limited demand. The new model will not be manufactured in the American plant.

The new chassis has not, however, been rushed in the designing or experimental departments, for it has been an open secret for more than twelve months that several smaller Rolls Royce chassis were under test. The only surprise accompanying the introduction of this new model relates to the dimensions of the six-cylinder engine, for it was generally believed that these would be 3½ x 4½ in., whereas the bore and stroke of the type selected for production are 3 x 4½, giving a piston displacement of but 190 cu. in., with a speed range up to 3000 r.p.m.

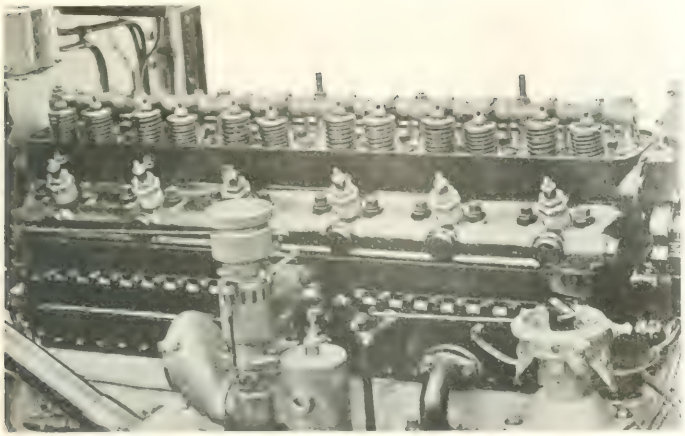
The first outstanding difference between the new engine and the existing model is the use of overhead valves; with heads of high-chrome steel. These have push-rod operation and there is nothing remarkable in the rocker design or mounting excepting that the valve clearance adjustment is at the top end of the cam followers, the push-rods being solid and located in the cupped extremities of the followers and rockers. The camshaft drive from skew gearing is transmitted through a series of sixteen helical compression springs forming buffers between the gear wheel and the shaft, with an opposed series of springs to dampen out the reaction of the main springs.

The use of a single block casting for the cylinders is another new feature for Rolls Royce, as is also a detachable one-piece cylinder head. The head is held to the block by 36 studs and nuts, the majority of these studs passing down through the block casting into the top of the aluminum crankcase, thus holding the three units together. Both head and cylinder block are of cast iron.

The crankcase is in two parts, the lower half forming the oil pump only, the upper carrying the crankshaft in seven journal bearings. The crankshaft is machined all over, and both pins and journals are bored for weight re-



Three-quarter right side view of new Rolls Royce chassis. Radiator shutters are standard though not in position in this view



Right side of engine, showing carbureter, distributor with top half removed, overhead valves, spark plug location and water jacket plates on side of cylinder block

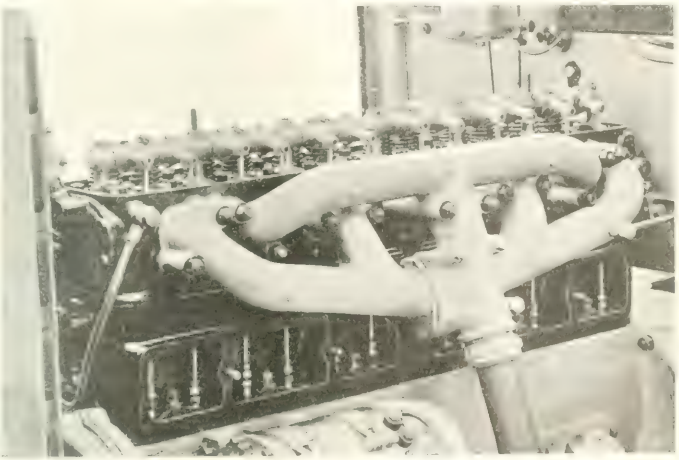
wheel controls only the first 35 deg. of advance and from that point a governor in the distributor casing takes care of the remaining 35 deg.

The carbureter also is exclusive to Rolls Royce as is that on the large model. It has two jets with dash control and an automatic air valve with a dashpot. The primary air supply is taken directly from the crankcase, thus eliminating a breather pipe and, it is claimed, preventing the smell of hot oil from reaching the passengers. For starting from cold there is what is to all intents a separate carbureter brought into or taken out of use by means of a control on the instrument board.

The carbureter is on the right of the engine, its outlet pipe leading to a transverse passage in the cylinder block; on the left of the latter the induction and exhaust manifolds are separately cast but the center of the induction branch is in firm contact with the centre of the exhaust, the latter being flanged out at this point and the two united by a wide saddle. It is not intended that the two manifolds should be separated when they have been once assembled. The fresh mixture issuing from the transverse passage comes into contact with a hot-spot where it must take a right angle path before being carried to the inlet ports by way of the four-branched manifold. The exhaust manifold is a three-branch unit with a central down-take to the exhaust pipe and muffler.

duction and to form oil passages. The connecting rods are of H-section, while the aluminum pistons are of the straight-side split-skirt type fitted with three compression rings in the crown, one used as a scraper and an expansion ring within the skirt.

Pressure lubrication is employed throughout. The gear type pump delivers oil to the three main journals of the crankshaft (center and each end) and thence through the hollow shaft to the other four subsidiary journals, the big-ends and the wrist pins. A lead, partly exterior and partly formed with the cylinder and head castings, runs to the front end of the hollow rocker shaft, oil under reduced pressure thus reaching the pivot bearings and, through the holes in the rockers, the sockets in the latter for the push-rods. The overhead valve gear is located within a tray integral with the top of the head casting and surplus oil drains back through the push-rod passages to the crank case. The detachable top cover of this valve tray carries the coil of the battery ignition system, so that to expose the rockers necessitates bringing away the cover with the high tension wires and the top half of the distributor.



Left side of engine with valve cover and plates enclosing lower end of push rods removed. Note that the manifolds are locked together in such a way as to provide hot spot

Although the battery system of ignition is at present standard, provision is made, by a facing on the crankcase, for fitting a magneto bracket with a tandem drive from the rear end of the generator, the latter being on the left of the crankcase with a direct drive from the distribution gearing. The starting motor is also on the left, low down and pilotted into the flywheel casing for a Bendix drive. The switch is operated by pedal and has a dash-pot control.

The whole of the electric equipment except the battery is of Rolls Royce design and manufacture, the wiring of the lamps being on the single wire system with a 12-volt circuit. A point to be noted in regard to the ignition is the semi-automatic timing advance. The lever over the

A feature of the large Rolls Royce has always been the provision of a throttle governor, the lever over the steering wheel controlling this unit, while the accelerator pedal acts directly upon the throttle. But in the 20-hp. model the governor is omitted, the lever and pedal both acting directly.

Vacuum fuel feed has been adopted, the vacuum tank on the inner face of the dashboard being of much larger



Rear end of new Rolls-Royce chassis showing the semi-elliptic springs

capacity than the normal, so providing a half gallon or so of fuel in reserve. The fuel tank is carried at the rear end of the chassis, is of 14 (Imperial) gallon capacity and has a dial gage alongside the filling spout.

Water circulation is by pump located on the right of the engine and driven from the distribution gearing through a flexible disk coupling. The pump delivers through a short elbow directly into the bottom of the cylinder jacket, while the only outlet to the radiator is at the front end of the head. The radiator is of the cellular pattern. The belt driven fan is eccentrically mounted for belt adjustment. Radiator shutters are standard, the control of these at present being by hand from the driving seat, but thermostatic control may be fitted later on. From the rear end of the cylinder head jacket a small pipe leads to a dial thermometer on the instrument board.

The suspension of the power unit is on the three-point system, but distinctive in detail. Through the rear end of the crankcase casting passes a tubular cross member, with lugs at each end having a horizontal bearing on short frame brackets. At the front the crankcase is clipped at two points on each side to a U-shaped tubular member which is supported at its front extremity by a trunnion bearing on the cross member of the frame located below the radiator. The enclosed clutch pit and three-speed gearset overhang toward the rear without direct support from the frame.

Single Dry Plate Clutch

Entirely enclosed and having merely a circular inspection hole cover in its bell-housing, the clutch is of the single dry plate type, an innovation for Rolls Royce, who have hitherto employed the cone type. There are eight non-adjustable springs and four pivotted operating levers; a plain pilot bearing with provision for hand oiling is used.

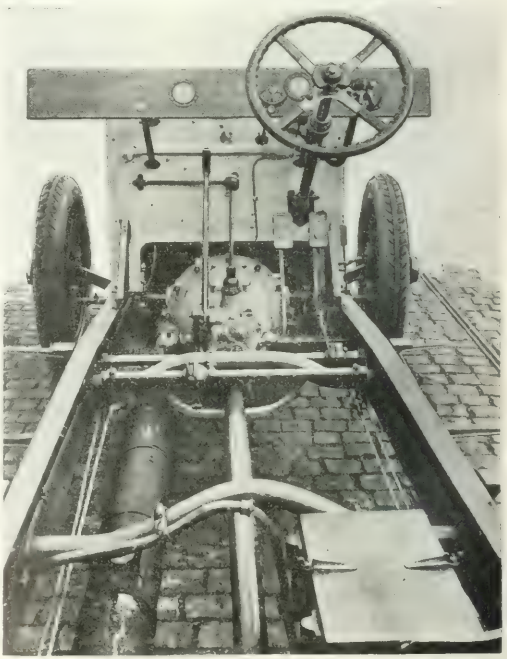
The three-speed gearset is very compact, despite the fact that the countershaft and the driven shaft have three bearings each, the third bearing of the latter shaft almost entirely relieving the pilot bearing of its usual function. The control lever is central and the brake lever, on the left side has an inverted ratchet quadrant. The constant mesh gears are of the helical type. The bearings are of the ball type, excepting the plain pilot, and a speedometer drive is provided. An open tubular 2½-in. diam. propeller shaft, has enclosed cross pin universals. The final drive is by spiral bevel gears (ratio 4.6 to 1 or 4.4 to 1) the pinion having an outboard bearing besides two on its main shaft. The differential is of the bevel type. The housing of the full floating axle consists of two aluminum center castings bolted together at a joint in a vertical plane, with flanged and tapered steel tubular extensions and a truss rod below. Ball bearings are used throughout.

Both sets of brake shoes expand within the rear wheel drums; they lie side by side, have fabric facings and are enclosed. Bevel gear equalizers are fitted on the cross shafts just behind the gearset and from the levers on each of these shafts steel cables take the place of rods. The brake camshafts are behind the axle at the same height from the ground, and a triangular double-plate bracket is therefore welded to the axle casing at each side to carry, at the front, a pair of intermediary levers, to which the cables are attached at the top with coupling rods lower down to act upon the camshaft levers.

Semi-elliptic springs with solid ends are used at front and rear. They are encased in leather gaiters and fitted with frictional dampers, the rear set of the latter having a two-stage effect increasing with spring deflection. The rear springs are underslung, take both torque and drive and are 54 in. in length. Both back and front springs are attached to the axle by means of bolts and a steel sheath which engages with keys formed on the axle, thus transmitting end shocks from the axle to the upper leaf without stressing or tending to shear the central leaf-locating bolt.

Worm and Nut Steering Gear

The steering equipment resembles that of the 40-50 hp. model, being of the worm and nut pattern with ball bearings and means for adjustment of the column. Spherical joints are used for the drag-link and cross-coupling rod, while the swivel axle pivots are inclined to bring their center lines to the ground contact of the tires. An H-section forging forms the front axle. Dunlop triple-spoked wire wheels with straight side rims for 32 x 4½ in. tires are used, for although rims for clincher edge tires are optional, the straight-side type is recommended.



Center of chassis, showing the two tubular cranked cross-members, also brake cross shafts with bevel gear equalizers, the clutch casing and gearset

There is nothing elaborate about the dash and instrument boards. The former is a plain aluminum plate with tubular steel brackets bolted to it to carry the instrument board. The latter is of wood or aluminum, as desired, and carries the usual instruments and controls plus the special ones already mentioned. Chassis lubrication throughout is by nipples and high pressure grease gun.

The frame side members are 6 in. deep between the inner ends of the springs, and 2½ in. wide. They have a kick-up over the rear axle and are slightly inset at the front. There are only two channel section cross members, the remainder—five in number—being tubular. One of the latter is located in front of the radiator line to stiffen the front horns and carry the front bearing of the starting crank.

The construction of the chassis parts is of the same grade which has characterized Rolls Royce cars in the past. The engine as a whole is obviously an expensive job, but in most other parts of the chassis there is nothing very costly about the design, though expense is not spared to provide an excellent finish. The price asked for the chassis (£1100) is not remarkable as compared to the larger model at £1850, though it is admittedly a high price when the engine dimensions and bare specifications alone are considered.

This model is intended for open and closed bodies seating up to six people. The chassis weight is 2020 lb. Some of the important dimensions are as follows:

Wheelbase	129 in.
Track	54 in.
Length of frame behind dash	99 in.
Length of frame to center of back axle	90 in.
Length overall	178 in.
Minimum ground clearance	11 in.

New Bus and Speed Truck Axle

A 1-TON speed truck and motor bus axle has been brought out by the Flint Motor Axle Co. It is of the spiral bevel gear type and the pinion shaft is supported by ball bearings on both sides of the pinion, which provides a more rigid support and tends to insure true pitch line contact.

The center housing is made of malleable iron, cast in one piece. The hole for the axle tubes is bored to the same diameter as that required for the bearings on the sides of the differential. This tends toward economy in operation, and it is claimed that the malleable casting permits of lower priced manufacture than the pressed steel housing construction or the usual method of building up axle housings.

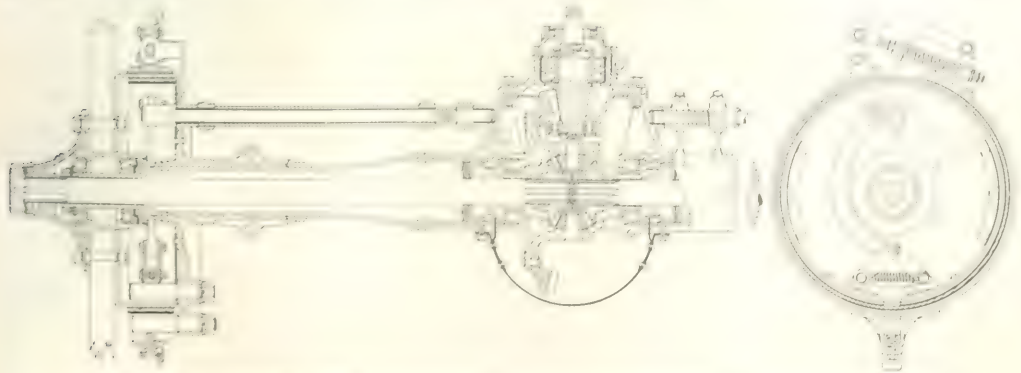
On the two main shafts there are six roller bearings, all of the same size, and the shaft is splined on both ends, the hub having a pressed fit and the side gear and differential a sliding fit on the splines. The main tubes are made of 30-40 point carbon steel and of large diameter. The tube tapers down to 3 in. diameter at the spring support.

The axle main shafts are 1½ in. in diameter and of S. A. E. No. 3135 steel. This axle is designed to carry a maximum of 4000 lb. live and dead load. The corresponding front axle has a load carrying capacity of 1400 or 2200 lb. The loads mentioned are those for which the axles are guaranteed, and in the design factors of safety of from 6 to 9 are claimed to have been incorporated. The axle, which is of the floating type, can be furnished with gear ratios of 4.9, 4.4, 5.2 and 5.5 to 1. It can be furnished with torque arm or as a Hotchkiss drive type.

A POTENTIAL fertile market for automobile export business in Indo-China is reported to the automotive division of the Department of Commerce by the Department's Trade Commissioner in that country. He says:

"The country, which is flat and covered with an excellent system of 19,000 kilometers of macadamized and graded roads, assures a brilliant future for the automobile. Already motor, passenger and freight services are spreading and the lack of railroad transportation is favorable to the establishment of new lines."

Several factors, however, are handicaps under which the American exporter must compete, chiefly against the French. "First of these is the question of credit, local agents not being required by the European manufacturers to pay for his shipment until the arrival at destination; second, gasoline retails at about 70 cents gold per gallon, and the American cars consume from 50 to 100 per cent more than the French cars in Indo-China; and third, slow delivery, compared with European delivery," the report states.



Sectional views of Flint bus and speed truck axle, of the spiral bevel gear type. Center housing is of malleable iron cast in one piece

Points to Remember in Designing Oil and Fuel Filters

Ready means for cleaning out sediment of great importance. Upward flow through horizontal screen at slow rate tends to prevent clogging and allows foreign matter to settle. Sediment bowl should be large and of such shape as not to be broken by the freezing of water which collects in it.

By J. B. Ferguson

AN ideal passenger car should run for 50,000 to 100,000 miles not only without stopping except at the will of the operator, but also without requiring overhauling or any mechanical attention beyond such items as grinding the valves, removing carbon, adjusting and relining brakes. It is easy enough to attain this perfection as far as the strictly mechanical units are concerned, but there are some weak spots still to be improved. Fuel and oil supplies must be fully maintained without any interruption and ignition must not fail.

The fuel and oil systems present a common problem in that the reliability of both depends upon the removal of foreign matter from the liquids used in them. Arrangements for drawing off this foreign matter before the sediment chambers fill up should not be left to chance.

These statements are not nearly so obvious as they sound. In numerous engines the screening arrangements used for separating out sediment are not adequate and in practically all engines the cleaning of the strainer and the emptying of the sediment chamber are totally neglected until it is time for the bearings to be taken up and even then it may not be done. Often foreign matter is not removed and the screens are not cleaned until lubrication fails. This frequently happens before it is necessary to take up the bearings.

The need for good filtration is perhaps more important in the case of the fuel system. Good atomization and economy are often dependent upon the use of fine jets, but minimum jet size is limited in part by the fact that there is often dirt in the gasoline. This dirt consists of scale from the inside of the tank, lint and rubber from the inside of the filler hose, dust from the road which enters the tank when the cap is off or being replaced. On most cars it is only a question of time until some part of the fuel system clogs up and the engine balks.

Many cars are fitted with no less than three and sometimes four strainers between the main tank and the carbureter. There is often a screen in the main tank, one in the vacuum tank and a third in the bottom of the carbureter, while if a filter is installed in the feed line its screen makes a fourth. These are often so small and inaccessible as to be worse than useless.

In studying this problem various types of filters were tried. It was not hard to find a filter that would work well for 5000 or 10,000 miles, but no filter was discovered which was invariably good for the life of the car. A filter which fails before the car is worn out is sometimes little better, and perhaps worse, than no filter. The object in installing a filter is to prevent stoppage of the flow of fuel. Therefore if the filter fills with sediment and thus clogs the line it is as bad as no filter. Likewise if the screen is too coarse or the filter material corrodes or rots, it is no filter.

It has been found that there are at least fifteen different conditions which a gasoline filter must meet to be entirely satisfactory. With one or two exceptions the same points apply to the lubrication system.

1—Above all, some means must be used to draw the sediment off so frequently that the sediment chamber will never become full. One of the simplest ways of doing this with a gasoline filter is to locate it within easy reach when the hood is open so that whenever gasoline is wanted for washing or other purpose it is logical for the driver to open the cock on the sediment chamber.

TOO little attention has been given in the past to the fundamentals which underlie the logical design of filtering systems. These fundamentals are here clearly stated and illustrations of their practical application are given.

The need for filtering fuel and oil is quite generally recognized, but the methods followed are often crude and correspondingly ineffective. Frequently there is inadequate means for collecting sediment, while provision for removing the foreign matter which accumulates in the screen and the settling chamber is usually lacking entirely or is so inaccessible as to be seldom given attention.

The remedy for this condition suggested in this article is worthy of careful consideration.



Fig. 1—Diagram of one common type of oil filter which becomes easily clogged with foreign matter and is relatively inaccessible for cleaning.

Inasmuch as there are some drivers who never use gasoline for any purpose, instructions for draining the filter should be placed on it in large, easily read letters. The draining of sediment from the engine base is frequently of equal importance.

Foreign matter, which is lighter than the fuel, can only be removed from the vicinity of the screen by draining, and matter which is heavier than the fuel should be drawn off before there is too large an accumulation. The success of the fuel filter depends entirely upon its being in such an accessible position that there is some inducement to drain it.

2—Straining should be in an upward direction. This is fundamental if the straining material is to be self-cleaning, and the filter must be considered of doubtful value unless it is self-cleaning. When straining is in an upward direction dirt which lodges on the screen is shaken loose and falls by gravity. On the other hand, if straining is downward, gravity and vibration combine to wedge the foreign matter into the mesh openings. Theoretically a vertical screen is neither self-cleaning nor self-clogging, but actually dirt lodges in it almost as rapidly as the down flow screen.

3—Flow through the screen must not be too rapid, otherwise particles of foreign matter will become wedged in the screen openings whether the flow is upward or not.

In considering gasoline strainers, many are of the impression that a large screen area is not required if the strainer is fitted on the supply pipe to the vacuum tank, for the reason that the return through the strainer of a small quantity of fuel each time that the vacuum tank releases helps to clean it. While this is true, it is largely counteracted by the velocity through the screen being so much higher when the vacuum tank is drawing fuel from the main tank. For this reason a straining screen in the position employed in most vacuum tanks is only a source of annoyance unless the mesh is so course that it is of no value as a strainer, which is frequently the case.

Provision for Collecting Sediment

4—There must be a space for settling of foreign matter below the straining surface.

5—The foreign matter must be brought to one point for draining, otherwise it cannot be removed unless the apparatus is taken apart for cleaning.

6—It should not be necessary to dismantle the mechanism in order to clean it thoroughly. If the straining area is too small the apparatus must be taken apart for cleaning. Frequently small particles of foreign matter become firmly imbedded in the screen so that in reassembly there is the chance that some of it will be found on the outlet side. Furthermore, anything that takes time and must be done periodically is usually forgotten and there is always the possibility of leakage when the joints are reassembled.

7—The filter should have no open joints of any sort. Experience proves that joints which open by unscrewing, etc., will leak in the course of time.

8—There should be only one straining screen. Two or more layers are satisfactory as far as straining is concerned, but when this construction is employed one of the two will not be self-cleaning.

9—All materials used in the filter should be able to stand up indefinitely without corroding. This requirement applies particularly to the straining screen and more especially when the car is out of service for extended periods. It is when the car is laid up that many otherwise excellent materials rust out.

10—The straining material must be metallic. Other materials have been found quite unsatisfactory over long periods when subjected to all the conditions necessary.

11—The shape of the sediment bowl must be such that water freezing in it will not cause trouble either by clogging the system or cracking the bowl. This consideration, of course, applies just as much to the filter in the crankcase as it does to the one for the fuel.

Water in the fuel line is a well known source of trouble and the object should be to bring it to the filter rather than to keep it in the main tank where it will accumulate. Consequently there should not be any U-bends or loops in the line since water sometimes freezes at the lower side of these and causes a most perplexing fuel stoppage.

12—All required instructions for successful operation of the filter should be clearly printed on it. This requirement is a good one to stipulate in the design of any piece of machinery.

13—The device should be light and compact.

14—Its cost of manufacture should be low.

15—Its cost of installation should be low.

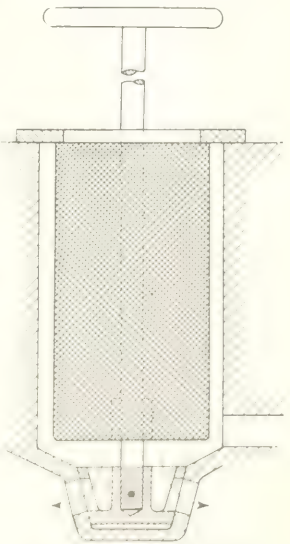


Fig. 2—Diagram of a vertical cylindrical filter, with sediment trap and drain valve below.

In applying these principles to the design of an oil filter it was found that at least 95 per cent of engine oil filter screens have too small an area, while the majority have no means whatever for removing the foreign matter refused by the strainer.

The writer knows of a car with an 18 hp. Knight engine which ran for years without a moment's trouble, and then one day it froze, due to lack of oil. When the engine was taken down it was found that the oil sediment in the crankcase had become so congealed to a depth of about 2 in. that all oil passages had become clogged. Had the engine been less carefully constructed, its bearings would have required attention more frequently, and the accident would never have occurred.

Strainers with insufficient areas, or ones through which the liquid passes in the wrong direction, especially, should

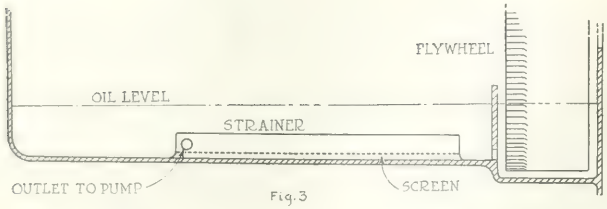


Fig. 3

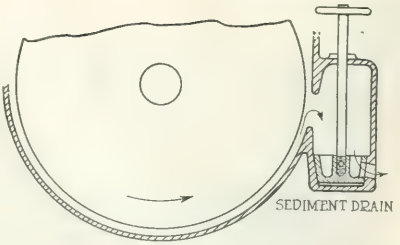


Fig. 4

Fig. 3—Diagram of a self-cleaning oil filter. The oil rises through the wire screen which closes the bottom of the inverted box. Sediment runs through the small hole into the flywheel compartment. Fig. 4—Section through flywheel compartment of the system shown in Fig. 3. The oil (and sediment) is thrown by the flywheel into the settling chamber at the right and overflows back to the sump. The sediment is easily drained off by simply turning the valve handle which can be easily reached without getting under the car

be made easy of access for cleaning. Fig. 1 shows a popular type of strainer, though one not to be recommended since the grit from the cylinders falls upon it, making frequent cleansing necessary. Ordinarily this involves the removal of the bottom half of the crankcase, although in the case of the Vauxhall car, the screen can be drawn out from the front of the engine without detaching the bottom half.

The circular, or tubular type of strainer has become very popular in recent years when placed in a vertical position, it has the advantage of being easily removed for cleaning. If it has a suitable drain valve at the bottom, for drawing off sediment and dirty oil refused by the strainer, it works reasonably well provided its area is sufficient. Fig. 2 shows such a strainer.

Where to Strain Oil

The question as to whether the straining should be done before the oil reaches the pump, or afterward, is a point of contention with many designers. The writer holds that this point can be settled by one argument which a majority of engineers have overlooked. That is—the strainer should be located so that the velocity of liquid through it will be lowest. If the strainer is placed on the inlet side, all oil passing through the pump must go through the strainer, whereas if the strainer is placed on the pressure side, this need not be so, providing the by-pass is placed between the pump and the strainer. In this case as much as two-thirds of the oil pumped may be short circuited back to the pump intake, so that only one-third passes through the strainer. Consequently, other things being equal, only one-third the strainer gauze is required when the strainer is placed on the discharge side.

Filters should be self-cleaning, not only because they will be neglected by the bulk of automobile owners, but also because cleansing a screen with a brush is likely to force the grit further into the mesh and, in addition, grit frequently is forced through on to the wrong side. Cleaning a filter, by the way, is a job not relished by most automobile users.

Some filters have been designed with a three-way valve so that the strainer can be cleansed by allowing the oil to be forced through the pump in a direction counter to normal for a few moments. Such an arrangement, however, is too complicated and cannot be looked upon with favor as long as there are many simpler ways of handling the problem.

Extensive experience with the problem of oil filtration, leads the writer to favor the arrangement illustrated in Figs. 3 and 4. Equally good results can be obtained by placing the different components in other positions, according to the requirements of the engine design, but the fundamental points are correct. The straining component is made up from sheet metal formed into an inverted rectangular pan, the open or under side of which is covered with a wire gauze securely soldered in position, so that oil passing through it must do so in an upward direction. The pump draws its supply from the interior of this component and the oil which passes from the relief valve also flows back into this chamber, instead of going back into the sump. This is most important, because the only oil which goes through the strainer is that which actually is delivered to the bearings of the engine, thus the velocity through the strainer is kept at a minimum. The grit refused by the strainer accumulates in the bottom of the crank case and finds its way through the small opening to the flywheel compartment, where the flywheel throws it into the grit trap shown in Fig. 4. The opening between the sump and the flywheel compartment must be small so that the flywheel will not become unduly flooded, but will carry the oil away faster than it can flow through the hole. There is, of course, an overflow from the grit trap back to the sump. The raising of the sediment by the flywheel to the grit trap allows any specific quantity of oil to be drawn off and gives plenty of room for a suitable discharge valve with ample ground clearance. A mushroom valve is not satisfactory, although it requires less space, because grit collects on its seat and prevents it from closing.

An oil filtering system along the lines described was designed for a special purpose during the war as a result of a great number of experiments and proved so satisfactory that, after many thousands of miles in service, the straining material was practically as clean as when installed. It is the opinion of the writer that straining material thus arranged will never require cleaning by hand.

German Railcar Specifications

THROUGH a compositor's error, some of the dimensions of the German N.A.G. railcar described in AUTOMOTIVE INDUSTRIES for Oct. 5, p. 664, were given in feet and inches instead of inches and decimal fractions thereof. The correct dimensions are as follows:

Length of railcar overall	38 ft. 7 in.
Length of railcar chassis	35 ft. 2 in.
Wheelbase	165.5 in.
Width of car body	103.2 in.
Gage (standard German railway)	56.5 in.
Wheel diameter	31.5 in.
Spring length	59.2 in.

Four New Methods in Spring Production

Novel stock marking system, special furnace arrangement and automatic cambering machine using chains instead of solid plates in forming operation are features of interesting plan for manufacture of springs. Shears brought to stock.

By J. Edward Schipper

MODERN production methods came into use in spring manufacturing later than in the making of most her automotive parts. Spring builders inherited many of their methods from the carriage builders who preceded them and, until recently, failed to discard all those phases of carriage practice which were not in line with modern needs.

Efficient spring production methods have been developed rapidly, however, in the last three or four years. Most factories making springs now have installed a large number of labor saving devices, possess up-to-date equipment and use modern methods throughout. These things are common to most establishments. There are four special features, however, in the production system of the American Auto Parts Co. These are:

1. A novel stock marking system which facilitates grading operations.
2. Shears are brought to the stock instead of stock being brought to the shears, as is common practice.
3. New features in the automatic cambering machine. These include a use of chains instead of a solid plate in the forming operation, which gives the quenching oil a better chance to circulate around the cambered leaf.
4. A particularly efficient arrangement of furnaces.

The shop in which these methods have been developed transforms about 3,500,000 lbs. of steel into springs each month. Less than one-half of one per cent of this material finds its way to the scrap pile. Twenty-six furnaces, divided into five sets, are used. These furnaces burn 75,000 gal. of fuel oil per month. The shop is arranged in four sections so that it practically constitutes four spring shops in one. Three of these sections are occupied with automatic machinery on which are performed the major operations, such as cambering, tempering, drawing, etc. Small orders requiring special hand work, quick delivery requirements, and supplementary operations of various kinds are taken care of in the fourth section.

Marking Stock Sizes on Wall

The method of marking the wall behind the stock rack is the first important departure from common operating practice.

A large white band is painted around the room at a height sufficient to clear the top of the stock when piled to maximum height. On this is painted plainly the size of the strips of spring stock as shown in Fig. 1. The stock is stored immediately adjacent to the shearing department thus minimizing the effort required to bring the stock to the shearing machines.

This is a scheme which could be employed to advantage in other than spring shops as it clearly defines the size of the stock, not only denoting the location for it in unloading, but also safeguarding against mistakes in grading afterwards.

Movable alligator shears are employed extensively as a further aid in reducing the movement and handling required for the stock. These shears are moved to the pile instead of the pile being moved to the shears as is usually the case. Even the large shearing machines are of the semi-stationary type. The overhead crane can readily pick up a big shearing machine, if necessary, and move it to any point on the shearing floor. Fig. 2 shows one of these shears in operation.

Movement of Stock

All stock is under the jurisdiction of a shearing foreman up to the time the shears cut it to the proper length. These lengths are turned over to the inter-department transfer which then becomes responsible for the stock and is charged with the job of moving it to the proper machine and passing it along from operation to operation until it is ready for assembly.

The steel is loaded on skids formed of pressed steel and is moved about the plant on trucks with elevating platforms. The platform slips beneath the skids and is then raised, lifting the skids from the floor and permitting the material to be hauled about the plant and readily deposited at any point required. All of this is handled by the inter-departmental transfer, which is a separate transportation department. Before the stock is turned over from the shearing department to the inter-department transfer, the rough plates, which have been sheared off to length, are weighed on a General Automatic Scale Company weightograph. This is a ready means of checking, not only the load, but also the amount of scrap, as all scrap for that load is weighed with it and deducted. These weights form part of the cost figures, which are very carefully kept. Costs which are often lumped and charged to overhead are, by this plan, worked out in detail and form part of the records kept of every job. Instead of a general scrap charge being made, every individual job is charged with its own scrap.

The Coulter-McKenzie eye machine, in which each eye on the main leaves is formed in one operation, is another interesting production development used in this plant. The ends of the leaf are heated and applied to the machine, which first bends the end down, then cuts a scarf or bevel on the end of the leaf and wraps it completely over to form the eye. A pin then goes through the eye which has been formed, sizing it out to the proper shape and



1—*A white band along the wall behind the stock pile carries very plainly the stock sizes, thereby greatly decreasing chances of error in grading.* 2—*Instead of moving the stock to the shears, by this arrangement the shears are moved to the stock. Note the alligator type shears mounted on rollers.* 3—*Forming the eye on main leaf. Note the convenient position of the furnace and the skids used for carrying the springs.* 4—*Punching the oil hole in the spring eye.* 5—*Automatic cambering machine. Spring leaves drawn from furnace are placed in automatic cambering machine which forms camber and drops the leaves into oil quenching bath.* 6—*Another view of cambering machine showing how conveyor brings leaves from the quenching bath to the sorting tables.* 7—*Brinell test immediately adjacent to the annealing furnace.*

also establishing its alignment. After the second eye is turned, pins are put through both eyes. The eyes are gaged by putting bars or mandrels into them and checking the distance between the bars, 18 in. out from the longitudinal center of the leaf. The space between the bars at this distance is not permitted to differ more than 3 32 in. from the distance between the eyes at the center of the leaf.

Punching the Oil Cup Hole

The oil cup hole is punched without the use of a bottom die, as shown in Fig. 4. This is accomplished by heating the eye to the proper temperature. Reaming and facing the eyes are also done in the main leaf department before these are ready to pass along and join the other leaves. This is an ordinary reaming and facing operation common to all spring shops.

As in all well equipped spring shops, the furnace work is automatic. The spring leaves are put in a walking beam type of furnace through which they pass in 20 min. The leaves are laid on the furnace table in order and the temperature in the furnace is graduated upward from cold in one end to a soaking heat at the other. Each movement of a walking beam mechanism moves the springs 4 in. The springs travel 22 ft. passing from one end to the other. This is a McGann-Harrison furnace.

The leaves are removed from the end of the furnace and set in the automatic cambering machine which immediately bends the spring leaf to the proper camber and douses it into the oil bath below. An unusual feature about this cambering machine, Fig 5, is the use of chains for the cambering die face instead of a solid piece of steel. This special construction permits the tempering oil to circulate freely around the leaves. The oil bath at the bottom of the automatic cambering machine is kept at a temperature of 120 deg. which is maintained by having fresh oil enter at this temperature and by draining out the main body of oil through the opposite end. Thus, the oil is continually kept in circulation. The oil is cooled by water, which itself is kept cool by a cooling tank outside of the building.

A conveyor at the bottom of the machine, Fig. 6, takes the leaves out in about the same order that they enter the bath, so that, as they leave the machine, they can be readily sorted on a sorting table. The conveyor and the automatic cambering mechanism are operated by a 7½ hp. electric motor.

After the leaves have been sorted out, they are put through a McGann-Harrison automatic draw furnace. Forty minutes are required for them to pass through this process. Then they are allowed to cool slowly at atmospheric temperature to anneal.

Immediately adjacent to the draw furnace is a Brinell instrument. The inspector does nothing else but Brinell springs as quickly as he is able to operate the instrument, as shown in Fig. 7. A close process check is kept in this way, on the work of the furnace. A very complete record on the steel characteristics is maintained by this Brinell instrument, by the graphic chart of furnace temperature, and by the laboratory tests given every batch of steel when it comes into the yard. Steel is ordered by both chemical and physical specifications so that little or no chance for error is introduced.

Process of Assembly

Assembly work follows along the usual lines for such processes. The assembly table is a moving, progressive platform. The first step is, of course, to press in the bushing and to grind off the ends to the proper width. There are four assembly tables, one of which holds the shop record of 2932 springs assembled in a 9 hr. period.

As a final check after assembly, every spring is given a load test in which it must show the desired deflection under load and also must check back to indicate that it has not taken a permanent set under this test.

New Type of Hydraulic Shock Absorber

A SHOCK absorber, of the hydraulic type has recently appeared on the market under the name of Manzel. It is attached to the frame of the car and is connected to the axle by means of a webbed strap and clamp.

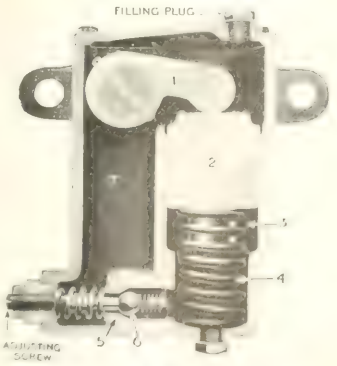
The device consists of an inner and outer chamber both partially filled with oil. Snubbing action is secured by forcing the oil from the inner to the outer chamber through a small double acting valve.

When the car spring is compressed the cam (1) is released and the piston (2) is forced upward by a large spring (4) and oil is drawn into the inner chamber (3) directly beneath the piston.

When the car spring expands the arm is drawn down by the webbed strap and acts through the cam (1) on the piston (2). The piston forces the oil from the inner chamber into the outer chamber through the small valve (6) which exerts a retarding force on the spring action. When a severe expansion occurs the initial shock opens the relief valve (5) permitting a sufficient volume of oil to pass through to relieve the strain. The relief valve then closes and the oil passes through normally.

The valve action may be regulated for any weight car by an adjusting screw which increases or decreases the valve (6) opening.

This shock absorber is made by Manzel Brothers Co.



Cross section of Manzel hydraulic shock absorber

THE Automotive Division of the Bureau of Foreign and Domestic Commerce handled 17,678 inquiries during the year ending July 1, 1922. This volume was greater than that handled by any other division except the Fuel Division and the Textile Division.

How American Tires Are Sold in the Belgian Market

American tires compare favorably with best European makes. Michelin and Englebert lead in popularity. American handicap lies in lack of persistent sales effort and severe competition. More liberal export policies will help to win market.

By P. L. Palmerton*
Chief, Rubber Division, Bureau of Foreign and Domestic Commerce

AMERICAN tire companies, with few exceptions, have not persistently cultivated the Belgian tire market, with the result that their share of the trade is not large. The sales of American tires are at this time largely in two well-known makes, and one other is entering. Other standard American makes are represented, but have not succeeded in securing a notable share of the business.

The premier place in the tire market is held today by the Michelin Co., of Clermont-Ferrand, France. This company alone is supplying at least one-half and perhaps slightly more of the automobile tires in use.

In second place is the Englebert Co., of Liège, Belgium. This may cause surprise because the company has not been prominent and has not become a highly important factor in any market outside of Belgium. The Englebert is very commonly used and its share of the trade can safely be put at 20 per cent.

The French Goodrich Co. is easily in third place with both cord and fabric tires. The three leading competitors named are securing perhaps more than 80 per cent of the tire replacement business.

During the two years following the armistice, American tires were in the best position they ever had in this market. Before the war they were almost unknown to the Belgian motorist. As the post-war scarcity of tires vanished, it became increasingly difficult for American brands to compete with European tires, which reached the market with lower first costs, less transportation charges, and slight exchange handicap. American tires were accordingly higher in price than the European brands and while the high quality of American tires was recognized there was no predisposition in their favor sufficiently strong to offset the lower prices of pre-war favorites.

IN most cases American tires have been represented by distributors rather than by factory branches or personal representation by the home company. These distributors have not always been well chosen and they have, as a rule, had but little enthusiasm in pushing the American tires since their higher price made their sale difficult.

Many of the American tires seen in Belgium today are of makes not well-known in the United States. These come for the most part from clearance stocks from small tire factories which have been sold direct by the factories or by New York tire jobbers to Belgian importers. This business has been wholly dependent on extremely low prices and is of course only temporary.

European makes of tires not mentioned above which are sold on the Belgian market in sufficient quantities to make them worth mentioning are Dunlop, Pirelli, Continental, Bergougnan and Jenatzy.

The causes underlying Michelin's strength in this market are the same that hold true in other European markets. The company is old and is everywhere well known. The product has been consistently good and has been aggressively merchandized. The prices of Michelin tires have always been low. These things have built up a consumer acceptance which is the basis of Michelin sales today. The tires are accepted by motorists without question and the way in which the trade is handled operates against the motorist being sold any other brand.

THE Englebert tire derives its popularity principally from the fact that it is a Belgian product. The natural advantages arising from its location enable it to adopt more liberal policies toward the trade. The plant at Liège has a capacity of 1000 automobile tires a day. The Jenatzy plant at Brussels has only a small tire production.

Dunlop and Bergougnan are more prominent in the solid tire trade than in the pneumatic. Continental is represented in Brussels but has not yet made much progress in re-establishing itself, although the Continental cord tire is not infrequently seen. Giant pneumatic tires of this make up to size 40 x 8 in. are in use in Brussels. The tire is handicapped by an import duty of 20 per cent as compared to 12 per cent imposed on tires from countries other than Germany. The second German tire, the Peters-Union, is seen in Belgium only as original equipment on German automobiles.

Unquestionably American tires surpass in quality any European makes offered on the Belgian market. This margin of superiority is not, however, so great as is popularly supposed in America, and it is impossible for a careful observer to disregard the good qualities of the Michelin tire.

The Belgian motorist apparently sees little to choose between the Michelin and the American tires. Other European tires do not so closely rival the American and if purchases were made entirely on a quality basis, Ameri-

*Digested from U. S. Department of Commerce, Trade Information Bulletin (Rubber Division) No. 65.

can tires would inherently command a much better place in the trade.

The chauffeur, however—it must be remembered that the big majority of Belgian cars are chauffeur driven—is not so much interested in the quality as he is in the rebate which he is to receive from the dealer. Since these rebates are given with all purchases, the chauffeurs are not particularly attracted by tires whose long-wearing qualities make purchases too infrequent. The quality appeal wins trade only from those motorists who drive their own cars or who take the trouble to check results received from tires purchased by their chauffeurs.

AMERICAN tires have recently come into a more favorable position in this market through price reductions which have brought their consumer price down to a level with the Michelin. The ascendency of the Michelin tire enables that company to take the lead in matters of price and policy. Michelin tires have heretofore been priced below American tires and dealers effected only small sales of the latter as a result.

At this time all popular tires are offered to consumers at practically the same price; in fact, the differences are so slight that some garages handle several makes and quote for all of them from the Michelin list.

Michelin has turned its production almost wholly to cord tires, the only fabric automobile tires which are continued being in small sizes for light cars.

The fact that American tires have recently been reduced in price should not be taken as indicating any present or future "price war." Tire exporters who have become convinced that volume business depends on equal competition have led in the reductions and in so far as can be ascertained, no factor in the trade is expecting to make further reductions in the near future.

The lower prices of American tires can be expected to encourage the distributors who are importing them and should greatly stimulate their sale among those motorists who make quality a ruling consideration. Both of these things will probably improve their acceptance by the dealers, who foresee a quickened demand for them. However, contracts made for the current year are preventing an extensive or immediate reaction.

Exchange conditions naturally make business difficult for American tire exporters. The Belgian franc stands to-day at almost exactly eight cents while its par is 19.3 cents. The French franc is worth only a trifle more than the Belgian franc, so that French manufacturers find but a slight handicap where the Americans find a very formidable one. This feature reacts particularly against native importers of American tires, who object to risking exchange fluctuations while goods are on order.

Tires imported into Belgium are subject to an import duty of 12 per cent ad valorem. On German made tires the duty is increased to 20 per cent. There are also two transmission taxes of one per cent each, and the final purchaser pays a luxury tax of five per cent.

The tire market depends upon approximately 27,000 passenger automobiles. At the present time, when the fabric tire is being replaced by the cord, it is difficult to estimate the average number of tires used per car per year. Roads are only fair, with a resulting hard wear on tires and the average number required per car per year has likely not fallen below four. The market for tires is slowly but steadily expanding, as the popularity of the motor car is apparently permanent and importations are heavy.

The straight side tire has not gone far toward replacing the beaded-edge tire. Until recently several popular American cars were imported in millimeter beaded-edge rims but at this time almost all American cars are brought in on straight side tire and rim equipment unless they are light enough to employ beaded-edge tires in inch sizes from 30 x 3 to 31 x 4.

Prominent factors in the tire trade estimate that present requirements are 84 to 86 per cent for metric beaded edge, 10 to 12 per cent for inch beaded edge (mostly 30 x 3½), and 4 per cent for straight side.

The most popular metric sizes are 710 by 90 (used on Citroen), 820 x 120, 915 x 105, 895 x 135 (popular on Belgian cars, 880 x 120, and 935 x 135.

The straight side inch sizes mostly used are 32 x 4½ (used on rear wheels of Ford trucks), 32 x 3½, 32 x 4, 33 x 4½, 35 x 5, and 31 x 4.

The progress of the cord tire has been very rapid. As noted above, Michelin has discontinued all metric fabric tires above the 80 millimeter section. Certain European and American companies are following Michelin's lead in this regard, since it already has become a difficult matter to sell fabric tires in other than the smaller sizes.

Michelin has gained a distinct advantage from the early appearance of its cord tire and, inversely, American tires are not yet able to furnish cord tires in metric sizes are feeling the handicap very keenly. There is a feeling that fabric tires in the smaller sizes will continue to find a reasonable demand, but the general acceptance of the cord tire has been so definite and sudden as to be somewhat amazing. It may be said that a cord tire in a full range of metric sizes is necessary if a company is to become a factor in the Belgian market.

The aversion toward the gray tube is not felt so strongly as in some other European and South American markets. It is believed that the red tube sells more easily than the gray and it is in fact the one generally used, but where gray tubes have been offered their color has not been found seriously to hamper their sale.

THE steel studded tire is rarely seen to-day and importers and distributors report that they have cleaned out their stock at 50 per cent or more off list prices. Michelin shows the steel studded tire on its price list, but it is not regularly stocked since the demand for it is almost nil.

The tire business is done on a consignment basis. This method has become so firmly entrenched and so commonly accepted that the amount of goods sold outright to dealers is negligible. It is customary to place only small stock with dealers, arranging for easy replacement of stock when the dealer reports sales in certain sizes. Dealers commonly stock many brands of tires and

THIS report gives a comprehensive study of the Belgian tire market. It shows where competition is the keenest, outlines customary trade practices in a concise but practical way and tells facts which cannot be gleaned from export figures alone.

* * *

The American tire exporter who wishes to learn where his product stands in the Belgian market, why it is in its present position and what can be done to obtain a greater volume of business, will find all the essential facts in this story.

let their sales be guided almost wholly by popular demand.

The Michelin dealers, however, contract not to become agents for any other brand, being permitted to secure tires of other brands only for filling definite orders. This company is able to secure such agreements from its dealers on account of the powerful consumer acceptance back of the tire. The agreement is not always religiously observed or enforced, but if a Michelin dealer does accept a second stock it is sure that he will not actively push it or advertise its presence either through the press or through signs erected at his place of business.

Dealers sell at the consumers list price furnished by the tire company and retain a percentage according to the contracts. The usual discount for dealers is 15 per cent. In addition a rebate is made to the dealer at the end of the year if the total yearly sales attain a figure specified in the contract.

At the time the contract is signed the dealer estimates the amount of business he can do with the brand in question and the figure inserted in the contract is the minimum which must be reached if a rebate is to be granted. Since the percentage of rebate increases in proportion to the amount of business done, the dealer naturally chooses the highest amount which he considers reasonable. The rebates commonly offered by Michelin are: On 25,000 francs, 7 per cent; on 50,000 francs, 8 per cent; on 75,000 francs, 9 per cent, and on 100,000 francs, 10 per cent.

Variation in Rebate Policy

While obviously the policy controlling the granting of rebates should be uniform and consistent, great variance can be noted between different companies and sometimes within the practice of one particular company. Arrangements are sometimes made to cover lesser amounts or intermediate amounts from those given above.

Since there is no standard policy regulating the amounts of rebates, it is necessary for each manufacturer or distributor either to adopt and maintain one scale of rebates or to meet competition as it is found, by giving more or less as appears necessary to get the dealer to sign.

It may be said that the scale of rebates given above is about the average, and divergence from it may be either in the direction of increasing or decreasing the amounts of business required.

Some dealers prefer to receive a higher original discount, usually 20 per cent, and a smaller rebate at the end of the year and certain companies vary their policies to meet this demand.

The custom of influencing chauffeurs which was originally started by occasional garages that were willing to reduce their profits to get volume business has become so general that tire dealers now regard it as inevitable.

Chauffeur Discounts

The customary discount to the chauffeur is 5 per cent, and some companies attempt to have their dealers adhere to that figure. It is common, however, for chauffeurs to receive as high as 10 per cent and in some cases the allowance exceeds this percentage. It is claimed that the popularity of Englebert tires rests to a large degree on the very high discounts given to chauffeurs purchasing them. The dealer is able to give such large discounts, of course, only with the aid of the company.

No definite mileage guarantees are given on tires. They are guaranteed only against defects in workmanship or material. Returned tires are adjusted on the basis of mileage rendered as compared to a mileage that the motorist would have been justified in getting.

As to the future of American tires in Belgium nothing can be foreseen which should prevent an agreeable growth in their volume if exporters are disposed to accept the rather severe conditions imposed. Volume business rests on prices so low as to allow only meagre profits, and competition is so keen and competitors so firmly entrenched that only persistent sales campaigns can produce results. The impression can not be avoided that only companies willing to adopt the most liberal export policies can hope to succeed.

The Gasoline and Motor Fuel Situation in Peru

NEARLY all of the gasoline used in automobiles and trucks in Peru is of native production. Not only does Peru produce gasoline for home consumption, but during the first half of 1922, has become a large exporter of petroleum. Under "petroleum," the custom house probably classes petroleum products, of which gasoline is one. The oil beds now operated are in the region around Tumbez, of which Talara is the port.

Gasoline produced in Peru is, naturally, of different grades. One grade, not very good, but perhaps what is being now used in the cheaper grade of automobile, retails for one sole a gallon. A sole is now worth about 40 cents, United States currency. A better grade sells for 6.30 (six soles thirty cents) for five gallons. Peru produces a grade of gasoline fine enough for aeroplanes.

In Lima there are about half a dozen gasoline street pumps; and as many more oil, tire and accessory stores, where gasoline is sold. The only difficulty about getting gasoline in Lima is that sometimes supplies do not arrive fast enough from the oil fields.

Outside of Lima, the sub-automotive centers of Peru, such as Chiclayo, Trujillo, Chincha, Ica, Arequipa, etc., have houses that supply gasoline. Inter-city motor travel is beginning in Peru, so far as the roads permit, but there is no provision for supplies of gasoline en route. Provision must be made at terminal points.

In the Sierra, or mountain region, the price of gasoline is very high, owing to the cost of transportation, a cost which is augmented at times by the contents of the gasoline cans being stolen en route. On this account it is sometimes suggested that steam motor cars be used, or electric motor cars, the electricity being developed from the water power in the mountains.

Alcohol can be produced very cheaply and abundantly in Peru. It has been successfully tried out here as a motor fuel. Its manufacture for motor use at present is rendered impossible by the fact that the government tax on alcohol is about three times what it costs to produce a gallon. Efforts have been made to get a government exemption on denatured alcohol, but so far without success.

Lubricating oil is produced in Peru, but not of a high grade. The native lubricating oil is, however, used by the cheaper grade automobiles in Lima.

All-Metal Airplanes Discussed by Metropolitan Section S. A. E.

Designers are attempting to materially decrease the power required to fly by minimizing parasite resistance and lessening dead weight. Ways for making planes safer and cheaper must be found. Duralumin now being used with much success.

"ALL metal planes, to date, can be called experimental. The future commercial airplanes, however, will undoubtedly be an all-metal construction. Metal planes mean greater safety to pilot and cargo; a possibility of considerably lighter weight; less production cost, particularly as quantities go up and the demand increases; easier servicing and simple repairs provided the airplanes are designed with this idea in view.

"It cannot be expected that the first metal construction attempts of any manufacturer will be a success in every particular, but, if America is to lead in aircraft, it must lead in metal aircraft, as it is my opinion that, in a comparatively few years from now, wooden airplanes in the air will be scarcer than wooden ships on the sea, and that all airplanes flying under insurance rulings will be of all-metal construction.

Low Cost Depends on Metal Construction

"Thick-wing airplanes are developing fast, both in monoplane and biplane types. Retractable chassis, wing-type radiators and all those items that the recent Pulitzer events have shown to be practicable, will appear shortly in commercial airplanes and increase their profit-paying possibilities. But if safety and low cost are to come with these items of greater performance, then must metal construction and production methods be applied to the production of an airplane for American air-services that shall be safe, cheap, economical and long-lived. Only by the production of a real commercial airplane can commercial aviation come in America."

These are, in brief, the conclusions reached by William B. Stout in his paper presented last week before the Metropolitan Section of the Society of Automotive Engineers. In reaching them Stout said in part:

"The attempts of designers to-day are largely toward reducing the amount of power required for flying by two methods: (a), by reducing the dead weight carried for a given useful load and (b), by seeking a minimum of parasite resistance toward forward movement, as against useful resistance which gives back a resultant lift.

"In the past, too many designers have approached the airplane from the standpoint of wing curve, lift-drift ratio and the like; forgetting that, after all, he who can build the lightest areas for a given strength has produced at least the fundamentals of the best airplane. Airplane design to-day, therefore, is largely a structural problem.

"It must be admitted that the present-day airplane, as now in use, carrying about 28 to 30 per cent of useful load, and a pay load of 3 to 5 lb. per hp., cannot hope to be the eventual commercial passenger or freight carrying machine. Ways must be found, if a real commercial airplane is to be available for air lines, for improving the structural part of the present type of airplane to make it lighter and stronger and cheaper. This can be done by using better materials, providing better structural arrangement, and then combining with them improvements in aerodynamics. Aerodynamic improvements include better wing curves and the elimination of parasite resistances by better arrangement of the design and better streamlining of those parts that must be exposed."

Stout firmly believes that the future airplane will have no parts exposed to the air which do not give back lift in return for their resistance to motion through the air. In consequence his work for some years has been toward the development of planes with such thick wing section that the engine, pilot and practically all structural members are within the wings. He has been a pioneer in this field and outlined briefly the development first of a plywood and then an all-metal plane, the latter having been recently completed. This machine, which has a span of 60 ft., an area of 790 sq. ft. weighs 6557 lb. light, carries 3260 lb. useful load, is fitted with two 300 hp. engines and is capable of traveling at a speed of 113.5 m.p.h. with full load. It is built largely of duralumin and is said to be the first American built all-metal plane to fly in this country.

Superiority of American Duralumin

Stout stated that American made duralumin is superior to the German product. He pointed out the advantages of duralumin as compared to steel and showed samples of several sections which have proved satisfactory in the designs with which he has been identified.

At the request of Chairman Kemp, Stout spoke briefly and enthusiastically regarding the recent airplane races in Detroit. He said that over 100 planes from various parts of the country as far removed as San Francisco had flown to the meet and that in none of these flights or in races had there been any accidents to pilots or passengers. This had impressed greatly those who attended the meet as indicating the safety of flight even when exceedingly high speeds are attained.

As to engineering features he mentioned the use of wing radiators and retractable landing gears as an indication of the effort to decrease parasite resistance. One machine with a folding type of landing gear was found to be capable of making a speed of 190 m.p.h. as against 175 m.p.h. for machine which was a duplicate in all particulars except that it had a non-folding landing chassis.

There were so many machines entered in the race that

they were sent away in two groups. The Verville-Sperry machines were winners in the first groups and as a result held the world record for about an hour until the conclusion of the trials of the second group in which the winning Curtiss machines were victorious. Inasmuch as the Verville-Sperry machines are of the thick wing section type, Stout regards this performance as a vindication of his views on this type of construction. He nevertheless paid a high compliment to the winning Curtiss machines which belonged to another school of design. They are fitted with exceedingly thin wings, but great care is used in seeing that all the non-lifting surfaces are properly stream lined in order to avoid unnecessary head resistance.

Future Design Discussed

Commander Richardson of the Navy Department opened the discussion by stating that he frankly disagreed with Stout's conclusion to the effect that future planes will tend toward a design in which all exposed surfaces are lifting surfaces. Richardson favors the Curtiss type of design in which the lifting surfaces are made the most efficient possible while other exposed parts are stream lined to minimize their resistance.

He also expressed the view that metal construction is likely to come ultimately for quantity production but is too expensive where planes are built in small numbers.

In contrast to this view Mr. Fowler of the Aeromarine Co. expressed the belief that duralumin will ultimately replace wood construction. In this connection Stout drew attention to the tendency of wooden floats such as are used on some seaplanes operated by the Aeromarine Co. to absorb large quantities of water thus materially to decrease the pay load which the machine can carry. With a metal float this difficulty would be overcome.

H. M. Crane stated that he agreed with Stout concerning the difficulty of designing satisfactory compression members. He stated that the failure of such a member had resulted in the loss of the large dirigible which this country purchased from England and which crashed during its acceptance trials. It is difficult, he said, to apply in practice the information gained on machine tests of compression members. Localized stresses are hard to avoid and are often the determining factors, especially in all metal construction.

Commenting upon the recent Detroit races, Crane said that the performance of the machines there used, all of which were of American design and manufacture, should be the occasion for national pride. In spite of much criticism and adverse comparison with European products, Crane expressed the view that there is nothing wrong with American aviation and that our aircraft compare favorably with all others. The Aeromarine Co. has demonstrated that a commercial success of airplane operation is possible in this country, while the Liberty engine, which has been but little changed since the war, has established an enviable reputation. One indication of this fact is, he said, the recent record endurance flight of a machine equipped with a Liberty engine.

Commercial Flying a Big Success

Mr. Bruno of the Aeromarine Co. spoke briefly of the success of the Aeromarine service between Cleveland and Detroit last summer. Two planes had flown daily in each direction adhering to a schedule with as much regularity as is common in express railway service. During the two months of operation over this route there had been no forced landings, and many prominent business men had availed themselves frequently of the service.

Charles M. Manly commended Stout for his persistent pioneer work in the development of a new type of machine. Referring to the Curtiss-Army plane which established a record speed of 248 m.p.h. recently in Detroit he said that he had figured that it would require about the same power to propel through the air normal to the direction of travel a surface having an area of 3 sq. ft. At the speed in question the pressure on such a surface would approximate 1 lb. per sq. in.

In reply to a question as to his reason for abandoning plywood construction in favor of all metal construction, Stout replied that plywood is affected by atmospheric conditions and that he considers metal construction safer, especially in case of a crash. He also prefers to trust metal rivets rather than glue as a means for fastening parts together. He said, however, that plywood can be depended upon to give a more uniform strength than wood in its natural condition so that lighter sections can often be used when plywood is employed.

Stout contends that all metal construction is not necessarily more expensive than wood. He expects that it will soon be possible to produce planes of a carrying capacity up to about one ton rather more cheaply than high grade cars of similar capacity.

Asked concerning the effect of salt water and of vibration upon the duralumin structure, Stout stated that there is a difference of opinion as to the ultimate effect of salt water. Duralumin which is not heat treated is attacked by salt water, but when properly heat treated the effect of salt water is, he believes, practically nil. The effect of vibration is largely dependent upon design as in the case of other metals. If zinc impurities are present in the aluminum employed in making duralumin, the effect of vibration is more pronounced. In this connection Commander Richardson stated that vibration appears to have no greater effect upon duralumin than upon other metals.

In concluding the discussion Stout emphasized the fact that a successful machine must be designed for the particular material employed, otherwise the result is not apt to be satisfactory.

THE Automotive Division of the Bureau of Foreign and Domestic Commerce has sent out a questionnaire to all representatives of the Department of Commerce in order to secure information on the world's markets for American motor fire-fighting apparatus and equipment.

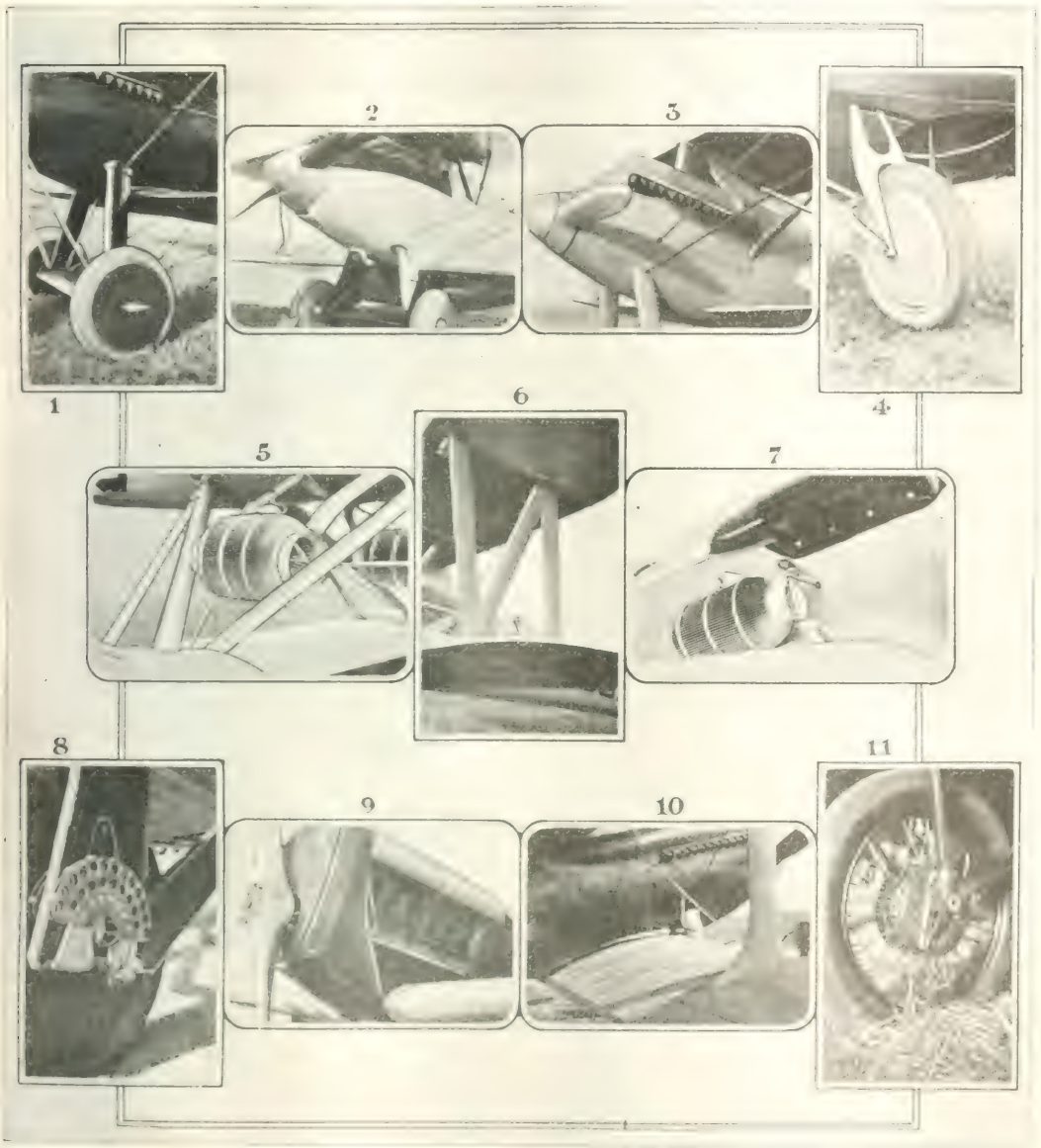
The following questions are asked in the questionnaire:

1. Is motor equipment being used?
2. Is purchase of new equipment being contemplated now or in the future and what are the chances of American firms obtaining orders?
3. What firms have furnished fire-fighting equipment?
4. In what manner and by what official is equipment purchased?
5. Is it desirable to send advertising matter to the official in charge?
6. Brief description of the water supply system.
7. Information regarding construction and paving of streets.
8. Information regarding construction and height of buildings.
9. Other pertinent information affecting the sale of American fire-fighting equipment.

Of the replies received from 177 cities, 40 have been in the affirmative, 109 in the negative and the remainder have signified possibility of American firms supplying equipment at a later date; 116 of the cities use modern equipment.

A list has been published by the Automotive Division giving the names of the cities, answers to questions Nos. 1, 2, 3, 5 and reference numbers. Complete reports on the cities mentioned are supplied by the division to those requesting and giving the reference numbers.

Details of Pulitzer Race Planes



1—Landing gear, Curtiss-Army Racer (note strut arrangement). 2—Nose of Verville-Packard (note radiator between struts). 3—Curtiss-Navy Racer powerplant. 4—Retractable wheel, Bee Line Racer (note recess in bottom of wing to receive wheel and struts). 5—Lamblin radiator on landing gear struts, Navy-X. 6—Wing struts, Curtiss Navy Racer. 7—Lamblin radiator installation on one of Bee Line Racers. 8—Shock absorber detail, Loening landing gear. 9—Loening monoplane powerplant. 10—Wing surface radiator and I-strut, Curtiss-Army Racer. 11—Retractable wheel, Verville-Sperry (shock absorbers inside of hub)



A Dealer Complains of His Factory Relations

This letter indicates that factories do not always take care of dealers when changes of distributors are made

Editor, AUTOMOTIVE INDUSTRIES:

As a reader of AUTOMOTIVE INDUSTRIES for the past six or eight years, I take the liberty of writing you in detail just how I have been handled by the manufacturer and distributor of a well known automobile. I have become so disgusted with the dealer's chances of making a success that I have fully decided to clean out my stock of cars and never again sign a contract with any automobile manufacturer or distributor. If I ever sell cars again I will have to change my way of thinking. I am positive that I shall never again sign a contract or put up any deposit money with any concern, in order to help make money for it while I hold the bag.

We started selling ..... and ..... cars in ..... in 1918. We remained with them through all the time that their cars were not up to the standard. We sold quite a few cars and gave service on them that made every owner of the car a booster while in other territories these cars could not be given away. *We claim the service made the cars and not the manufacturer.*

We were selling under the ..... Sales Co. of ..... at the time the new series ..... came out. This new car looked to be a very good proposition and we secured the entire county rights through the ..... Auto Co. and opened a branch in ..... on April 1, 1922. Just at this time the distribution contract of the ..... Auto Co. was cancelled for some unknown reason and, I may add, caused quite a confusion in automobile circles in .....

Just when things begin to look brighter and the new series ..... and ..... made their appearance on the market, the contract of the ..... Auto Co. was cancelled. The ..... Automobile Dealers' Association sent representatives to the factory to investigate and get the facts on this deal. But the factory refused to make any statement at that time. For this reason the ..... Automobile Dealers' Association refused the new distributor space at the annual automobile show and all the ..... dealers have been boycotting this line ever since. I now understand that the ..... Auto Co. has brought suit for damages against the ..... Motor Co. Through all this we stuck with the ..... and were selling them under a handicap.

THIS letter was written to the editor of AUTOMOTIVE INDUSTRIES. *It gives a specific instance of what happened to a dealer after he had stuck by a manufacturer through bad times.*

The incident may not be typical, but it does show that dealers have certain grievances about which the manufacturer ought to know. Some of these grievances are not justified—others probably are.

Manufacturing executives will be better able to handle dealer problems, however, as they recognize the presence of such grievances.

My contract with the factory, through the ..... Auto Co., called for a rebate of 2 per cent when twenty-five cars had been sold. This number we had not reached when our contract was cancelled with the contract of the ..... company and the remainder of their dealers. There we were with a new showroom lease on hand and no contract. After about three weeks we signed a contract with the new distributor, ... Motor Co., and started all over again, losing all rebate on the number of cars we had sold on the old contract and having about four months of the contract year—which expired July 21—to sell the twenty-five cars in order to get the 2 per cent discount as rebate.

We went ahead with our plans and opened a sales and service station in ..... on April 1 and sold twenty-five cars under the new contract by July 31 but, as stated above, we lost all rebate on the cars we had sold the first nine months of our contract with the other distributor. It was stated by the new distributor that we were their best agents.

Shortly after Aug. 1 the new contract was put up to us, which we signed with a schedule of all the cars we thought we would use in the next twelve months. This was sent to the factory and returned as unacceptable, with a letter stating that we should sell more cars. We immediately signed a contract for the number of cars they wanted us to take, put up the additional deposit and sent it back again, only to have it returned by a factory representative, who called upon me, with the statement that a contract could not be accepted for our territory unless an order for $1,000 worth of parts accompanied the contract. This we refused to do because there was not a sufficient number of cars of the old model in the territory to make it a sound investment, and also we were too close to the distributor; nearly every owner would stop at the distributor's parts station instead of coming to us. The factory man informed us that unless we were to buy all our stock of parts direct from the factory a handling charge of 10 per cent, in addition to the 5 per cent we had already paid, would be tacked on all our invoices. The distributor's place is just five minutes' drive from our ..... branch and we are not permitted to avail ourselves of this service. We informed the factory's representative that we would quit if this went into effect.

We have gone along for two months without a contract and just a few days ago the 10 per cent penalty went on an invoice of parts we bought from the distributor. The writer immediately went to the office and informed Mr. ....., the president, that we were through. The answer was: "All right. Come over any time and get your deposit and straighten out the account. I am busy just now."

Pretty tough, when you have worked for four years on a line to build it up to where the parts and repair business will begin to pay overhead! Never again for us. The dealer always did hold the bag, the factory having no chance to lose and—no trade-in, always getting spot cash. The dealer does the work and the worrying and gets no consideration for his efforts.

We are going back to ..... and take care of our parts and supply business, which has always made money, and let the other fellows sell the cars. We might also add that we are not going to break our necks to buy parts from the ..... Co. We do not believe in pirate parts, but we are going to give the pirates a chance from now on. A factory will never again profit by adding 10 per cent to our invoice.

Curing Wheel Wobble

Editor, AUTOMOTIVE INDUSTRIES:

I note with much interest your article appearing in the last issue with reference to the subject of wobbling front wheels.

The Winton Co. have experienced considerable of this trouble, and with our particular car have always been able to perfect remedy by having the kingpin of the front axle brought to a vertical position with the car not loaded.

Our method of procedure is as follows: We have in our repair department a level spot on the floor the length of the car. We first measure from this floor to the center of each hub cap, and by deflating the tires, bring all of the hub cap centers to the same measurement.

We then square off from the floor, lengthwise of the car, to a position vertical with the king pin. The next step is to measure from the center of both the top and bottom of the king pin to the edge of the square. This will show whether or not this king pin is more than 2 deg. out of the vertical position. We bring the king pin to a vertical position by installing wedges between the front axle I-beam and the springs. When the car is then loaded, the king pin will tip slightly to the rear.

Experience has taught us that we must not allow the pin to tip forward, as the car will then not right itself when turning a corner. We fully realize that the freest steering point to be obtained is when the king pin stands in as near a vertical position as is possible to obtain.

H. R. MATHENY, Service Manager,
The Winton Co.

Editor, AUTOMOTIVE INDUSTRIES:

With reference to the editorial entitled "What Makes 'Em Shimmy?", in the Sept. 14 issue of AUTOMOTIVE INDUSTRIES, I would like to give you a few of my experiences. I believe that there are three principal causes and that the trouble is nearly always the result of some one of these or a combination of two or all three. I have proven these points by actual tests and have cured the troubles in every case.

The most common cause is a condition such that the center of the wheel load is too far from the center of the knuckle pin and quite often along with this trouble one finds the spindle slanting downward at the outer end.

Another common cause is the too nearly vertical position of the steering knuckle bolts (or pins) accompanied with bushing wear in the tie rod.

The third and least important of all is the lack of sufficient pitch or toe in of the front wheels which alone would not cause the trouble but along with either of the others adds to it greatly.

These few suggestions are based on seventeen years' experience in the automotive world both in designing, repairing and correcting troubles.

LEE ARTHUR, Construction Engineer.

Editor, AUTOMOTIVE INDUSTRIES:

On page 535 of AUTOMOTIVE INDUSTRIES, Sept. 14, you speak about "shimmying." According to my experience this phenomenon is caused by the reaction of the unequal engine torque.

As a matter of fact, I have observed that the phenomenon may be stopped, without stopping the car, by declutching and starving the engine.

To reduce the phenomenon with a given car, remove the play in front spring shackles and bolts, in steering knuckles and in front wheel bearings.

Multicylinder engines with their more even torque are less liable to it; but the flywheel has nothing to do with it, as this does equalize the torque itself, but not the reaction of the torque, which is transmitted through the engine arms on to the front end of the chassis.

The matter, therefore, is very simple and the only reason for its apparent mystery is that many engines (as six-cylinder and twelve-cylinder engines, rotary engines, etc.) are considered to be in perfect running balance. This is only true as far as the balance of masses is concerned, but not for the torque.

Hence these engines also will set up vibration, which may change into violent harmonic oscillations.

Another cause for shimmying, quite apart from the engine, is the same that often causes wobbling of the front wheels. When the front wheels touch the road some distance behind the point of intersection of the steering knuckle pivot axis produced with the ground, wobbling or even their tendency to wobble exerts a reaction on the chassis, which evidences itself by cross oscillations of the front part of the car. This phenomenon, therefore, occurs in riding over rough roads. The front springs rock around the front spring bolts, as a center, but the drag link has a fixed pivot at the rear, hence any deflection of the front springs causes a pull and push action in the drag link. Either the direct wobbling, caused by the road shocks, or the indirect wobbling, caused by the deflection of the front springs may be reduced by introducing some friction in the steering knuckles; that is, by using plain bearings, not ball or roller bearings, between the knuckles and front axle.

If the shimmying is caused by the pull and push in the drag link that is set up by deflection of the front springs, it is obvious that the tendency of the front wheels to wobble can be diminished by creating an extra resistance in the knuckles and lessening the friction of parts between the drag link and the steering wheel. In this case the pull and push will act on the steering wheel and not cause wobbling of the front wheels. This involves friction in the drag link and a steering gear which is not self-locking.

If wobbling of the front wheels is brought about directly by road shocks, thereby causing the shimmying, this can be remedied by bringing the point of intersection of the steering knuckle pivot with the road closer to the point where the front wheel touches the road and also by increasing the friction between steering knuckles and front axle.

H. C. OLIVIER,
Mechanical Engineer, Ryswyk, Holland.

Passenger Car Dealers Offer Means for Truck Distribution

Rural centers are small markets but aggregate is too large to neglect. Business may not warrant exclusive representation, hence selling through passenger car dealers should be considered. Merchandising methods vary greatly in different territories.

By Harry Tipper

THE difficulties inherent in the merchandising of commercial vehicles require the use of more methods of sale and distribution than are demanded in the passenger car business. No one method of distribution is suitable for all manufacturers or for the sale of commercial vehicles to all sections of the market.

One manufacturer may be able to dispose of his output entirely through branch offices because of the sizes and number of such vehicles made by him. Another manufacturer finds successful development with his business through the development of territory operated from his factory or headquarters, while a third may find it advisable to deal with retail establishments and distribute through these outlets.

Each one of these methods is limited in its application to the market, and more than one must be used to reach all the growing sections of the commercial vehicle possibilities. By far the majority of trading centers in the United States are small towns, and the majority of business concerns, large and small, are in the smaller centers. Almost half of the people of the United States live in rural communities, and if the smaller cities and towns be added, a considerable majority of the population live in these centers or the surrounding areas.

This situation is changing slowly, but the change is not sufficiently rapid to disturb the market calculations. The general use of commercial vehicles—that is, their use for all purposes outside of industrial and commercial haulage—is governed by the segregation of the population and the relation between trade center and delivery necessities. The volume of business done by the individual concern is an index only when the population factors of trading center and territory have been considered in connection therewith.

Most of the commercial vehicles in use to-day are used for light delivery purposes. This is evidenced by the fact that out of approximately 1,100,000 in use, over 600,000 are Ford trucks and about 150,000 more are commercial vehicles of the makes used for the same general purposes. This means that out of a total usage of somewhat over a million, at least 750,000 vehicles are used for local or territorial delivery where the load is comparatively small and the dumps frequent. Of course, this does not comprehend the whole of this market, as additional requirements of local delivery are answered by the use of heavier vehicles. However, the statement will serve to illustrate the percentage of the present use of commercial vehicles required for light delivery purposes.

A good deal has been said of the market for vehicles for hauling farm products to the railroad, trading center, or market. So far, the farm use of self-propelled vehicles for this purpose has been very slight and almost negligible in proportion to the total haulage requirements on the farms of the United States.

Smaller cities, towns and villages form the trading centers for the majority of the population of the United States. In the villages and towns, the actual area of distribution from the store is relatively larger per unit of turnover than in the larger city. The number of passenger cars per 100 people is greater. The economic value of the passenger car is relatively greater in these areas than in the larger cities or centers of population.

These same factors of population, distribution, trading area and volume, enter into the economic necessity of the commercial vehicle for local delivery purposes. The value of the motor vehicle is enhanced where the area of delivery is increased per one hundred families, and the trading radius grows larger in consequence. If the figures were accurately accumulated, it would not be surprising to find the larger portion of the 750,000 or 800,000 motor vehicles used for commercial purposes in the rural, small town and small city areas in this country.

The number of such vehicles required in any of these smaller trading centers is not large; only a few commercial vehicles would be required each year in order to supply the market. The total volume required for this section of the market each year in the United States represents,

IN this article Harry Tipper points out many of the inherent difficulties in merchandising commercial vehicles. He shows that methods must vary according to locality and offers suggestions as to procedure.

* * *

The rural territory and small cities offer a large market which cannot always be covered by exclusive representation. Mr. Tipper tells how this difficulty may be partially overcome by using passenger car dealers as a means of truck distribution.

however, a large percentage of the entire market and cannot well be neglected by the manufacturer who desires to maintain a national business.

The difficulty of the situation lies in the methods of distribution to be adopted in bringing the manufacturer's commercial vehicles into contact with this large and scattered, but productive section of the market. The passenger car has established itself in all these places. In all the trading centers there are retailers who are selling cars to the population in the surrounding areas. It is significant that the commercial vehicles sold in such areas are largely built and sold by factories making passenger cars and retailed through the same channels. Of such vehicles, coming from factories exclusively devoted to their manufacture, there is little seen either in the way of use or in the way of retail representation in these places. For most factories handling commercial vehicles exclusively, this market is as distant as a foreign country and contributes as little to his output. Nevertheless, the total sales are large and they represent a very considerable proportion of the total market.

As a natural enough matter, the manufacturer concerned only with commercial vehicles has held largely to the idea that these could be sold only by retailers giving their time and attention solely to this purpose.

Few attempts have been made to distribute from such factories to dealers handling passenger cars. Practically all passenger car factories making commercial vehicles have been successful in getting a reasonable distribution of these products through the retailing organization concerned primarily with the sale of the passenger cars.

Large Market Neglected

The sale of such vehicles is not fundamentally difficult, whether the article sold is one put out by a passenger car manufacturer or a manufacturer producing exclusively the commercial type. John Smith, who is a Sennett dealer in a town of 8000 people, has to sell the local dry goods store in the application of the Sennett truck to his business by just the same methods he would employ if he sold a truck put out by a manufacturer who did not make a passenger car at all.

The manufacturer engaged only with commercial vehicles has developed the large city and the industrial market to some extent, but the wide market in the smaller trading centers has not been developed systematically and in general these areas are supplied by commercial vehicles manufactured in factories making also passenger cars.

A good deal of discussion has arisen about the farm market for commercial vehicles. The use of this method of haulage by the farmer is increasing, although the increase is quite slow in comparison with the possibilities of such use. The development of this market depends entirely upon the convenience of retail contact in sale and service, and must be made through the existing channels of distribution quite largely because of the small volume probably in any one year in any one rural trading center.

Truck Sale Statistics

The few statistics it is possible to gather indicate:

(1) That the majority of commercial vehicles are used for local delivery.
(2) A majority of these vehicles are sold in the small trading centers.
(3) They are sold and serviced mainly by retailers handling passenger cars as well.

The small town and small market depends upon this type of distribution, and it is likely that a number of the medium-sized cities can be dealt with in a similar way.

Unfortunately, the statistics do not go into sizes and capacities in use sufficiently to indicate the limitations in the usual requirement in such places. Consequently, these conclusions are general and cannot be applied by the particular manufacturer without some further examination to determine the probable range of capacities required and the line of vehicles most likely to interest the retailer in these areas. The general statistics relating to the requirements of local delivery and the use of commercial vehicles clearly point out the proportion of the market located in and around these smaller centers and suggest the existence of an important part of the market under conditions which present the adoption of exclusive dealers for commercial motor vehicles. There is no question as to the present method of reaching this market and there is little doubt of its continued growth, or its importance in proportion to the entire market for these products.

Wide Range in Rural Hauling

In few of these places is the market confined to the use of light capacity vehicles. A proportion of the requirements demand the hauling of bulk goods where the larger capacity of haulage is of importance. The requirements of local haulage in the rural or small town trading center are more varied than the casual consideration would suggest. These variations make for the use of different types and capacities of vehicles, the light capacity vehicles predominating as they do in the larger centers.

The difficulty lies in the fact that the number required per year in any of these smaller centers is not sufficient to warrant the exclusive attention of the retailer to that business. On the other hand, few manufacturers of commercial vehicles have thoroughly attempted the distribution of their products through the existing passenger car retailers. Most of these were passenger car manufacturers first and added the other line to the passenger car business through to the local retailer.

Obviously, this method of distribution may be entirely out of line for larger cities and for particular work with industries, but for the purpose of cultivating the large proportion of the market composed of users of one or two commercial vehicles, the considerations in this article are of importance.

Potential Market in Brazil

THE sale of American-made automobiles in the Para district, Brazil, is not being pushed, and a potential field awaits some aggressive American agent or selling organization, the automotive division of the U. S. Department of Commerce is advised by Consul George H. Pickenell, located at Para.

There are no selling organizations or sub-agents which devote themselves exclusively to automotive products, he writes. Cars when displayed at all are usually shown in windows of hardware stores, surrounded by farm implements, and a general line of hardware fixtures, thus spoiling the entire beauty of the car. Most accessories are carried in these stores as a side line. Automobiles are not carried in stock by any of the selling organizations and a purchaser must await long deliveries.

Repair work, while satisfactory as to workmanship, is exceedingly slow, and an automobile owner must take his machine to various shops to get different kinds of work done. Negotiations for sub-agents or selling organizations may be taken up with the consul.

THE *Southern Ruralist* has published a booklet of interest to automotive sales managers. It contains a copy of the 1922 registration of automobiles by counties and makes for the thirteen Southern States.

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The AUTOMOBILE
Reg. U. S. Pat. Off.

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Unsound Business Practice

ELSEWHERE in this issue P. L. Palmerton points out a pretty moral when he speaks of tire sales in Belgium being dependent on discounts to chauffeurs. This practice which started in a small way has grown so strong that it is the principal factor in tire sales. Like all evil practices, no one ever expected it to assume the proportions that it since has, but now that it exists it is well-nigh impossible to break.

We in this country escape from such a contingency by virtue of the fact that the preponderance of cars are owner driven.

But we cannot pat ourselves on the back too much. Is not the practice of over-allowances for trade-ins on used cars similar in principle to the chauffeur evil in the Belgian tire market? Here, again, an unsound business practice has become common because of the desire for immediate sales and consequent hardship is suffered.

Quality is one of the foundations upon which the permanent success of a concern is established. The quality appeal in tire selling is lost through giving discounts to chauffeurs. That same appeal is swept away in selling motor vehicles by the practice of buying used cars from the prospect. Its loss means more sand and less concrete in the foundation of the manufacturer's organization.

Unsound business practice as a temporary expedient is apt to act like the proverbial rolling snowball; it gains weight and becomes unmanageable.

Four Cylinder V Engines

ONE of the most radical departures in automobile design made in recent years is found in the Lancia car described in our issue of Oct. 12. This new model evidently represents an attempt to reduce the weight of a car of given capacity and ability and to bring down the cost of manufacture. The small angled V type of construction was introduced by Lancia some years ago in connection with eight-cylinder engines, where it has the advantages of greatly reducing the unbalanced forces in a horizontal plane and of permitting of the use of a narrower and more sightly engine bonnet. What is gained by substituting this construction for the conventional type of four-cylinder engine is not so apparent, however. By departing from the usual form of four-throw crankshaft, equality in the intervals between explosions is maintained, but the cost of crankshaft manufacture is evidently increased, for the crankpin axes are no longer all in one plane and the long crank arms, instead of being straight bars of rectangular or other simple section, have to be made of the arched form characteristic of six-cylinder crankshafts.

While regularity of explosion sequence is maintained, the conditions of running balance are undoubtedly somewhat impaired. In the first place, the unbalanced forces are no longer confined to the vertical plane but contain a variable horizontal component as well, and the maximum value of the total unbalanced force is about 18 per cent greater than in a similar vertical engine. Owing to the materially different character of the unbalanced forces—a plain reciprocating force in the first case and a variable rocking force in the second—it is hard to say exactly how the amplitudes of vibration would compare, but it is a fairly safe assumption that the car with the V engine would vibrate perceptibly more.

The engine is very slightly shorter than the ordinary four-cylinder engine of the same displacement, but this shortening is effected by cutting down the length of the center bearing as well as that of the crankpin bearings. The over-all length of the engine could have been further reduced by using a two-bearing crankshaft, but apparently Lancia has no faith in that type of shaft.

One advantage of the construction resides in the fact that the rows of valves in the head are somewhat

farther apart than in a vertical valve-in-head engine, and the rocker arms therefore come longer, and, in consequence, exert less side pressure on the valve stems and their guides.

Perhaps the most interesting aspect of the new design is that it adds one more to the growing list of post-war European aluminum engines, which now include the Hispano-Suiza, Napier, Szawe and Austro-Daimler. In the earlier attempts to use aluminum cylinder castings a great deal of trouble was encountered due to the fact that the cylinders would distort when subjected to working temperatures, but it has since been found that if the blocks are previously annealed at a higher than their working temperatures they will not lose their shape in service.

All-Steel Bodies and "Frameless" Chassis

UNDOUBTEDLY the most interesting engineering feature of the recent Paris automobile show was the new and so-called "frameless" Lancia chassis, described fully in these columns under date of Oct. 12. In this vehicle the body forms the chassis frame and is the only structural member connecting the front and rear axles. The conception is a radical departure from conventional practice, but is worthy of careful study for two primary reasons:

1—It eliminates a heavy structural element, which has come to be looked upon as a necessary part of every car, and therefore should result in a considerable saving in weight.

2—It makes the car a substantially all-metal product which, it would appear, will greatly facilitate production and enable the use of a durable baked enamel finish such as cannot be applied to wood on account of the high baking temperatures required.

Some of the other features of the car in question, such as the novel type of front spring and axle and the V-type four-cylinder engine, while they are interesting in themselves, do not appear to be required to realize the advantages of a construction combining body and frame. In other words it would seem to be possible to realize the advantages inherent in the body and still utilize a conventional front axle and spring, and an ordinary type of engine.

It may be contended that the saving in weight is more apparent than real, since it will evidently be necessary to use a heavier sheet metal for the body and frame combined in one unit than is required for covering the body when the latter is made independent of the frame. On the other hand the vertical section used in the new Lancia is much deeper than any ordinary frame, so that the pressed metal employed can still be light if provision against buckling is made. Beside this the weight of wood ordinarily used would be eliminated, except perhaps that in floor boards and whatever wooden frames for upholstery and seats are employed.

It is interesting to note that the 122-in. wheelbase Lancia with a four-passenger phaeton body and full equipment is reported to weigh only 1650 lb. The track is only 43 in. but the engine has 122 cu. in. displacement, which is not small according to European standards. The car is said to be capable of making 70 m.p.h. and is not one of the diminutive types of automobile which are becoming more popular in Europe.

Just how a car of this general type will perform over rough roads such as are frequently encountered in this country is a matter for speculation. Comparative costs will undoubtedly be a determining factor, once ability to stand up under rough usage is demonstrated. Some satisfactory means for applying the upholstery would have to be worked out, if this has not already been done. Changes in body lines would be expensive, once dies are made for a given type. The matter of applying various upper structures to give the usual number of body models will require much study.

These are some of the problems whose solution must be sought before a radical departure, such as the Lancia design involves, can be considered by American builders. Nevertheless, the possibilities of such a design should not be overlooked.

How Much Does a Car Sale Cost?

DEALERS in every line of merchandise are demanding longer discounts. In some lines where 25 per cent was satisfactory ten years ago, dealers are demanding and getting 50 and 60 per cent. The difference is being passed on to the public. Automobile dealers are among those demanding larger discounts. But car and truck manufacturers know that there is a definite limit to what can be passed on to the public. They know that permanent progress depends upon reducing the cost to the public, rather than in increasing it.

Dealers may be able to prove, however, in many cases that they are not making reasonable profits on the present basis, and they will be honest in their statements.

The answer to the difficulty lies in a reduction of marketing costs, rather than in a shifting of discount percentages or an increase in price. Few companies would attempt to operate their factories to-day with as little detailed knowledge of unit costs as they have in connection with their sales. Total sales figures are no more useful in determining where costs can be cut than are total production cost figures in seeking production wastes and inefficiencies.

Cost accounting in regard to sales must be improved until it resembles in accuracy the picture of factory methods given by modern production cost figures. Unit sales costs must be determined. Total marketing costs must be split up into their integral parts and the resulting figures studied carefully if any real progress is to be made in reducing merchandising costs. Efforts along this line are essential to future progress.

Shipping Facilities Retarding Deliveries

Dealers Get Some Shipments Through Driveaways—Production Keeps Up

NEW YORK, Oct. 23—October production is holding up remarkably well despite the difficulty experienced in getting through materials. Shipping conditions have shown little improvement in the last week, nor is any expected until the needs of the farmers in moving crops and the demands of lake ports for coal have been relieved. Detroit has met the situation through the greater employment of motor trucks to bring steel from Pittsburgh, so that up to this time there has been no curtailment of operations from this cause.

Reports for the first week of October show only a slight falling off from the output of the last two weeks in September. That this condition exists is only a little less surprising than the fact that the usual seasonal decline has not yet struck the industry and it is doubtful if it will be apparent to any degree this year. New models and a stimulated interest in closed cars have kept up buying to an almost unprecedented level.

May Equal September

Indications point to the possibility that the month will develop a total production equal to September, when the output aggregated 206,000 cars and trucks, and that it will show a gain over last October when 147,000 were produced. Such curtailment in operations as may come in some plants between now and the end of the month probably will be more than offset by the increased production of the Ford plants.

Automobile dealers are now being hampered through the lack of adequate shipping facilities. With the growing shortage of available freight cars, driveways are being resorted to by most manufacturers, and as long as good weather prevails dealers can get some of the cars in this way.

Conditions through the country as they bear on the automotive industry are generally encouraging. Particularly good are the reports coming from the South and Southeast, where it is predicted that, with the improvement among the farmers, a normal volume of automotive business will be established by next spring.

With truck manufacturers there has been a steady advance. While the tractor branch of the industry has taken no decided spurt it has shown marked improvement. The majority of tractor manufacturers have made headway in clearing their floors of finished stocks.

Parts makers are in a thriving condition, with their financial foundation never sounder than it is now. Collections are good and orders on hand call for the maintenance of production at a peak rate.

Business in Brief

NEW YORK, Oct. 25—Industry is active. There is comparatively little non-employment, and the general situation is described as the best in a year and a half. Cooler weather is given the credit for this, especially in the retail and jobbing trades. Prices are holding up well, and while the car shortage is felt, still business is generally good. The pinch is on movements of crops, coal and lumber.

Car loadings for the week were 968,169, which was 20,212 fewer than in the preceding week but 68,488 over 1921. Merchandise and miscellaneous products suffered most, while grain and forest products slumped some; other loadings showed an increase.

There was an easing of prices of pig iron, steel and industrial coal and copper, too, dropped a bit. Steel buying, while fairly good, was not so active, and production has suffered because of delays in arrivals of raw materials and with the shipment of finished products.

Soft coal production is running along at a uniform pace, the returns for the week ending Oct. 17 showing about 9,900,000 tons, which is about the average of the last five weeks. Anthracite production is increasing slightly, the outlook being for about 2,000,000 for the week, which may be compared with 1,959,000 tons the preceding week and 1,843,000 in the like week a year ago.

Textiles have been active, and jobbers are buying more freely, which shows depleted stocks and heavier distribution. There seems to be a better feeling in the wool trade, with foreign markets firm.

Profit sharing and bear pressure caused sharp reactions in the stock market and stocks were lower, with bonds irregular. Liberty $3\frac{1}{2}$s were at a new high, and money and sterling ruled firmer.

Bank clearings showed a gain of 41.2 per cent, the aggregate being $8,915,082,000. Compared with the same week a year ago, there was a gain of 28.5 per cent.

Mengel Co. to Build Bodies for Durant

Output of New Louisville Company Will Be 30,000 During First Year

LOUISVILLE, KY., Oct. 23—A $600,000 automobile body manufacturing concern, with the Mengel Co. as the principal stockholder, will begin operations here early in 1923, F. B. Ayres, manager of the Louisville Industrial Foundation, announced last night.

It is understood that Durant interests are responsible for the formation of this new company, which will be only one of a half dozen body building concerns that will work on the 300,000 bodies which Durant will require in his operations during the next year.

The new company, known as the Mengel Body Co., will occupy a 30-acre site at Fourth and G Streets. Buildings will be erected south of the Southern Railway and will have track connections with the Louisville & Nashville Railroad. Construction will be started at once.

Plans are being made to manufacture 30,000 bodies during the first year and to give employment to 500 men. A five-year contract, totaling $20,000,000, has been obtained, it was announced. It is understood that this is a Durant contract.

Capital May Be Increased

The new company will be incorporated under the laws of New Jersey, and the initial capital is expected to be increased soon.

Plans for the new company were agreed on by R. Frank Monroe of Ludington, Mich., an expert automobile body builder, who has been associated with Durant in such work, W. C. Durant, William L. Hoge and Arthur D. Allen of the Mengel company. Allen will be president of the company, and Monroe and Hoge, vice-presidents. Monroe soon will remove to Louisville.

The new plant will manufacture bodies for light trucks, park and station wagons and regular chassis, especially those used for delivery purposes. The plant will consist of woodworking shops, dry kilns and assembling, painting and finishing departments, containing 200,000 sq. ft. of floor space. It will be so arranged that additional units may be added.

Plant in Kalamazoo

KALAMAZOO, Oct. 24—A new body plant to operate in connection with Durant Motors, Inc., the concern to be headed by H. Jay Hayes, of Detroit, with Victor Preston, of Grand Rapids, as engineer, is announced. Information concerning the new concern was first given out at a banquet tendered foremen of the Hayes-Ionia Automobile Body Co., at Ionia. It is reported the organization is to be perfected immediately.

Grant Stockholders Fail to Heed Appeal

Lack of Capital Results in Receivership—Plant to Continue Operations

CLEVELAND, Oct. 14—Joseph C. Hostetler, lawyer and member of the law firm headed by former Secretary of War Newton D. Baker, was to-day appointed receiver for the Grant Motor Car Co. His bond is $50,000.

Creditors of the corporation are asked in the bill of complaint to send in their claims. The plant will be closed for a short time for inventory, but the receiver has authority to operate the plant and this will be done, with the view to working out the company's salvation under the protection of the United States District Court. This has proved a great help to the Standard Parts Co., which has been in the hands of receiver Frank Scott for two years.

Plant Not Levied On

The appointment of the receiver was made by Federal Judge D. C. Westenhaver on the application of the Durston Gear Corp. of Syracuse, N. Y., which says that it obtained a judgment against Grant in the local common pleas court for $13,620. The company states that it has not levied on the plant of Grant for the reason that such action would precipitate a judicial sale and cause the assets to be placed on the auction block to the detriment of both creditors and stockholders.

The gear company states in its application that the $3,250,000 of authorized common stock of the company is all outstanding; that of the $1,250,000 of authorized 7 per cent cumulative preferred stock, $1,035,000 is outstanding and that the company's principal assets consist of land, buildings, machinery and stock.

It also states that the company owes to creditors $167,000 on open accounts; to merchandise creditors on notes, $232,000; to banks on notes, $638,000; to various holders of long term notes, $500,000, and to stockholders on notes, $41,000. Most of these obligations are past due, while the company cannot realize at once on its principal assets in order to pay the obligations. There was not sufficient money on hand to meet current expenses.

Unable to Get Working Capital

Other creditors in addition to the gear company have filed suits against the Grant company, alleging that, unless a receiver was appointed, they would join in action that would embarrass the company to an even greater extent.

The Grant company plant is at Coit road in this city, and its real trouble this year has been its inability to take advantage of the prosperous times that has come to the automobile industry in general by its failure to get sufficient working capital for current operating expenses.

Recently the company made an appeal to stockholders to help out by subscribing for more stock, but that appeal fell on deaf ears. Efforts have been made in other quarters to raise cash for working capital, but these failed.

"Sport" Name Given to Models Brings Back Unpleasant Inference That Car Is Pleasure Vehicle

By C. D. HASTINGS,
President, Hupp Motor Car Corp.

Detroit, Oct. 25.

USE of the name "sport car" to describe a specially equipped open model is not consistent with the policy of the industry in recent years to establish itself as a stable, conservative industry with a definite and important place in American business. For years now the industry has striven to overcome the early designation of pleasure vehicles, and now that this term has been practically superseded by passenger car, the name sport car has been devised injecting possibilities of many undesirable complications.

The industry has taken the position that all of its products are of major importance in the business and social life of America. There can be no question but that this is so. Unquestionably there will be fads from time to time which the industry must meet, but production schedules or earning capacities of factories will never be built upon fads. Where it is a question of meeting a temporary demand with specially designed and equipped vehicles, the industry should exercise a great deal of caution in the selection of its names.

Use of the term "artificial leather" to describe a specially perfected fabric which had an unquestioned place in the manufacture of cars has done much to destroy the possibilities of this fabric. As a substitute for leather it gives splendid service, in many cases better than leather, but the title "artificial" has made it unpopular in the buying public's mind. Had this fabric been established under a special name and this name used exclusively there would have been no instinctive feeling against it.

Nickel trimmings on cars have not worked out satisfactorily in the experience of the industry and there is no indication that it will work out more satisfactorily now. Minute imperfections in the metal or lack of care in handling before undergoing the nickeling process means a short life for the plating and owners whose cars chip or turn yellow will not be satisfied owners or future buyers of cars of that make. With the extreme care necessary in turning out cars of this type the production possibilities of factories must necessarily be curtailed.

Anything that does not make for utility in an automobile cannot be long lived. The trend toward utility in cars cannot escape the attention of the manufacturer, and the manufacturer who makes cars according to the greatest utility and service will lead the field. Where utility is considered nickel plating, drum type lights and other features of present day cars cannot endure. Everyone knows that much superfluous metal is used in the manufacture of drum type headlights. In the centering upon the development of cars to their greatest utility value all such superfluous metal and equipment must go.

Monroe May Consolidate with Louisville Company

LOUISVILLE, KY., Oct. 23—The Monroe Motor Co. of Indianapolis, which recently was reorganized after defending a receivership suit, is negotiating through Attorney Warren T. Godfroy here to consolidate with a Louisville manufacturing concern and move to Louisville. Neither the Fletcher-American National Bank of Indianajolis, which has a controlling interest in the property, nor Godfroy, would reveal the identity of the company here.

The Monroe company owns no property in Indianapolis, but leases its buildings. According to Godfroy's information, it has $750,000 quick assets and no indebtedness. Godfroy said that he visited the plant and that it is turning out three cars a day.

Climax Rubber Acquires Factory of Rotary Tire

COLUMBUS, Oct. 23—The Climax Rubber Co. of Columbus, which has been operating plants at Columbus and Delaware has taken over the plant of the defunct Rotary Tire Co. The deal was made by I. S. Hoffmann, president of the Climax company, with the Franklin Mortgage Co. of Columbus, which concern took over the property from I. R. Winegarner, the receiver. The deal is in the form of a lease with the privilege of purchase after certain litigation now pending is settled.

The Climax Rubber Co. has started operations. The equipment is sufficient for the manufacture of 500 casings and 500 tubes daily, and it is planned to get under full production soon. The plant is one of the best equipped in the State, among the smaller ones, and has a floor space of 50,000 sq. ft. It is planned to make compression tubes.

When the company was forced into the hands of the receiver about a year ago, the Franklin Mortgage Co. held a mortgage for $38,000. This concern advanced $20,000 more in cash.

Engineers to Drive Competitor's Cars

Chandler Vice-President Starts Move at Meeting of S. A. E. in Cleveland

CLEVELAND, Oct. 24—Cleveland automotive engineers for a period are going to drive their competitors' cars. The engineer of the Chandler Motor Car Co. will drive the car owned by the engineer for the Peerless Motor Car Co., and the Chandler engineer will lend his car to the Peerless engineer.

George M. Graham, vice-president of the Chandler company, started the swapping-of-cars idea when he addressed the Cleveland section of the S. A. E. He told the members that by driving a competitor's car for a day or two the engineer would learn of the latest developments in other cars, that he could talk more intelligently to his own organization and would broaden his vision.

Engineers Adopt Idea

Engineers in the audience fell in with the idea so well that they adopted it, and several volunteered to lend their cars on an exchange basis.

More and more as the industry grows, the automotive engineer should know of other makes, Graham said. The engineer is a bit of recluse and must have time to himself to think, plan and devise and then to check up, and he can obtain many excellent ideas from other cars and, in instances, save himself much time.

Another suggestion was that the engineers should come together often, as Graham also favored more frequent meetings of engineer and salesman. The engineer who acquires more of the viewpoint of the salesman, and the salesman who takes on some of the mechanical knowledge of the engineer will prove to be of greatest value in the industry, Graham said.

Research Work Important

The third suggestion, directed to the manufacturer, was that the importance of the research work of the engineer may not have been given the importance in the financial budget to which it is entitled. It is easy to get an appropriation to place more salesmen on the road and to extend the advertising campaign, he said, but it is difficult in too many cases to get the proper amount of money needed for engineering work that may never pan out in the production schedule.

The engineer was advised to keep close to the service department of the factory, where the latest information from the file may be obtained. Graham said that the service stations of the dealers and distributors also are a source of valuable information, inasmuch as there the engineer may get the customers' viewpoint. The service stations are the eyes and ears of the industry, and the engineer who is not in close contact with these departments is overlooking something.

The manner in which the distribution of automobiles has been made is a greater achievement than the fact that so many have been sold and are in operation, Graham told the engineers. One-third have gone into the homes of farmers and two-thirds into homes where the annual income is $4,000 and less.

Seventy-two per cent of the automobiles in use have gone to cities of a population of 50,000 and less.

Kettering Addresses Society

CHICAGO, Oct. 23—C. F. Kettering was the speaker at the meeting of the Mid-West Section of the S. A. E. on Friday night. His speech was devoted to analyzing the fundamentals of engineering.

Chicago Meeting Jan. 31

NEW YORK, Oct. 23—The Chicago meeting and dinner of the Society of Automotive Engineers will be held at the Congress Hotel Jan. 31, 1923.

CITROEN WILL SEND CARAVAN TO SAHARA

NEW YORK, Oct. 23—Approved by the French government, which will send official observers, an automobile caravan is being organized by Andre Citroen, French automobile manufacturer, for an exploration of the Sahara desert, according to a copyrighted cablegram to the New York Tribune.

Citroen has built the cars which really are moving fortresses, being armored and equipped with the caterpillar tread as were the tanks in the war. This protection is necessary because of the bandits who infest the desert. The expedition, which will start about Dec. 1, will be divided into three sections. The first will carry machine guns, mounted in armored cars, the second, the food supply, sufficient for a year, and the third, gasoline, water and spare parts.

The desert trip will be through country unknown to white men. It is believed it will produce scientific results of interest and is hoped by the scientists who will be in the party to make possible the discovery of ruins of prehistoric cities.

REPUBLIC TRUCK PLANS

NEW YORK, Oct. 23—The working out of plans for removing the Republic Motor Truck Corp. from receivership has reached that stage where the bankers are waiting for the auditor's report and appraisal of the company's property. Upon receipt of this report, which is expected about Nov. 1, a general creditors meeting will be called for consideration of the completed re-organization plan.

Durant Will Erect Another Star Plant

To Be Located at Flint and Have Production Capacity of 8000 Cars Monthly

NEW YORK, Oct. 24—W. C. Durant has ordered the construction of a fifth factory for the manufacture of Star cars. It will be located at Flint, will have a capacity of 8000 cars a month and will employ 4000 men.

It is to be a million dollar plant and will be a duplicate of the one now in course of construction for the manufacture of the Flint car. It will afford 51,640 sq. ft. of floor space and be of concrete and steel construction, brick faced. The contractor has agreed to have the plant completed by May 23. The main assembly plant will be three stories in height, 80 x 900. There will be three wings, two of them three stories, 80 x 400, and the third one story, 257 x 400.

The revised Durant schedule calls for the production of 281,000 Star cars between now and Dec. 31, 1924. Between Jan. 1, 1923, and Jan. 1, 1924, 86,000 will be made at Lansing, 50,000 at Flint, 53,650 at Elizabeth, 43,000 in California and 32,250 at Leaside, the Canadian plant. It is expected that the four plants now in operation will produce 16,000 cars before the first of the year. Up to the present about 4000 have been built.

Contract Between Driggs and Diamond Cab Voided

NEW YORK, Oct. 23—Deciding to do the marketing of its product itself, the Driggs Ordnance & Manufacturing Corp. announces the annulment of its contract with the Diamond Taxicab Co. which called for the manufacture of taxicabs to equip the fleets to be put out by the Diamond company. This has resulted in the formation of the Driggs Taxicab Corp. which will manufacture taxicabs in the plant of the Driggs Ordnance corporation at New Haven. It is planned to turn out 1000 cabs the first year.

A selling organization is being perfected to handle this product. It will be known as the Driggs Taxicab Sales Co., with E. E. Garrison in charge of sales. Its headquarters will be in New York, probably at 19 West 44th Street, the present location of the Driggs Ordnance & Manufacturing Corp.

The Driggs taxicab will sell at $1,950 f.o.b. New York, and the selling plan will be based on time payments to the drivers direct.

HENDEE MAY EXCEED 1920

SPRINGFIELD, MASS., Oct. 24—Sales of the 1923 Indian models are so satisfactory as to indicate that the Hendee Manufacturing Co. will do a business this year exceeding the high mark reached in 1920. A single day's sales totalling 309 cycles, Oct. 19, are reported as the best record for a year and a half.

Thropp Patent Suit Won by Seiberling

Decision of Lower Court Is Reversed and Infringement Claims Are Upheld

AKRON, Oct. 21—F. A. Seiberling, president of the Seiberling Rubber Co., operating plants at Barberton, Ohio, and New Castle, Pa., has won a notable victory in the United States District Court of Appeals, third circuit, at Philadelphia, in his patent infringement suit against the John A. Thropp & Sons Co. of Trenton, N. J., according to word received here to-day, the court of appeals reversing the trial court's decision and handing down a decision in Seiberling's favor.

It is expected that the case will be carried at once to the United States Supreme Court for final adjudication.

The final outcome of the Seiberling suit closely concerns the tire industry, as the John A. Thropp & Sons Co. is one of the largest manufacturers of tire building machinery and is supplying such equipment for more than 60 tire factories in the United States.

Covers Tire Building Machines

The Seiberling suits charged infringement of two of Seiberling's tire building machinery patents which he invented and used at the Goodyear plant in Akron, the litigation specifically involving spinning rolls and high speed cores used on machines spinning the cotton fabric into the tire carcass.

Prior to the final argument of the case before the trial court, the United States District Court of New Jersey last February, Seiberling withdrew his infringement claim on his first patent and filed a disclaimer which sought to read into the latter patent a particular process of tire building. The district court in its decision ruled that the patent in claim as modified by the disclaimer was invalid, on the ground that the process or method specified was nothing more than had formerly been followed by hand in tire construction.

The court of appeals, however, in its decision reverses the trial court and validates Seiberling's claim of a patent infringement.

The outcome of this case has also an important bearing on a similar suit filed some time ago by Seiberling against the Firestone Tire & Rubber Co. of Akron, and in which case the Firestone company received the verdict in the United States district court of appeals at Cincinnati a year and a half ago. This case is now pending on appeal.

1923 OAKLAND PRODUCTION

DETROIT, Oct. 23—Thirty per cent of Oakland production in 1923 will be closed cars, according to C. J. Nephler, general sales manager. September was the company's biggest month this year, due to the introduction of its new models, and October production will run higher. The company reports its sport car and two passenger coupe oversold. The sedan and five passenger coupe now are in full production. Full working time is assured for the winter months, he said.

W. R. Tracy, assistant sales manager, back from a trip through the Middle West, reports business in industrial centers holding up in good shape, but that farmer buying is considerably below normal.

STATION WAGON, CAR FOR TAXING PURPOSE

NEW YORK, Oct. 23—Affirming a decision recently made by Justice Norman S. Dike in the case of George G. Zabriskie against Walter W. Law, Jr., president of the State Tax Commission, the Appellate Division holds that the common type of automobile known as the suburban or station wagon is not a commercial truck but a passenger car, and as such is entitled to the lower license rate collected by the Automobile Bureau.

Judge Dike's decision held that station wagons were subject to the personal use of their owners only and were not used for the transportation of passengers or freight for pay, hence were not commercial vehicles.

Fuller Extends Gearsets to Passenger Car Lines

KALAMAZOO, Oct. 24—Fuller & Sons Manufacturing Co. has extended its output of gearsets to include types for both trucks and passenger cars. Among orders for passenger car equipment that have been received is one from the Maxwell Motor Corp. for 50 transmissions daily for use in the new model of Chalmers automobiles, and another given by the Barley Motor Car Co.

"Our production schedule for next week calls for over 1000 transmissions," president Frank D. Fuller says. "We expect to run steadily through the winter months and I look for a record breaking business all next year. For the ensuing week our payroll shows 326 people employed. We should be able to maintain that quota and probably increase it."

ELECTED TO ELECTRIC BODY

CLEVELAND, Oct. 23—The Philadelphia Storage Battery Co. and the Vesta Battery Corp. have become members of the Automotive Electric Association.

Philadelphia will be represented in the association by James M. Skinner, vice-president, and W. S. Cranmer, sales manager. Vesta will be represented by F. S. Armstrong, secretary and sales manager. The storage battery division of this association is making a careful study of battery distribution and service.

Rushmore's Patent Awarded Priority

Washington Hands Down Decision in Suit Covering Steam Cooling System

WASHINGTON, Oct. 23—The United States Patent Office has handed down a decision in the interference suit of Wellington W. Muir of the Harrison Radiator Corp. vs. Samuel W. Rushmore of the Rushmore Laboratory of Plainfield, N. J., awarding to Rushmore priority of invention for a steam cooling system for internal combustion engines on motor vehicles.

According to the testimony Rushmore filed his application March 21, 1921, and Muir's application was recorded Oct. 10, 1921. Rushmore, who is a former manufacturer of automobile headlights and of an electric starting and lighting system, offered in the way of testimony in the suit a copy of AUTOMOTIVE INDUSTRIES of May 26, 1921, which contained an article written by P. M. Heldt which described Rushmore's invention. The Patent Office in its decision stated that President Harrison of the Harrison Radiator Corp. had admitted he knew of Rushmore's work "in all probability" promptly after the issue of AUTOMOTIVE INDUSTRIES of May 26, 1921.

Rushmore System Intermediary

The Rushmore cooling system is in a way intermediary between the air cooling and the ordinary water cooling system. Water is used as the cooling medium, but the jacket outlet temperature is constantly maintained near the boiling point of water. Ordinarily there is little or no water in the radiator above the bottom tank. The radiator core is filled with steam to a certain height, depending upon the relation between heat absorption in the cylinder jackets and heat dispersal per unit of core surface of the radiator.

Temco Awarded Damages in Shock Absorber Suit

COLUMBUS, Oct. 23—The United States Circuit Court of Appeals has handed down a decision awarding the Temco Electric Motor Co. damages in its suit against the K. W. Ignition Co. of Cleveland, for infringement of the Thompson patent relating to shock absorbers for Ford automobiles. The case had been appealed from the District Court of the United States for the Northern District of Ohio, whose decision was reversed.

The decision carried with it a recovery of nearly $300,000, said to be one of the largest in a patent suit of this sort which has ever been secured. It is stated that 25 or 30 other concerns are also involved in this decision, and that some of them already have settled without court action.

Time Near to Build Tire Reserve Supply

Needed to Meet Spring Demands —Goodyear Plant Executives Hear of Prospects

AKRON, Oct. 5—Plant executives of the Goodyear Tire & Rubber Co. from Connecticut, Canada and California, in conference here this week, were unanimous in expressing the conviction that the tire industry to-day was on the most stable basis it had known in years, and that the outlook for the future was increasingly bright, with prospects for an unprecedented sale of tires early next year.

With automobile dealers expecting the greatest era of automobile buying within the next twelve months that the automotive industry has ever experienced, tire manufacturers will have to begin shortly to build up finished goods inventories in order to have sufficient reserve supplies on hand to meet emergency demands in the spring. The buying peak in automobiles is expected to be between March and June of next year.

Goodyear officials say the low mark of production in tires will be reached before Nov. 1 and that production will then curve upward again and continue on an upward curve as manufacturers prepare for the spring business. Goodyear now is on a basis of more than 20,000 tires a day.

Attending the three day conference were Harry Blythe, superintendent, and C. C. Slusser, general manager of the Goodyear tire plant at Los Angeles; E. H. Koken, superintendent of the Goodyear tire plant at Toronto; and A. M. Hardy, A. D. Wheeler and A. J. Smith of the Goodyear mechanical goods and solid tire plant at Bowmanville, Canada; S. A. Steere, superintendent of the Goodyear cotton mills in California, and C. W. Young, superintendent of the Goodyear cotton mills at Killingly, Conn.

Vice-president and Factory Manager Paul W. Litchfield presided at the sessions.

Dunlop Refits Factory It Bought Near Paris

PARIS, Oct. 4 (*by mail*)—Dunlop this week inaugurated his new 250 acre tire factory at Montluçon (Allier). Built during the war by the French Government for shell production, this factory was purchased by the French Dunlop Tire Co. soon after the armistice and has been fitted up in the most modern manner. It will replace the factory at Argenteuil, near Paris, which had become too small for modern requirements.

The new Dunlop factory gives employment to 5000 work-people. Placed almost in the center of France, it is conveniently situated for railroad transportation and is by the side of the Berry canal. There are 12 miles of normal gage railroad tracks within the works and 40 miles of narrow gage line. The factory has attached to it a garden city with houses for 700 families.

To celebrate the completion of this factory, which is stated to be the most modern of its kind in Europe, the Dunlop company ran a special train with saloon and dining cars from Paris to Montluçon for the convenience of its guests.

9 MONTHS' OUTPUT PUT AT 1,875,227

WASHINGTON, Oct. 25—Figures received by the Department of Commerce through the Bureau of the Census places total production of passenger cars in September at 186,562, compared with 249,225 in August, and of motor trucks at 18,843 as against 24,200 in August. While the September production is the lowest since March, it is considerably above the figures for September, 1921, when 144,669 passenger cars and 13,648 motor trucks were produced.

The following table gives the total output for each of the last nine months. With a few exceptions, the each month are from identical firms and include approximately 90 passenger car and 80 motor truck manufacturers. September figures are subject to slight revision when all reports have been received.

1922	Passenger cars	Trucks	Total
Jan.	81,693	9,416	91,109
Feb.	109,171	13,195	122,366
March	152,959	19,761	172,720
April	197,216	22,342	219,558
May	232,431	23,788	256,219
June	263,027	25,984	289,011
July	224,057	21,357	245,414
Aug.	249,225	24,200	273,425
Sept.	186,562	18,843	205,405
	1,696,341	178,886	1,875,227

INLAND RUBBER ELECTION

CHICAGO, Oct. 23—At the annual meeting of the stockholders of the Inland Rubber Co. the following officers and directors were elected: E. B. McKay, president and general manager; M. J. Flynn, treasurer, and F. L. Ayer, secretary. The directors elected are E. B. McKay, M. J. Flynn, F. L. Ayer, Adolf Kuecken and A. Colnon.

THOMAS H. GLENN DIES

BOSTON, Oct. 25—Word has been received here of the death at Dunkirk, N. Y., of Thomas H. Glenn, the first manager of the New England branch of the Firestone Tire & Rubber Co. at Boston. He was one of the pioneers in the tire field, and after working for the Firestone in its early days at New York was transferred to Boston.

Distributors Order 300 Federal Trucks

Annual Sales Meeting Held—Plant Operations Exceed 50 Per Cent Capacity

DETROIT, Oct. 23—Federal Motor Truck Co. received orders from distributors at its annual sales convention this week in excess of 300 for immediate delivery and looks for a steady stream of business through the winter months. The factory now is operating at better than 50 per cent of its normal capacity and is rapidly getting into production on its new light models. Buying from the farm districts is light, but is improving.

M. L. Pulcher, vice-president and general manager of Federal, predicted that the next five years will be the most prosperous era the truck business has known. Dealers who have been through the depression of the past two years are about to cash in, Pulcher said, and will do so because of the present disorganized railway transportation system of the country.

F. L. Pierce, general sales manager, pointed out to the convention the strength of the Federal sales organization, declaring that in addition to the 75 distributors present, it had 600 dealers. L. B. Dudley, advertising manager, outlined the company's advertising program, and R. H. Crooker, sales promotion manager, told of plans to aid dealers.

The convention closed with a dinner at the Detroit Athletic Club, at which F. W. Fenn, chairman of the motor truck committee of the N. A. C. C. spoke, in addition to company officers. An inspection trip to the Muskegon plant of the Continental Motors Corp. followed the dinner.

Nash Turning Out 75 Cars Daily at Milwaukee Plant

MILWAUKEE, Oct. 23—Operating at capacity and with night shifts, the Milwaukee plant of Nash Motors is turning out 75 cars a day, employing more than 1000 men. By March 1, when the addition to the local plant will be completed, this output will be increased to 125 cars a day. Lack of bodies also has limited production, although the Seaman Body Corp. has doubled the capacity of its plant.

To accommodate the large number of workmen employed by the Nash company, and men engaged (in building the new LaFayette works adjoining this plant, as well as further extensions of the Nash factory, the Milwaukee Electric Railway & Light Co. has installed four large passenger buses to operate between the end of its city line and the Nash-Lafayette works. Passengers pay the regular city fare of 7 cents and have the usual transfer privileges.

Milwaukee Schedules Reach Steady Level

Improvement Seen Especially in Motor Truck and Passenger Bus Field

MILWAUKEE, Oct. 23—Production schedules in practically all branches of the automotive industry have settled down to an even pace on the basis of contracts that will probably cause no marked variation in volume until the holiday vacations. So far as passenger car builders are concerned, they are operating as well as the September average, and orders from distributors and dealers are absorbing output steadily, while on closed types factories are still far behind and see little hope of catching up with deliveries until the end of the year.

Motor truck manufacturers are finding a steadily improving market, both for freight carriers and passenger vehicles of the motor-bus type. The latter has come to be a distinct feature of business. The call for freight trucks covers the general range, with the ¾ to 1-ton and the 3 to 3½-ton vehicle moving probably best at this time.

Activity in Engine Shops

Engine shops are very busy, and operations are at least as good, if not somewhat heavier, than the summer average due to good orders for current as well as future delivery. Heavy duty engines for trucks are in better request than at any time this year. It is apparent that the motor truck trade is laying foundations for increased production in anticipation of a much better market, as the business of this country comes to a more complete realization of the critical situation of railroad transportation, especially when winter makes the present serious condition far worse.

Makers of automotive equipment, both for the manufacturing trade and the industries catering to individual owners, report business very satisfactory and look for the most active winter production season since 1919, or even an increase of activity. Shipping directions from manufacturers and jobbers are coming freely, and so far there is little or no accumulation for stock in warehouses, although usually at this time plants were beginning to lay up surplus for the spring rush.

The railroad freight situation is more unfavorable than before, but motor transport facilities are being put to good use, especially on short hauls. This method is coming into greater use, regardless of the railroad situation.

WHITE CO. AT CAPACITY

CLEVELAND, Oct. 24—Production by the White Co. has been steadily increased until its plants are now operating at their capacity of 10,000 trucks annually. The company reports unfilled orders sufficient to keep its plants busy for at least two months, with new business continuing large. The management has reduced bank loans from $9,000,000 to $500,000, and cash in hand is about $2,500,000. No new financing will be required to carry out the company's policy of expanding production as fast as conditions warrant.

NO LET-UP IN OUTPUT PREDICTED BY BANKER

BOSTON, Oct. 25—"Motor vehicles ranked third among the essentials which showed a shortage during 1922," Col. Leonard P. Ayers, vice-president of the Cleveland Trust Co., told the men gathered here to attend the annual conference of the Harvard Universal Committee on Economic Research at the Harvard Club this evening. There were 200 business men present.

"There were four shortages," Col. Ayers said. "The first was in building, the second railroad equipment, the third motor vehicles and the last was a general shortage of many lines of the thousands sold in stores. The record being made in automobile output will continue, as there seems to be no indication that it will diminish in 1923."

He predicted a real business revival, and gave facts upon which he based his optimism. His address made a deep impression upon those present. He predicted that there will be notably fewer motor companies competing for business in 1925, and added that in 1923 the automobile industry will reach an unparalleled pitch of competition.

Mexico Levies 10 Per Cent Duty on Cars and Trucks

WASHINGTON, Oct. 23—Amounting to 10 per cent of the value as carried by the consular invoice, the Mexican government has imposed an import duty on automobiles and trucks. It became effective upon publication in the Diario Official on Oct. 20, according to a telegram received by the Department of Commerce from Assistant Trade Commissioner John P. Bushnell, Mexico City.

Automobiles have been admitted into Mexico free of duty since Jan. 7, 1919. Changes made affect all goods reaching the country after the date of publication and apply equally to imports from all countries.

It is understood that the duty is being imposed at the instance of a group of German and French manufacturers, coupled with some Americans, who have proposed to erect a large manufacturing plant in Mexico, provided they are given the tariff protection.

The new import duty will affect approximately 600 cars per month imported from the United States.

Southern Farmers Buying Power High

Best in Three Years, Bank Finds —More Liberal Loans Being Made

ATLANTA, Oct. 25—An investigation of crop conditions over the South this year as compared with last year, conducted recently by the Atlanta National Bank indicates that the twelve most important crops of the South, in 1922 returns in dollars, will bring to southern farmers at least one billion dollars more than the same twelve crops realized in 1921. This includes cotton, which this year brings southern growers about $500,000,000 more than in 1921, with cotton seed about $70,000,000 more.

The same bank advises that the buying power of the southern farmer is now at a considerably higher point than it has been at any time in the past three years, in spite of the fact that much of the money he makes on this year's crops will be needed for liquidation purposes.

No Difficulty to Borrow

Banks throughout the entire South are making more liberal loans to farmers than they have in some time in the view of their financial recovery this year, and it is no difficulty whatever to borrow money with which to purchase farm machinery or tractors, trucks or automobiles, especially if the latter are to be put to some productive use other than for mere pleasure.

What the increased buying power of the farmer means to the automotive industry in the South remains to be seen, but dealers and distributors almost invariably are looking for a normal volume of business between now and next spring.

Registration figures for the State of Georgia to Oct. 15, as compared with records to the same date in 1921, show a material increase this year, especially in the smaller counties where the population is principally rural.

American Bosch Expects to Gain Over September

SPRINGFIELD, MASS., Oct. 24—A. H. Bartsch, sales manager of the American Bosch Magneto Corp., has returned from a two weeks' trip in the Middle West and South and reports sales as very satisfactory.

The number of Bosch dealers throughout the country has been increased by 20 per cent in the last six months, and it is estimated that the volume of business done by branches and agencies in the month of October will exceed that of the preceding month.

Connections have recently been made with automobile manufacturers which promise a substantial expansion of production for the direct outfitting of cars, along with the growing trade in replacements.

Fine French Makers for Demonstrations

Records Were Established Without Approval Given by National Federation

PARIS, Oct. 10 (By Mail)—For having taken part in competitions, demonstrations or races not approved by the National Federation of automobile manufacturers, a fine of 20,000 francs each and a threat of expulsion from the automobile show have been pronounced against Renault, Delage, Voisin, Rolland-Pilain and Peugeot.

The group of manufacturers' associations which is responsible for the organization of the Paris show stipulates in its general conditions that no exhibitor shall take part in any race, competition, or sporting event which has not been approved by the National Federation.

Lamberjack, a Paris dealer, established a record from Paris to Milan on a 10 hp. Voisin. For this performance the Federation pronounced a 20,000 francs fine against Voisin and threatened to shut the firm's cars out of the Paris Salon. The Voisin directors refused to pay and declined to withdraw their cars from the show.

Delage Toured France

A Hartford shock absorber dealer established a record run from Paris to Madrid on a Delage car which was his own property. This was followed by a 3000 mile tour round France in five days by the Delage company, and for these two events the Federation pronounced a 20,000 fine against the Delage company. Rolland-Pilain made a fast run from the north of France to the Spanish frontier and was fined the same amount. Renault and Peugeot appear to have broken the law unintentionally. The former carried out an endurance test from Paris to Warsaw at a moderate rate of speed, and the latter made a demonstration run with a crude oil engine from Paris to Bordeaux and return, the average speed being less than 30 miles an hour, and they were put on the black list.

Voisin, Delage and Rolland-Pilain refuse to accept the decision of the Federation. They claim that they will not pay the fine and they contest the right of the Federation to shut them out of the national show held in a Government building loaned for the benefit of the entire automobile industry. Except in official circles the impression is that the action of the Federation is much too drastic, for it limits all activity on the part of makers and dealers to competitions and demonstrations approved by a small group. A fight to the end on this point is expected.

PARKER TIRE RECEIVERSHIP

INDIANAPOLIS, Oct. 25—The Parker Tire & Rubber Co., operating a plant in this city, has been placed in the hands of a receiver by Judge Linn D. Hay. Suit was brought in the name of the Central Rubber & Supply Co., jobbers in mill supplies and automobile accessories.

Though insolvency is not claimed, it is alleged that an emergency exists and the assets of the company are endangered by numerous debtor claims and threatened suits. The Bankers Trust Co. has been appointed receiver. It is understood that, though the plant will not be operated for the present, its stock of tires will be sold by the receiver.

Ford Produced 42,096 Cars Abroad in First 8 Months

DETROIT, Oct. 23—For the first eight months of 1922 the foreign plants of the Ford Motor Co. produced 42,096 cars and trucks as compared with 20,756 in the same period in 1921. This does not include the Canadian plant, which built 37,696 units in this time, compared with 34,178 in the first eight months of last year. The Canadian company turned out 3511 in August. In South America, the Ford company says, business is showing wonderful improvement.

In the six foreign plants, not including Canada, the production for the first eight months of this year as compared with the same period in 1921 was as follows:

	1922	1921
Manchester	21,305	12,431
Buenos Aires	7,073	2,616
Copenhagen	7,013	3,713
Bordeaux	6,722	847
San Paulo	1,876	616
Cadiz	3,117	439

Cars Grow in Importance, Hardy Tells Service Men

DETROIT, Oct. 23—Automobiles will be the principal medium of transportation in the near future, President A. B. C. Hardy of the Olds Motor Works told the service managers gathered at the factory this week for the annual convention. It will rank next after food, clothing, housing and the telephone in importance in the life of the people, he said. Startling improvements will be made in the next five years, he declared, making for economy, lighter weight and increased power.

An exhibition of parts, illustrating mechanical features of the Olds models, will be made a permanent exhibit to promote the development of service at all times when dealers or service men visit the plant.

LEE IN MIDDLE WEST

WASHINGTON, Oct. 24—American automobile manufacturers and other business men in the Middle West will be told the trade extension work that is being conducted by the automotive division of the United States Department of Commerce in behalf of the automobile industry by Gordon Lee, chief of the division, who will leave Washington Nov. 1 on a ten day speaking tour through that section.

Crude Rubber Price May Force Up Tires

Manufacturers Remain Non-Committal on Action Likely to Be Taken

AKRON, Oct. 24—Akron tire manufacturers remain steadfastly non-committal upon the report that they have under consideration an increase in tire prices which may approximate 20 per cent. Despite their refusal to discuss the rumor, however, the matter of a tire price revision upward within the next month or so is considered probable by men close to the tire industry.

Strengthening the rumor of a price increase is the fact that crude rubber is soaring in price, having jumped from 14 cents to 23 cents a pound within the past two weeks, and that crude rubber quotations for winter deliveries show a considerably higher price, which is expected to keep on increasing.

Tire prices for some months have been the lowest in the history of the automotive industry and far below pre-war price levels, when tires did not give one-third of the mileage that the present day tire will average.

Some Companies at Advantage

When some companies cut prices last spring and again in the early summer, a few companies instead of following suit immediately introduced a new line of cheaper fabric and cross-rib cord tires to compete with the lowered prices of standard tires and kept their standard tires at standard list prices. This condition puts these companies almost in a position where they cannot well increase prices on standard brands of tires, whereas companies which lowered the prices of their standard casings are in a better strategic position to revise prices upward again.

Spring customarily is the time for tire price revisions, but with the crude rubber market strongly indicating a steadily rising price, it is considered very prboable here that the motoring public soon may be paying more for its tires and that the increases will come before spring.

Mitchell Able to Make 100 Additional Bodies

RACINE, WIS., Oct. 23—A capacity for manufacturing 100 bodies a day is provided by the new paint shop and trimming works, established by the Mitchell Motors Co., Inc., in this city. The building is four stories high, 93 x 320 ft. in size, and is regarded as a model plant of its kind.

The building itself is closed airtight. Incoming air is forced to pass through washers to regulate the humidity and supply clean air for the paint and varnish rooms. Individual "weather machines" for each dry room provide heat and automatically furnishes the desired percentage of humidity.

Parts Makers Show Gain Over Year Ago

This September Was 62.1 Per Cent Better in Sales Than Same Month in 1921

NEW YORK, Oct. 24—Parts makers are doing a surprising business for this time of the year, according to reports from members of the Motor and Accessory Manufacturers Association. This statement is based on September, 1922, which is 62.1 per cent better than September, 1921. Last month sales ran to $37,300,050 as compared with $23,141,891 12 months ago. There is the usual seasonal slump but it is not as severe a one as in previous years. In fact, September may be compared with April of this year, which marked the start of great activity in the parts business.

Collections, too, are better than a year ago, although somewhat slower than in August. Past due accounts show an increase of 13.91 per cent in September, 1922, over August, while notes outstanding in September totaled $2,658,800 as compared with $3,677,500 in September, 1921.

Other reports on future business show that car manufacturers are buying conservatively. Purchases are not being made very far in advance; in fact, there are few who are ordering any further ahead than January.

SALES BY M. A. M. A. MEMBERS FOR 9 MONTHS SHOW AGGREGATE OF $308,855,420

NEW YORK, Oct. 25—Reports from members of the Motor and Accessory Manufacturers Association show that sales in September, 1922, decreased 13.36 per cent over the preceding month, August, and that for the first nine months of this year the total sales amounted to $308,855,420, or $116,216,675 more than for the corresponding period of 1921.

The following table shows the sales by members of the association, the total past due accounts and the total of notes held for all the months of 1921 and the first nine months of 1922:

1921	Total Sales	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	$6,264,587		$8,099,727		$4,359,871	
February	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,069,118	39.08 Inc
March	20,120,386	93.30 Inc	5,603,992	16.57 Dec.	5,069 877	16.38 Dec.
April	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc.
May	26,781,350	.13 Inc	4,505,176	15.64 Dec.	4,460,355	16.77 Dec.
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc	4,012,670	10.37 Dec.
July	23,096,214	1.68 Inc	5,242,046	10.79 Inc	3,690,154	7.90 Dec.
August	23,397,640	1.31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec.
September	23,141,891	1.09 Inc	4,358,545	.22 Inc	3,677,500	5.24 Inc.
October	22,053,327	4.70 Dec.	4,512,680	3.54 Inc	3,463,500	5.82 Dec.
November	18,998,490	13.85 Dec.	4,352,000	3.56 Dec.	3,661,900	5.73 Inc.
December	14,349,750	24.47 Dec.	4,220,450	3.02 Dec.	3,384,250	7.58 Dec.
1922						
January	17,320,000	20.61 Inc.	4,450,000	5.45 Inc.	3,146,000	7.02 Dec.
February	22,720,000	31.17 Inc.	4,070,000	8.57 Dec.	3,483,000	10.74 Inc.
March	28,670,000	26.14 Inc.	2,890,000	28.86 Dec.	2,657,000	23.69 Dec.
April	33,830,000	18.07 Inc.	3,000,000	2.00 Inc.	2,500,000	1.05 Dec.
May	43,700,000	28.06 Inc.	2,900,000	2.75 Dec.	2,450,000	6.05 Dec.
June	42,000,000	3.85 Dec.	2,840,000	1.25 Dec.	2,320,000	5.00 Dec.
July	41,001,670	2.42 Dec.	3,423,850	20.42 Inc.	2,217,670	4.49 Dec.
August	43,700,000	5.00 Inc.	3,705,000	8.21 Inc	2,398,350	8.15 Inc
September	37,300,050	13.36 Dec.	4,220,400	13.91 Inc.	2,658,800	10.86 Inc

Price Reductions Made by Case on Two Models

RACINE, WIS., Oct. 25—J. I. Case Threshing Machine Co. announces price reductions ranging from $70 to $370 on its passenger car models. No change has been made on the Model X phaeton and roadster. The list is as follows:

	Old Price	New Price
Model W, phaeton	$2 200	$1,990
Model W, sedan	3,250	2,975
Model W, coupe	2,850	2,480
Model W, sport	——	1,950
Model X, sedan	2,690	2,575
Model X, suburban coupe	2,550	2,480

Michelin and Dunlop Cut Prices of Tires Abroad

WASHINGTON, Oct. 23—The French Michelin Co. reduced tire prices in the Scandinavian countries about 20 per cent on Sept. 4, the English Dunlop company following immediately, according to a report from Paul L. Palmerton, chief of the Rubber Division of the Bureau of Foreign and Domestic Commerce, who is now in Europe investigating foreign markets for rubber goods.

The Michelin company altered its plan of distribution in Scandinavia about a year ago, and now has perhaps 18 to 20 per cent of the tire trade in Denmark, three to five per cent in Norway and probably less in Sweden.

Price reductions were made by Michelin in Belgium on Sept. 1, and similar reductions are reported in France. The Belgian Englebert Co. has also adopted the new Michelin price list in Belgium.

TWIN CITY TRUCK CUT

MINNEAPOLIS, Oct. 23—Minneapolis Steel & Machinery Co. announces the following reductions in the price of Twin City motor trucks:

	Old Price	New Price
2-ton model	$2,750	$2,400
3½-ton model	3,950	3,500

Page Makes Last Payment on Plainfield Property

PLAINFIELD, N. J., Oct. 23—Carl H. Page, president of the American Motors Corp., has made the final payment of $5,646.48 on the total purchase price of $200,000 set upon the property by the court at the receiver's sale, and the reorganization company of which Page is the head has formally taken over the plant.

Under the reorganization plan put into effect some months ago, interests identified with the original company have provided working capital amounting to about $250,000, and it is announced that the balance of the new company's stock will be turned over to a group of Philadelphia brokers under an arrangement that will net the company an additional amount of $250,000.

President Page reports that September was the best month in the company's history, and he expects the plant will be running on a 1000 cars per year basis within the next 60 days.

Chapin Back Announcing Depot Opened in London

NEW YORK, Oct. 25—Roy D. Chapin, president of the Hudson Motor Car Co., was one of the passengers on the Majestic, returning from a 10 weeks' business trip in France and England. As a result of the trip Chapin announces the establishment of a general European depot in London for the distribution of Hudson and Essex cars.

Chapin said:

We intend going after European business on a much larger scale than ever before and the establishing of this depot will facilitate business from an exchange and delivery standpoint.

Because of taxes and the high price of gasoline, there is a distinct tendency in Europe to get in for the small car. Also there is a tendency to use motor vehicles less commercially and more for pleasure than we here in America. Cars of the same quality of European manufacture are far more expensive than those of American manufacture which is caused by the limited volume of production in Europe.

American Steam Truck Acquires Duty Factory

CHICAGO, Oct. 24—The American Steam Truck Co. to-day announces the completion of negotiations by which it acquired the factory of the Duty Motor Truck Co. at Elgin, Ill. These negotiations have been in progress for several weeks, and for a time it appeared as if they would fail because of the opposition of some members of the Elgin Chamber of Commerce.

Men of the Industry and What They Are Doing

Wood Heads Coach Company

Frederic T. Wood has been elected president and general manager of the Fifth Avenue Coach Co. and the New York Transportation Co. to fill the vacancies caused by the resignation of President John A. Ritchie and Vice-President and General Manager George A. Green, who have joined the Yellow Cab Manufacturing Co. of Chicago, as president and vice-president and general manager, respectively. Wood will fill the dual rôle, while R. E. Fisher will continue as chief engineer. Wood comes into the presidency with an experience of 20 years as a student of transportation, some of which time has been devoted to studying the problems of London and Paris. Previous to his present connection he acted as secretary to Job Hedges, receiver for the New York Railways.

The New York Transportation Co., the parent concern, will continue the manufacture of motor buses, although no statement has been issued as to its future plans in this department.

McConnell Leaves Klaxon

D. A. McConnell has resigned the presidency of the Klaxon Co. of Newark, N. J., effective Dec. 31, although his active connection with the company ceased Oct. 15. As yet McConnell has formulated no plans as to his future business connections. In all likelihood he will spend the winter in California. With F. Hallett Lovell, Jr., McConnell formed the Lovell-McConnell Manufacturing Co. in 1906 to manufacture the Klaxon horn which was one of the pioneers in the electric warning field and which was invented by Dr. Miller Reese Hutchinson. In 1916 Lovell retired following the selling of the Lovell-McConnell interests to United Motors, which in turn transferred the interests to General Motors a couple of years ago. Lovell retired from business altogether at the time and McConnell remained with the Klaxon interests as president and general manager until the present.

Wilson Chalmers Sales Director

Earl B. Wilson has been appointed director of sales of the Chalmers Motor Co., following his resignation from the sales department of the Willys Corp. For several years he was connected with Buick in branch and factory sales work, serving in Chicago, Memphis, Philadelphia and Flint. He entered the sales field first handling farm machinery, serving several years before entering the automobile business.

Locomobile Makes Changes

Clinton B. Amorous, manager of the Locomobile Co. of America's Boston branch and in charge of its New England distribution, has been made manager of the New York Locomobile branch, relieving E. A. Travis, general sales manager of the Locomobile company, of the detail of responsibility of the branch. Under the arrangement, Travis will be able to devote his entire time to the duties of general sales manager of the recently reorganized company. W. S. Porter, Chicago branch manager of the Locomobile interests, succeeds Amorous in Boston. Porter in turn is succeeded in Chicago by J. Murray Page, who lately has been representing Marmon interests in Chicago and the West.

Cravens to Go Abroad

George W. Cravens, president of the Climax Engineering Co., of Clinton, Iowa, will start on a trip to Europe shortly to investigate the Diesel engine situation there.

Rickenbacker in Turin

E. V. Rickenbacker, vice-president and director of sales of the Rickenbacker Motor Co., is now at Turin, Italy, visiting the Fiat plant, builders of the car which won the last French Grand Prix. After a visit to Germany to inspect the automobile and aircraft manufacturing plants, Rickenbacker attended the Paris show and from there went to Italy. He will return to America by way of England, stopping off for the London exhibition. In all he will have spent two months in Europe on his wedding trip, in which he combined a search for new developments in the automotive field.

T. E. Myers Sails for Europe

T. E. Myers, secretary and general manager of the Indianapolis Speedway, sailed for Europe on the Aquitania Tuesday. The Indianapolis Motor Speedway Co. is sending him to get a line on the prospects for European factory entries in the eleventh annual international 500 mile sweepstakes on May 30 for 122 cu. in. cars. On arriving in Europe, Myers will be met by W. F. Bradley, of Paris, who will accompany him on his visits to the European factories. Myers plans to visit plants in England, France, Belgium, Germany, Australia, Italy, and also to inspect the famous cement bowl at Brooklands and the new Monza track at Milan. The Indianapolis speedway has decided to accept entries from Germany and Austria for the coming race. Entries also are expected from Fiat, Sunbeam, Ballot, Peugeot and Mercedes.

Crabtree Succeeds Tisdale

William O. Crabtree, formerly representing the Bethlehem and Republic trucks in New York City, succeeds Glen A. Tisdale as New York representative of the Franklin. Crabtree will take over the Franklin agency and act as distributor for Manhattan and the Bronx.

Woodworth Joins Fuller

Frank Woodworth of the Remy Electric Co., Anderson, Ind., has been appointed production manager of Fuller & Sons Manufacturing Co. He succeeds William T. Clark, who has severed his connections with the plant. The position will not be a new one for Woodworth for he was with the Fullers when they built the first unit of their present modern factory.

Multibestos Appoints Miner

E. C. Miner has been named sales manager of the Multibestos Co. of Walpole, Mass.

Harvey With Matthews

R. B. Harvey, formerly of the Westinghouse company and the Litscher-Lite Corp., has been appointed sales manager of the farm light and power division of the Matthews Engineering Co. of Sandusky, Ohio. Harvey's experience covers every phase of the farm light and power business from manufacturing to sales.

Pardee Returns to Commercial

C. L. Pardee, Jr., at one time credit manager for the Commercial Investment Trust Co., has returned to that concern in the same capacity. Pardee has been engaged in handling personal matters since leaving the organization in 1915.

Will Speak at Convention

Representatives of the automotive industry will be among the principal speakers at the fifth annual convention of the Direct Mail Advertising Association to be held in Cincinnati Oct. 25, 26 and 27. Harry Tipper, business manager of AUTOMOTIVE INDUSTRIES, will speak on "The Broader Outlook of Business"; A. B. Batterson, director of advertising, Buick Motor Co., Flint, Mich., will talk on "A House Organ That Brings Real Financial Returns," and Walter J. Towers, advertising manager, Paige-Detroit Motor Car Co., will talk on "Twelve Million Dollar Sale of a New Product in Six Months."

J. C. Agnew Appointed

J. C. Agnew, for several years sales manager for Frank H. Sanders, former Chicago dealer for the Franklin, has been appointed assistant sales manager of the Detroit Air Cooled Car Co., Detroit.

ONE EQUIPMENT SHOW

CHICAGO, Oct. 23—The open show of automotive equipment, which was scheduled to be held at the Chicago Armory the week of Nov. 13 simultaneously with the Automotive Equipment Association's show for its members has been called off, it was announced to-day by Charles P. Hughes, promoter of the enterprise.

Manufacturers Adding New Models to Lines of Cars

Haynes

KOKOMO, IND., Oct. 24—a new Model 55 sport coupelet has been added to the Haynes 1923 line. The price is $2,095. It carries three passengers, has complete sport equipment and is finished in Haynes coach blue. The equipment includes six disk wheels with six cord tires, a trunk on a trunk rack at the rear, nickel plated radiator and headlamps, Moto-Meter, sun visor, etc.

The seat is upholstered in black long grain leather while the remainder of the interior above the belt line is in fabric. There is a compartment at the rear of the seat and a luggage space in the rear deck. A gasoline gage is on the dash and a stop light is part of the regular equipment.

The newest Haynes model is the Model 55 sport sedan for $2,695. The chassis and body are the same as the standard Model 55, but a considerable amount of equipment is added. Six disk wheels with six cord tires, 32 by 4½ in., are standard, and other equipment includes a trunk, nickeled bumpers front and rear, adjustable visor, protection bars, individual steps and individual fenders. Finish is in deep maroon.

King

DETROIT, Oct. 23—Two new closed bodies have been added to the King line. These are a sedanette and a seven-passenger sedan added on a chassis which is similar in all respects to the standard King chassis, except that it is 124 in. wheelbase instead of 120. Mechanically, the cars are the same as previously with the exception of the adoption of a ball bearing steering thrust bearing in the steering knuckle in place of the plain bearing. The axle is a Columbia, however, as previously.

In the fittings, the drum type headlamp has been adopted and parking lights of similar design as the headlamps are also part of the standard equipment. The fender lines have also been altered somewhat to coincide with the exterior lines of the body. The sedanette sells for $1,995 and the seven-passenger sedan for $2,550.

Cleveland

CLEVELAND, Oct. 25—A new two-door sedan is added to the Cleveland six line, the price being $1,295. This replaces the coupé. It carries five passengers and has a trunk platform and barrel type headlamps. The color scheme is gray and the individual front seats tip forward. In addition to this new model, changes have been made in the prices and equipment of the phaeton and four-door sedan.

The phaeton is now $995 instead of $1,095, and the four-door sedan is $1,495 instead of $1,585. In both cases the reduction has been accomplished by a reduction in the amount of additional equipment which may still be had at the former price. All these bodies are Fisher built.

Nash

KENOSHA, WIS., Oct. 25—A new Nash roadster on the six cylinder chassis takes the place of the previous roadster. The price is $1,210, the same as on the old model. The top is ecru silk mohair and the upholstery is dark gray Spanish leather. The wheels are finished in bright vermillion. A new type ventilator is used on the cowl, the windshield being of the one-piece type. Other refinements include a new steering mechanism, Oil Kip equipment, new barrel type headlamps and parking lamps. Across the front of the chassis side members is a bar to prevent weaving of the frame.

Dorris

ST. LOUIS, Oct. 24—The Dorris Motor Car Co. is fitting a new "custombuilt" sedan to the regular chassis, the price being $6,800. The bodies are made to specification by the Hume Body Corp., Boston, and are finished, painted and upholstered at the Dorris factory. The painting and upholstery is according to the purchaser's selection. The frame construction is hardwood and the metal covering is aluminum. The equipment is very complete.

Seiberling Makes New Pneumatic Truck Tire

AKRON, Oct. 23—Seiberling Rubber Co. announces a new pneumatic truck tire which is called the All-Tread and which now is in production in the following sizes: 30 x 3½, 32 x 4½, 34 x 4½, 33 x 5, 34 x 5, 35 x 5, 36 x 6, 38 x 7 and 40 x 8. The 30 x 3½ is of 3.85 diameter, six ply, for Ford delivery trucks and for use on Ford passenger cars where road conditions are severe.

The feature of this new model is that the tread design is extended down the side walls, the heavy bars running almost to the bead. The tread rubber goes from bead to bead and is extra heavy, of about 4200 lb. per sq. in. tensile strength. There is an extra wide breaker strip, a double thick cushion of rubber between the last few plies.

REO ADDS TO EQUIPMENT

LANSING, MICH., Oct. 25—Reo Motor Co. is planning to install a new air compressing system and also to add to its enameling ovens. With this new equipment the total expenditure by the company in 1922 for machinery to increase and improve production will reach about $500,000. Sales are reported to be in excess of production at the present time, due in part to material shortage occasioned by the railroad situation.

Paris Show Results Are "Good to Fair"

Activity Shown by Provinces—Prices for Cars Declared Too High

PARIS, Oct. 14 (*by mail*)—Net results of the Paris automobile show, which will close its doors to-morrow night, after having been open for 12 consecutive days, are declared to be good to fair. The French provinces have shown activity, but business in the capital has been sluggish. Foreign dealers who have to face American and German competition declare that French prices are too high and attribute this to the fact that, by reason of the exchange situation and the protective tariff, the home industry in France is completely protected.

For the first time the used car problem has become serious. Dealers are asking the makers to assist them in the disposal of used cars taken in exchange, but the factories have no organization for dealing with these.

This year's show was marked by an unusual amount of newspaper advertising on an American scale. Instead of the old custom of paying for advertising "puffs" to be inserted in the reading columns, which before the war was the only kind of publicity known to French automobile manufacturers, several of the big companies ran full page advertisements at $5,000 a page in the daily papers.

Citroen, who has an American publicity expert at the head of his advertising department, was the leader in this direction, and in addition he adopted for the first time in France the English system of writing in the sky by white smoke emitted from an airplane.

Thorne Machine Builds First Steinmetz Model

SYRACUSE, N. Y., Oct. 24—Announcement is made by the Thorne Machine Tool Co. of this city of the completion of a new model electric car for the Steinmetz Motor Car Co. of Baltimore. This is the first of four to be made for experimental purposes, the experiments lasting about a year before production will be attempted. The car has been built under the direction of Charles P. Steinmetz and the work here has been in charge of Oscar C. Kavie and L. W. Moulton of the Manufacturers' Consulting Engineers.

In producing the model the aim has been to develop an electric driven vehicle weighing under 2000 lbs., with a speed up to 40 m.p.h. and an operating radius of 200 miles. The motor, it is said, will be placed in the rear axle housing.

Emphasizes Quality in Buying Material

Price Not Sole Factor To Be Considered, Jordan Tells Purchasing Agents

DETROIT, Oct. 24—Edward S. Jordan, president of the Jordan Motor Car Co., addressing the Purchasing Agents Association of Detroit, stated that automobile manufacturers who are to prosper in the future will be those who carefully choose their material with reference to quality rather than price. He deplored the practice of allowing price to govern entirely in the purchase of materials and parts.

Commenting on Ford's recent price cut Jordan stated that this created "2,000,000 more students in the kindergarten of the automobile." In other words, it brought 2,000,000 more car owners into the field and, consequently, is of the greatest benefit to the entire industry. He said that Ford's sole purpose in cutting the price naturally is to sell more automobiles. Regarding future prices of other makes, he stated that the next two or three years would find prices declining at intervals.

Industry in Five Phases

Drawing a picture of the progress of the automobile industry to date, he pointed out that it has gone through five distinct phases, the first of which was when the engineer controlled the entire business. In the early days, he said, the engineer or mechanic would deal with the rich young sport in the neighborhood and, consequently, became the automobile dealer. The first dealers were mechanics. The second phase of the industry was when the production manager began to become a dominant factor. The ability to manufacture a good automobile in quantities was the criterion of success during the second period.

The third phase was that of the sales manager, in which the ability to sell the product was the paramount necessity for success. The fourth phase, Jordan stated, was that of service, and finally the fifth phase has been reached in which the owner has become the dominant figure and a company, to succeed, must build a car which pleases the owner. Jordan stated that this quotation has been made, beginning with Norval Hawkins, probably 700,000 times and has been forgotten just as often.

Example of Owner Dominance

He tied his statements of the dominance of the owner in the field up with the second-hand value of the car. The car which pleases the owner most, naturally, is the one which has the greatest second hand value. He stated that on lists sent out to dealers all over the country asking these dealers to put down the list price of each car and alongside the car which had the greatest relative resale value, it was found that the names of twelve manufacturers appeared on the list of all of the dealers. These twelve manufacturers are naturally the most consistently successful in the field.

In illustrating his point, he took two cars, A and B, selling for $1,500 each originally. One car, he stated, had a maintenance bill of $100 for the year and a depreciation of $200, making the total cost to the owner of $1,800 for the year. The second car had a maintenance bill of $200 for the year and a depreciation of $500, which brought the price of this car to $2,200 to the owner. He used this to illustrate the point that the owner is becoming educated to the fact that the first price of the car is not the only point to consider. The depreciation, or, in other words, the re-sale value must be taken into consideration when figuring the expenditure for the car. Also the ability to service the car at low price.

Competition, he said, is becoming tremendous, particularly in the low-priced field. He called the price class up to $1,000 a whirlpool rapids of the automobile industry and stated that anyone who is not a strong swimmer had better stay out.

Competition for Dealers Also

Competition, he stated, was not for actual car sales but for dealers, and the opportunity for those in the price class of $1,500 and above to secure these dealers was offered when the dealer in the low-priced field found his territory cut so small and his commission down to such an amount that the pace became too hot for him and he jumped out into the higher priced field where the sailing is easier.

In making his prediction for the next 18 months, he said that during the next six months the industry will be in the period where all of the closed cars that can be manufactured will be absorbed. This six months will be followed by a period of price competition in the closed car field.

Regarding the well known saturation point, he stated that this will never be reached until everybody who desires to go from one place to another or to transport goods from one place to another has an automobile.

NEWBURGH RAILWAY ADOPTS MOTOR BUS

NEWBURGH, N. Y., Oct. 23—The Orange County Traction Co., of which B. B. Odell, former governor of New York, is the head, has put motor buses into service on two of its branches, replacing six trolley cars with seven buses. The main line, which runs 12 miles to Walden, still uses trolleys, but on the branches the buses act as feeders to the main lines. The new system has been in operation three weeks and has proved a success. The buses are of the type used by the Fifth Avenue Coach Co. of New York, only smaller.

Chapin Tells France Import Duty Is Cut

No Newspapers There Carried Item of Tariff Action by U. S. Senate

PARIS, Oct. 14 (*by mail*)—French automobile manufacturers are quite unaware that the United States Senate has reduced import duties to 25 per cent, for not a single newspaper thought it necessary to carry this news, notwithstanding the fact that for several years the French Government and French manufacturers have been protesting against what they term the unjust 45 per cent American duty.

Roy D. Chapin, president of the Hudson Motor Car Co., who is at present in this city, stated that he had not met a single French manufacturer who was aware that the American automobile industry had gone to Congress with a request that import duties be lowered. "Even the secretary of the international organization, known as the Bureau Permanent, was unacquainted with this move," Chapin declared.

Will Meet Manufacturers

In order to pave the way for official action, an informal meeting has been arranged for next week, when Chapin and H. H. Rice, president of the Cadillac Motor Car Co., will meet several of the Franch manufacturers.

With a 45 per cent import duty and the low value of the franc, France is at present the most protected country in Europe. It appears necessary to point out to the French makers that, if they wish to take advantage of the 25 per cent duty adopted by America, it is essential that they abandon their ultra protectionism.

A step in this direction has already been taken by Belgium, which nation has intimated that at the meeting of the Bureau Permanent, to be held in London on Nov. 1, she will raise the question of import duties throughout the world. This bureau unites the delegates of all the national automobile manufacturers' associations throughout Europe (Germany excepted). Although the United States never ratified her membership in the bureau, it is understood that an invitation is being extended to Rice to attend as the representative of the National Automobile Chamber of Commerce of the United States.

Countries Favor Reduction

It is believed that the Belgian delegates will propose a moderate and uniform rate of import duty, which probably will be the figure adopted by the United States. Engineer Marchesi, president of the Bureau Permanent and the Italian delegates, has on several occasions declared that Italy is in favor of such a measure; Belgium and England are favorably disposed toward a reduction, and only the French attitude remains doubtful.

High Garage Rentals Retarding Car Sales

Colin Campbell Tells Chevrolet Dealers That Big Cities Need Relief

DETROIT, Oct. 23—Lack of garage space was declared by Colin Campbell, general sales manager of the Chevrolet Motor Co., to be a restraining influence against a greatly increased volume sales of cars in congested eastern cities. Such conditions, he said, were holding back the immediate sale of approximately 100,000 cars in New York alone.

He urged that architects, engineers and civic authorities begin to take the transportation needs of the public more into consideration in developing plans for apartment houses, office buildings, civic structures and highways. Modern apartment buildings in congested districts, he recommended, should have three of four sub-cellars with ramps to provide for car storage if such buildings are to meet tenant requirements of the future. Multiple deck streets already are a crying need in many cities to provide adequately for traffic and car parking.

No Saturation Point Near

His remarks on traffic and garage conditions were in refutation to the report of any saturation point for automobiles being near or possible. He further stated that the limiting factor of the industry, if it ever occurred, would be governed entirely by the capacity of the highways and streets in large cities. He remarked further that but seven per cent of the highways in this country were improved at the present time and that the industry, aside from its natural normal growth each year, would have to grow with the highways as they were improved.

Campbell addressed Chevrolet dealers of zone No. 1, which includes Michigan, the northern half of Indiana and the northern half of Ohio, at a sales meeting in the Hotel Statler, in which he outlined the business possibilities of the new Chevrolet line.

Addresses Remarks to Bankers

Bankers attending the meeting with dealer clients were addressed directly by Campbell in a request for co-operation for the automobile industry as represented by automobile dealers in their respective localities. He brought particularly to the attention of the banking interests the relative importance of the industry to the business and social life of the nation.

Dealers should justify the confidence of the bankers by setting their own business in order, he said, and where dealers have not had sufficient capitalization to conduct their business properly from a credit standpoint, they should prepare immediately to change such conditions.

135,000 Automobile Owners Leave City for Suburbs To Meet Problem of High Rents for Homes

NEW YORK, Oct. 23.—Compiling statistics for the forthcoming conference of the Highway Education Board at Washington, Oct. 26-28, on the uses to which the motor car is put by its purchaser, the National Automobile Chamber of Commerce finds that in 135,000 instances the motor car has been used as a vehicle of relief from high city rentals, the owners of this number of automobiles having moved from the city to the suburbs and depending solely upon their cars for transportation between their offices and homes.

The 60 cities from which reports have been received include only three chief municipalities, Baltimore, Detroit and Cleveland. The combined population of the reporting cities is about 8,000,000. If the same ratio is maintained throughout the rest of the United States, not fewer than 500,000 automobiles have been used during the past three years in the fight against high rents.

Baltimore and Detroit are tied for first place in the number of motor cars used primarily to carry workers to and from their work each day. In each case the number is approximately 25,000. Louisville is rated next, in returns compiled thus far, with 20,000. Oak Park, Ill., and Cleveland are rated at 5000 cars each; Toledo at 3500; Tampa, Dayton, Pasadena and Casper, Wyo., at 3000 each. Eight cities—Danville, Ill.; Waterloo, Ia.; Nashville, Winston-Salem, Tulsa, Houston, Richmond and Bellingham, are reported to the Chamber as having 2000 cars each which have been devoted to this purpose.

K. T. Keller, general production manager, referred to the change that had been taking place from the old to the present models and said that, in consequence, production naturally had tapered off, but had been resuming very fast since the announcement of the new models. In a few days he said production will be within the regular schedule of 1250 cars a day at the various plants in the United States.

New Fisher body plants located at the present Chevrolet assembly plants will build closed cars exclusively for Chevrolet he said, which would assure the dealers of ample quantities of such models. Closed body production the past year totaled approximately 84,000 cars of various models of that type, and such business has been rapidly increasing.

George Frank Lord, advertising manager of the company, stated that extensive plans of national advertising had been worked out to aid dealers in their sales efforts, and that the dealers are expected to co-operate in their individual localities. The extent of future advertising will be materially affected by the degree to which dealers co-operate with the company. Under the plans as proposed, the Chevrolet message will be taken to every American family.

FORD'S SEPTEMBER OUTPUT

DETROIT, Oct. 25—In September, during which it was shut down four days, the Ford Motor Co. produced a total of 95,126 cars and trucks in the home and foreign plants in comparison with 136,132. Of this total the six foreign plants turned out 5369 and Canada 3511.

CHAS. H. WOODRUFF DIES

DAYTON, OHIO, Oct. 24—Charles H. Woodruff, former sales manager of the O. Armleder Co. of Cincinnati, manufacturers of the Armleder truck, died suddenly Friday night, following an acute attack of indigestion.

Britain Shows Gain in August Exports

WASHINGTON, Oct. 25—Exports of motor vehicles and parts from the United Kingdom in August totaled £214,223, or an increase of 31 per cent over July when they amounted to £162,376, which was an increase of 23 per cent over June. The July exports were made up of 77 passenger cars valued at £39,062; 46 motor trucks valued at £25,770; 64 chassis valued at £32,421 and parts valued at £65,123.

The August exports consisted of 82 passenger cars valued at £41,438; 63 motor trucks valued at £35,836; 128 chassis valued at £53,799 and parts valued at £83,150.

While exports of passenger cars increased but little, chassis exports again increased 100 per cent in number and truck shipments showed a gain of 39 per cent in August as compared with the previous month. The largest increases in July as compared with June were 128 per cent in number for chassis and 70 per cent in number for trucks.

Sixty-one of the 64 chassis exported went to British possessions, the largest market being Australia. Australia, New Zealand and the Channel Islands were the largest markets during August among the British possessions, while exports to foreign countries went chiefly to Denmark, Germany, the Netherlands, China, Japan and Siam, but none of these countries took large numbers of vehicles.

GEAR SALE NOT CONFIRMED

ALBANY, N. Y., Oct. 23—Judge Cooper to-day refused to confirm the sale of the New Process Gear unit of the Willys Corp. to T. W. Warner of Muncie, Ind., who had offered $1,904,000 at the receiver's sale, the only bid made. Following the sale, protest was made by two other prospective bidders who asked for an opportunity to bid.

Packard Adds Extra Dividend to Regular

Declares 2½ Per Cent on Common Stock. First Payment Since October. 1920

DETROIT, Oct. 24—Increased prosperity of the company and the favorable outlook for a continuation of good business are the reasons given by the directors of the Packard Motor Car Co. for the declaration of a 2½ per cent extra dividend in addition to the regular quarterly dividend of 2½ per cent in cash on the company's common stock, of which there is about $11,885,100 outstanding. Both dividends are payable on Oct. 31 to stockholders of record at the close of business Oct. 25. The total payments in the October dividend will aggregate $594,205.

The last previous payment was in October, 1920, at the rate of 10 per cent per annum on stock of the par value of $10 a share.

Packard is enjoying its greatest prosperity at the present time, its profits being greater than at any other time in its history save for a brief time during the war when the manufacture of Liberty engines brought in rich returns. Its profits run from $600,000 to $900,000 a month at the present time.

The factory reports that it is unable to catch up with orders on its single six. Starting with a production of 800 a month, it has climbed to 1600, and it expects to manufacture 2000 single sixes in November.

Buick Makes Shipments to Northwest by Boat

DETROIT, Oct. 24—Boat shipments to the northwest territory are being used exclusively by the Buick Motor Co. because of existing railroad conditions. Cars are driven away by dealers on arrival in Duluth.

Buick officials point out that the present record production at the Flint and Detroit plants has been reached in the face of railroad embargoes and car shortage. Motor trucks are being used to speed-up material deliveries, one load of brass fittings from Bristol, Conn., by truck, being transshipped over the lakes from Buffalo to Detroit.

Favorable weather for driveaways and the availability of lake shipping vessels has been of importance in getting cars away from the factory when completed. Maintenance of a production of 700 cars a day at this time, however, is declared by officials to require tremendous effort.

MORE CONTINENTAL CAPITAL

RICHMOND, Oct. 25—Stockholders of the Continental Motors Co. at a special meeting held here to-day approved an authorized increase in the capital stock to 3,000,000 shares of no par value, of which 1,500,000 shares are to be exchanged for the present stock of $10 par value.

FINANCIAL NOTES

Stewart-Warner Speedometer Corp. have earned the equivalent of $3.49 a share on its outstanding stock in the quarter ended Sept. 30, has increased its quarterly dividend from 75 cents to $1 a share, payable Nov. 15. Total earnings after taxes for the quarter were $1,657,554, indicating the continuance of sales at a high point. For the first nine months of this year the profits have been $3,514,078, equal to $7.40 a share. This compares with profits of $1,039,572 in the corresponding period of 1921.

Madison Tire & Rubber Co. at a special meeting adopted a resolution authorizing the company to borrow a sum not in excess of $750,000 and to execute a serial bond and mortgage on the real property equipment and machinery owned by the corporation at Buffalo.

McKone Tire & Rubber Co. has declared a semi-annual cash dividend of 3 per cent, covering operations of the past six months, to the common stockholders of record Oct. 1.

Lee Rubber & Tire Corp. directors have declared a dividend of 50 cents a share on the capital stock payable Dec. 1 to stockholders of record Nov. 15.

Profits of $5,000,000 Reported by Firestone

AKRON, O., Oct. 23—With net profits of $5,000,000 for the first eight months of the year, it is expected the Firestone Tire & Rubber Co. will close its fiscal year Oct. 31 with net profits of between $7,000,000 and $8,000,000. The company has had a good season. Starting with a production of 23,000 tires a day production went as high as 28,000. It has been running slightly in excess of 26,000 since then.

When the company started the year its inventory was $12,534,369, reduced from $45,163,710 as of Oct. 31, 1920. Current assets were $34,000,000 against current liabilities of about $23,000,000, of which $21,000,000 was in notes. Because inventory losses of more than $16,000,000 were taken last year, it is expected that no further losses will be shown in the annual statement.

69 Headlight Devices Illegal in New York

ALBANY, N. Y., Oct. 25—Sixty-nine of the nearly 100 automobile headlight devices previously approved for use in New York State have been declared illegal by the State Tax Commission. The final list will not be announced until several other manufacturers have had a hearing.

Under the law manufacturers and users of condemned devices have six months from date of notices of withdrawal of approval in which to dispose of their devices or fit their cars with legal headlight equipment.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Last week call loans covered a range of 4½ per cent to 6 per cent, as in the preceding week. Time money was quiet and also was without essential change. Toward the end of the week rates were firm at 4¾ per cent for 60 days' maturities, and 4¾ per cent to 5 per cent for 90 days', four, five and six months'. These rates were the same as in the preceding week. The prime commercial paper market continued to be quiet at 4¼ per cent to 4½ per cent.

For the week ending Sept. 30 the number of freight cars loaded was the largest recorded since Oct. 22, 1920. Although car loadings for the week ending Oct. 7 were 20,212 less than for the week of Sept. 30, the requisitions for freight cars needed in excess of the supply available totaled 141,252, a gain of 10,927 cars over Sept. 30.

The production of steel ingots during September shows a prompt recovery from the recent curtailment in production, due principally to the coal and railway strikes. Production during September amounted to 2,374,000 tons, an increase of approximately 7 per cent over the August production, and slightly more than twice the output during September, 1921. The pig iron output during September also showed an increase of slightly more than 9000 tons per day, the total output being 2,033,720 tons, as compared with 1,816,170 tons in August.

Although building contracts awarded during September declined 16 per cent from the August figures, chiefly on account of seasonal activity, the total is the highest September total on record, and is 11 per cent greater that the amount reported for September of last year. Total construction for the nine months of 1922, moreover, is greater than that of any preceding annual total, and is 51 per cent more than the total contracts awarded for the first nine months of 1921.

The Federal Reserve statement as of Oct. 18 showed a decrease of $3,167,000 in gold reserves, but an increase of $4,180,000 in total reserves. Total bills on hand declined $3,492,000, and total earning assets $31,143,000. Deposits showed a gain of $33,882,000, while Federal Reserve notes in circulation increased $4,678.000. The reserve ratio declined from 75.7 per cent to 75.2 per cent.

SCAT RECEIVERSHIP

WASHINGTON, Oct. 25—The Socista Anonima Ceirane Manufacturing Co., maker of the Scat automobile, with headquarters in Rome, has gone into the hands of a receiver, according to cable advices to the automotive division of the Department of Commerce.

The company has offered its creditors a settlement of 40 per cent. According to the balance sheet of the company, its assets are listed as Lire 12,143,201.14 and its liabilities, Lire 19,785,878.50.

Autocar Completes Twenty-fifth Year

Fourth Company in Industry to Round Out This Period of Manufacturing

NEW YORK, Oct. 23—The Autocar Co. of Ardmore, Pa., completed its twenty-fifth year as a producer of motor vehicles on Saturday, thus becoming the fourth concern in the industry to round out a quarter century of manufacturing. On this honor roll of pioneers are found the names of Haynes, starting in 1895, and Winton, Stanley and Autocar, which began operations 25 years ago and which still are engaged in automobile manufacturing.

There are eleven other concerns which, the records show, have been in business 20 years or more and which include Locomobile, 1899; Stearns, 1899; Packard, 1900; National, 1900; Oldsmobile, 1901; Peerless, 1902; Nash (formerly the Rambler and Jeffery), 1902; Franklin, 1902; Cadillac, 1902; Jackson, 1902, and White, 1902. The present Packard started as the Ohio Auto Co. of Warren, Ohio, in 1899 and became the Packard company in 1903.

Within the gunshot of the 20 year class are the Apperson, which started in 1903, following the split-up of the Haynes-Apperson Co.; the Auburn, 1903; Buick, 1903; Mitchell, 1903; Reo, 1904, and Studebaker, 1904.

Louis S. Clarke founded the Autocar Co. and still is active as vice-president. He first experimented with electric vehicles in 1890 at Pittsburgh, beginning his experiments with the gasoline engine in 1895 and in 1897 combining with William Morgan, also of Pittsburgh, which marked the beginning of the Autocar Co. The concern was incorporated under its present name in 1899 and was moved from Pittsburgh to Ardmore.

Making passenger cars at the start, it featured a two-cylinder runabout which was one of the most advanced types of the pioneer days. In 1902 it exhibited at the New York show what is claimed to have been the first shaft driven car built in America. In 1908 the company took up the manufacture of trucks, abandoning the passenger car. To-day the principal stockholders are the same who started the business.

STEEL GROUP MEETS

CHICAGO, Oct. 23—Chief executives and operating officials of the companies comprising the Electric Steel Founders' Research Group recently held a three-day meeting at Wernersville, Pa., at which exhaustive progress reports were presented on researches being conducted by the organization into annealing, core practice, facing practice, furnace practice and the elimination of slag from castings.

The members report that the standardization of practices has recently been extended to cover methods of chemical analysis.

The group consists of the following companies: Electric Steel Co., Chicago; Fort Pitt Steel Casting Co., McKeesport, Pa.; Lebanon Steel Foundry, Lebanon, Pa.; Michigan Steel Casting Co., Detroit, and Sivyer Steel Casting Co., Milwaukee.

INDUSTRIAL NOTES

Jenkins Vulcan Spring Co. reports that September business was the largest in the history of the company. Shipments for the month of October to date are running considerably in excess of those of the same period of September and the plant is operating 20 hours a day every day in the week with a large percentage of the increased business coming from old established accounts.

Easthampton Cork Co. plant at Easthampton, Mass., was destroyed by fire Oct. 20. The plant was bought early this year by the Silver Crown Cork Disk Co., and the new company formed. New machinery and equipment installed. It is expected the plant will be rebuilt. The company manufactures automobile brake linings.

W. J. Doughty, president of the Detroit Air Cooled Car Co., reports rapid progress is being made in preparing its plant at Wayne for production equipment. It is the intention to remove the company's office from 3745 Cass avenue to Wayne, within 45 days.

Windsor Steam Motors has opened temporary offices at 6 London Street East, Windsor, Ont. The company is a branch of the Detroit Steam Motor Corp., maker of the Trask steamer.

Batavia Rubber Co. assets at Batavia, N. Y., will be sold at receiver's sale on Nov. 9. The plant has a possible production of 500 tires a day. John Woodward is receiver.

Acme Brass Now Operating Jorgenson Waupac Factory

WAUPACA, WIS., Oct. 23—The business of the defunct Jorgenson Manufacturing Co., manufacturer of priming devices and other brass specialties for the automotive industries, is being resumed by a new corporation, under the name of Acme Brass & Metal Works, Inc. The new concern has completed the purchase of all of the assets, including plant and equipment, from the receiver of the Jorgenson company. All of the interests are new and consist of Waupaca and Appleton business men.

Officers have been elected by the Acme company as follows: President, J. M. Brown, Appleton, Wis.; vice-president, Lewis Larson, Waupaca; secretary, E. W. Nelson, Waupaca; treasurer, C. J. Pommer, Waupaca. S. K. Wood of Waupaca and B. C. Koepke of Appleton are additional directors. Wood has been designated as general sales manager.

The new company enters business with orders requiring capacity past the end of the year. An inquiry has been received from a large automotive concern for quotations on 1,500,000 small brass accessories and the outlook is regarded as most promising.

METAL MARKETS

Its dullness has become the steel market's most outstanding feature. Slowly but surely the market is turning in buyers' favor. So far there is no tangible recession in prices but if there were any buyers they would find the attitude of sellers considerably changed from what it was a few weeks ago. Then rollers experienced difficulty in securing sheet bars at $40; to-day they are plentiful at that price and the general trend is toward a lower level. The demand for full-finished automobile sheets continues at a somewhat better rate than that in evidence for other grades of sheets. As a result most of the mills that specialize in the rolling of full-finished sheets continue to enjoy a gratifyingly large quota of orders at prices which will go far toward sweetening their year's average.

Paucity in the labor supply is still one of the producer's most vexatious problems and further wage scale increases are on the program. With the general lessening in tension the factor of stocks of steel in consumers' hands and in resellers' warehouses comes in for more consideration than it has heretofore. Until the beginning of the year's last quarter reserve holdings of steel in consumers' hands were generally looked upon as a negligible quantity. Trade opinion has undergone somewhat of a change on this score in the last few days, and there are many who believe that consumers are more adequately provisioned with steel than they are generally given credit for. While hand-to-mouth buying was the policy manifested in automotive steel purchases throughout the year, it has been impossible in all cases to carry out this policy and the very irregularity of shipments during and immediately following the strike period necessitated the taking of steel shipments when they could be gotten with the result of some accumulation of reserve stocks.

It is also obvious that there are again considerable steel stocks in the hands of resellers. Some of this material comes from overbought consumers and some of it from surplus stocks sold by the Government. Much of these holdings is off-size or off-quality.

Pig Iron.—Pig iron prices are on the return march toward more normal levels. Buyers are holding off while the market is in a declining condition, waiting for prices to reach well below $30 level. Here and there one encounters predictions of a continuing downward slide in prices until $25 is reached. Foreign pig iron continues to compete actively with metal of domestic origin.

Aluminum.—Automotive consumers are reported as manifesting brisk interest in sheet offerings. The domestic producer is booked to capacity on sheets and enjoying a steadily increasing demand upon its sheet rolling facilities. At the same time there are reports that the high tariff on sheets has not done away with imports of that commodity, some light gage sheets which carry heavy extras having been sold recently for importation from Europe. In the ingot market inquiries for both the last quarter of 1922 and the first quarter of 1923 are reported. Sales of 98 to 99 per cent pure virgin ingots at 20 @ 20.25c., ex New York warehouse, are reported.

Copper.—The market is rather soft, the general run of consumers being apathetic. There are, however, some of a semi-speculative turn of mind who have taken on fairly sized tonnages at 13.75c. and less.

Calendar

SHOWS

Oct. 21-28—Washington, D. C., Annual Closed Car Salon, Convention Hall, under the auspices of the Washington Automotive Trade Association.

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8 - 13 — New York, Second National Automobile Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Nov. 3-11 — London (Olympia), Automobile Show.

Nov. 9 - 19 — Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

Dec. 15-Jan. 2 — Paris, Aeronautical Salon, Grand Palace. Chambre Syndicale des Industries Aeronautiques, 9 Rue Anatole de la Forge.

Jan. 13-24—Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

May - July, 1923 — Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

CONVENTIONS

Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

Nov. 14 - 15 — Chicago, Semi-Annual Convention, Factory Service Managers, National Automobile Chamber of Commerce, La Salle Hotel.

Jan. 15-19—Chicago, Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show.

Jan. 29 - 31 — Chicago, Annual Meeting, Automobile Electric Association, Congress Hotel.

S. A. E. MEETINGS

Metropolitan Section

Nov. 16—Speaker, A. L. McNurty, Consulting Engineer, connecticut State Motor Vehicle Commission; Subject, Regulations Governing the Use of Rural Highways.

Dec. 14—Speaker, Charles P. Grimes, Research Engineer, H. H. Franklin Manufacturing Co.; Subject, Air Cooling in Automotive Engines.

March 15—Speaker, William P. Kennedy, President, Kennedy Engineering Corp.; Subject, Trolley Buses and Flexible Vehicles for Street Railway Service.

April 19—Speaker, Edw. E. La Schum, General Superintendent, Motor Vehicle Equipment, American Railway Express Co.; Subject, Engineering Features of Fleet Operation.

May 17—Speaker, F. P. Gilligan, Secretary, Henry Souther Engineering Co., Subject, Metallic Materials for Automotive Work.

Other Meetings

Jan. 9-12—New York, Annual Meeting.

Jan. 31 — Chicago Meeting and Dinner of the Society at the Congress Hotel.

New Inflation Period Due Says Reeves After Meeting

WASHINGTON, Oct. 25—The automobile industry, and all industry in general, is due for a short "secondary period of inflation," which will not be severe and which may not last long, according to the prediction of Alfred Reeves, general manager of the National Automobile Chamber of Commerce, following a two-day conference with Government officials and members of the District Federal Reserve Board.

This secondary period of inflation, however, in Reeves' opinion, will have little effect upon the automobile industry for three reasons:

First, because the automobile industry is going to profit from "dammed up buying." These "dammed up buyers" he characterizes as those who wanted to buy automobiles last year but did not do so, waiting for prices to come down.

Second, because there is a more general use of automobiles in smaller cities, as actual necessities in the matter of transportation.

Third, because of the inadequacy of the railroad facilities, and the recent strike which taught the general business public the advantage of automotive highway transportation.

Egyptian Students Here for Study of Industry

NEW YORK, Oct. 24—A party of ten Egyptian students, six of whom will spend three years in automotive factories of this country, disembarked here to-day from the liner Majestic, being met by M. H. Hoepli, assistant chief of the Automotive Division of the Bureau of Foreign and Domestic Commerce, and Roger C. Dunn, another representative of the bureau.

The students are accredited representatives of the Egyptian government and were sent to this country to inform themselves of American business methods so that later they may take posts in the transport and communications services of their home country. The party will go to Washington, but later will be assigned to various manufacturing plants for their educational work.

The six young men going to the automotive plants will specialize on maintenance and operation work. The remaining four will be assigned to studies relating to locomotives, Diesel and other marine engines and telephones.

Their coming to this country was under a plan evolved by Secretary of Commerce Hoover to provide technical instruction here of official representatives of other countries. Arrangements in connection with the automotive industry are being made by Gordon Lee, head of the automotive division.

Police Believe They Have Head of Car Theft Ring

DETROIT, Oct. 23—Local police believe that, in the arrest of Edward J Sweeney, they have reached the head of a gang that has stolen many high priced cars recently.

Early this fall Sweeney, it is said, went to New York and presented an option on the purchase of 4000 Cadillacs of an older model at an extremely low price which he claimed was given him by the General Motors Corp. His explanation, it is asserted, was that Cadillac planned to produce a new model that would make the present obsolete and the cars he had an option on would be made from parts of the present model. The cars were to have used tires and speedometers registering 500 to 1000 miles to prevent dealer antagonism.

A sample car interested O. B. Richards & Co. into offering $4,600,000 for the lot. An attempt to insure this car, which a friend of the firm bought, caused suspicion, resulting in the arrest of Sweeney under the Dyer Act.

Crisp Fall Weather Helps Sales of Cars in New York

NEW YORK, Oct. 23—Crisp fall weather has helped passenger car sales in the metropolitan territory to keep going at a high level for this time of the year. The bulk of the demand, naturally, is for closed cars, but owing to the fact that most dealers are short of these models, there is better than a normal demand for open cars at this time of the year.

Only dealers in a few lines are getting closed cars in sufficient volume to make immediate deliveries. Railroad embargoes and delays, which are in effect throughout the eastern section of the country, are aggravating closed car shortage conditions, due to lack of production facilities, and dealers in some of the more popular lines are having to accept orders with delivery dates weeks and in some cases months off.

The used car market has kept pace with that for new cars. Only a minority of dealers are overstocked with used cars. As might be expected, the demand for closed used cars is brisk, and there are practically no accumulations of stock in this class.

The truck market is showing gradual but steady recovery. Dealers in the more popular makes report sales running 50 to 100 per cent of what they were a year ago.

FORD USING RADIO

DETROIT, Oct. 24—The Ford Motor Co. is using radio communication on its railroad between Dearborn and Springfield, its two main terminals. Consideration is being given to the practicability of using the radio as a means of communication between the plants and branches of the Ford company, this involving the use of a code or the perfection of tuning so there would be no interruption of service.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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Two Meetings Full of Food for Thought

S. A. E. Production Session—

PRODUCTION men turned out in full force for the first S. A. E. Production Meeting. Five hundred of them came to the sessions held in Detroit Oct. 26 and 27.

They arrived early, listened intently to the papers, and discussed with vigor and interest every topic that was brought up.

The pages immediately following tell the story of this big gathering. They outline the present trend in automotive production and show what is being done to solve the many problems faced in every factory.

The story will bring to those not present a clear picture of the ideas and tendencies developed at this important meeting and will serve to visualize clearly the outstanding features in the minds of those who did attend the sessions.

Highway Education Conference—

UNQUESTIONABLY the most important convention of its kind ever held in the United States was the second national conference on education for highway engineering and highway transport at Washington last Thursday, Friday and Saturday.

All the leading colleges and universities of this country and a dozen foreign nations were represented. It was evident that not only America but other lands as well are alive at last to the fact that they must constantly extend their highway systems if they are to progress. This means a steadily widening market for motor vehicles and automotive products.

Educators, engineers and the spokesmen of the industry are approaching agreement on the main features of the program which must be carried through in reference to education, construction and finance. Huge sums will be available annually and they must be expended wisely if taxpayers as a whole are to profit as they should.

Good roads are the instruments which must be used in breaking down the barriers between the city and the country. If America is to attain its full destiny, social, political and industrial advantages must be made equally available to all.

In this work the automotive industry has a deeper direct interest than any other. Up to this time only a few of its leaders seem to have realized this fact.

AUTOMOTIVE INDUSTRIES believes that in the Washington conference there was something of deep and vital interest to every man in the industry. For that reason it is devoting 18 pages of the present issue to a complete report of the proceedings. The account begins on page 874 and ends on page 891.

Probably never before in a single issue has any American publication given so much space to a discussion of highway and highway transport education with their attendant problems of construction and finance.

New Men Voice New Ideas at First S. A. E. Production Meeting

Engineers discuss how to cut out red tape, reduce overhead costs, and prevent waste. Gear production methods examined. Group-bonus system of wage payments explained. Five hundred attend highly successful session and evidence keen interest in topics on program.

By Norman G. Shidle

CUT out the red tape. Reduce overhead costs in every phase of production work. Study gear manufacturing problems carefully and conduct intensive research. Always take into account the desires of the individual worker when considering wage systems. Exchange ideas about production methods and practices and realize the full benefits of co-operation. These were some of the chief points emphasized by automotive production men at the First Annual Production Meeting of the Society of Automotive Engineers held in Detroit, Oct. 26 and 27.

Production engineers came out in full for this session, the first S. A. E. gathering devoted entirely to production problems. Nearly 400 members and guests had registered before noon of the first day, and the total attendance for the meeting was about 500. Both technical sessions were attended by more than 400 and practically everybody stayed throughout the entire sessions, despite the fact that the Friday morning meeting was not over until well after 1 p. m.



E. Karl Wennerlund, whose paper on the group-bonus system was widely discussed

The large attendance and the very lively interest in the papers and discussions were both as gratifying as they had been unexpected. The marked success of the meeting was due in large part to the selection of topics for papers, the excellent handling of the meetings by the chairmen and the efficient organization and operation of the entire program. The sessions provided not only interest for those who attended, but also a very great deal of practical help and actual information.

Papers and discussion throughout the meeting reflected the intense interest of automotive production men in the reduction of overhead costs. While mechanical production methods were discussed to some extent, the underlying theme of most of the thought was the necessity for cutting out waste effort, waste material and waste supervision.

Group-Bonus System Simplifies Records

E. KARL WENNERLUND, General Motors Corporation, giving the opening paper of the meeting on the Group-Bonus Method of Wage Payment, for example, stated that this method of wage payment has been adopted primarily because it simplifies factory records and detail work very materially. He pointed out that most incentive wage systems, such as straight piece work, require a vast amount of "paper" system; that a time has come when all "paper" systems must be carefully weighed to see whether or not the efficiency gained by them is greater than the detail work necessary to keep them in operation.

F. A. Mance of Studebaker expressed the same general idea in connection with another phase of the production problem. Mance showed how a plan of budgeting tool and supply disbursements to various fac-

tory departments resulted in a 71 per cent decrease in the cost of renewal of perishable tools, while the work of operating the budgeting system, once under way, was no more than under the old system.

R. K. Mitchell of Maxwell and A. J. Baker of Willys-Overland, showed that overhead cost should be a major consideration in the purchase of machine tools. They pointed out the fact that many special purpose tools bought to decrease the time of production, have been uneconomical because other important items of expense in their purchase and operation had not been considered.

Cost Factors Are Considered

NEARLY every speaker at some time touched upon one or another of these cost factors surrounding production and emphasized their importance in connection with actual production work. This fact does not evidence any lack of appreciation of the mechanical problems of production. It does reflect, however, the type of problem which is occupying the chief attention of production men to-day. They are finding it necessary to analyze and study such matters as overhead costs, wage-systems, production records, and waste more intensely than ever before. They are finding essential a solution of what might be called "surrounding problems" if their mechanical production methods are to produce the real efficiency for which they were designed.

A trend toward close study and intensive research in production problems also is evidenced by the ideas developed at this meeting. Careful study of production methods has been going on, of course, for many years, but a tendency toward actual research, dealing with very minute refinements, is in evidence in addition to the general type of study that has been common.

K. L. Herrmann of the Studebaker Corporation, for example, in his paper on "Production Errors in Gears," gave a detailed account of a series of research investigations on this subject that has been carried on by his company. This paper, printed on later pages of this issue, brought out considerable discussion, representatives of many important companies exhibiting a keen interest in the research methods and results discussed in Herrmann's paper. It seems evident from the discussion



K. L. Herrmann, Studebaker Corp., gave the machine tool builders something to think about, in addition to presenting much new information about production errors in gears

that further investigations along this particular line will be carried on by other companies and that the topic will come in for further illumination at future production meetings.

Illustrates Gear Imperfections

HERRMANN reached the heart of the present day gear production problem. He clearly illustrated the imperfections of present day gears made with the best available production tools. His paper, in part, was an appeal to the gear-making machine men to give better production tools. He illustrated his talk with graphic views of magnified gear teeth and made it clear that better manufacturing methods would result from recent



Continental Motors was represented by: L. P. Kolb, W. H. Seeger, F. A. Hammer



Among those present from Cadillac were: Harry Ford, D. G. Clemmer, V. W. Myers

They Helped to Make the Meeting Successful



A. B. C. Hardy, president of the Olds Motor Works, spoke at the Production Dinner



B. B. Bachman, president of the S. A. E., presided at the Friday technical session



H. W. Alden, president-elect of the S. A. E., presided at the Thursday technical session

research, so that we may look forward to quieter transmissions in the future.

The paper prepared by H. J. Crain and J. Brodie of the Packard Company further illustrated this trend toward detailed research. It dealt chiefly with the results of investigations carried on at Packard to determine the cause of gear noise, together with a discussion of remedies.

Further indications of this trend appeared in the description given by the Franklin representative of the experiments Franklin has been conducting to develop a method of producing drive-shafts by the hot swaging process; in the brief description given by the Ford representative of a new machine, pneumatically operated, to pack sand in molds in foundry work; and in other minor developments of greater or less importance.

Many New Faces

MORE new faces appeared at this production gathering than at any previous S. A. E. meeting in many years. Production men were there who never attended an S. A. E. meeting before. They came out in full force and they apparently came for business. There was a great deal of interested and spirited discussion despite the fact that this was the first special meeting for production men and despite the fact that few of the papers were printed in advance. The chairman was forced to shut off discussion because of lack of time after most of the papers.

Technical sessions were held in the morning, while the two afternoons were devoted to factory visits. Everybody went to the Ford River Rouge plant on Thursday afternoon, while on Friday the visitors were divided between Packard, Cadillac and Dodge.

Pierre S. du Pont, chairman of the board of General Motors Corporation, and A. B. C. Hardy, president of the Olds Motor Co., were the chief speakers at the production dinner, which was held Thursday evening at the Hotel Statler. Du Pont spoke briefly, emphasizing the importance of co-operation in solving the problems of the industry and pointing out that there are many common problems to be met. "If we work together in this industry," DuPont said, "its problems will be easily solved; if we are not fearful, they will be solved that much easier."

Production Man's Scope of Knowledge

HARDY outlined the wide scope of knowledge necessary in the successful production man. Touching upon labor and wage systems, he pointed out that "the production man must know in a general way about day work, piece work and group bonus systems as he is the first man that we have to sell any new rating system to and he in turn must help sell it to his department heads and they in turn to their employees. And he must know in a general way the results to be expected from each of these systems."

B. B. Bachman, president of the Society of Automotive Engineers, presiding at the banquet, emphasized the value of unity of interest and co-operation in activity among the various members of the society, whether they be design or production engineers. He voiced his enthusiasm for special meetings dealing with specific phases of automotive work, such as the production meeting, but pointed out the necessity of every engineer keeping his viewpoint broad and taking an active interest in all of the society activities.

Kettering Speaks Extemporaneously

SPEAKING extemporaneously, C. F. Kettering advocated calling in the production man for consultation before a new design is made. He said that the cost accountant should also be consulted, that the fundamental economies of the car and its use may be considered at the inception of the design. Harold H. Emmons acted as toastmaster.

Col. H. W. Alden, president-elect of the Society of Automotive Engineers, presided at the first technical session, while B. B. Bachman was in the chair on the second day.

Group-Bonus Plan Simplifies Factory Records

Progressive system of manufacture favorable to wage-payment plan described. Individual incentive retained.

THE group bonus system of wage payment is valued chiefly because it simplifies factory detail very greatly, and, at the same time, increases all the incentive values of the individual bonus method of payment. Bonus is paid to each worker in a group in proportion to the production of the group, a standard time having been previously determined for the series of operations performed by each group.

In addition to simplifying factory records, the group bonus system tends to speed up production, and thus lower unit costs, because it gives each man a personal interest in the efficiency of every other man in his group. The elimination of one man from the group, for instance, without a lowering of production, means more bonus for each worker in the group. Thus each worker desires to get the unit produced with the smallest force in the shortest time.

E. Karl Wennerlund brought out these points in his paper on "The Group-Bonus Wage-Incentive Plan" and included a detailed description of how such a plan can be successfully operated. "The group plan is primarily applicable to repetitive work arranged in progressive production lines of sequence operations," Wennerlund said, "but it is also applicable to non-progressive operations where the individual interest can be centered on definite results per man-hour of labor. Like any other wage incentive plan, it has for its main object the speeding up of the production rate per employee; that is, intensive production.

"It is being used," he continued, "because it simplifies the factory detail where a high rate of production is desired on repetitive work, and where a wage incentive is employed as a means of obtaining intensive production. Its application has gained favor among factory executives because it speeds up production as compared with the individual plan on the same work, ties up less material in process, and minimizes clerical detail in the factory."

THE necessity for eliminating red tape and all except absolutely necessary records in factory routine is well illustrated by Wennerlund's statements about the group-bonus system of wage payments. Throughout his paper he shows how records can be cut down, how material can be kept moving, and how supervisory checking work can be reduced to a minimum. These points are specially interesting to automotive manufacturers in whose plants large scale production has created a large number of supervisory records which sometimes tend to multiply detail work without a corresponding increase in efficiency.

Wennerlund began his talk by saying that the object of this group-bonus system of wage payments is the same as that of every other wage-incentive plan, namely:

(1) To stimulate the worker to a greater effort than is generally obtained on a straight day's-work basis
(2) To reward him somewhat in proportion to his effort
(3) The gaining of other advantages such as the attention given to conditions that curtail production, more uniform labor costs and the elimination of inefficient employees

He then discussed this particular plan in detail, saying in part:

NEARLY all industries engaged in repetitive work, with very few exceptions, are on an incentive basis. Until recently, the plan followed has been generally of the type known as the individual-effort plan, with either straight piece-rates or some form of premium or bonus based on time measurements. Grouping of employees was not often resorted to, except for such operations as made it impracticable to keep track of the output from individuals. The application of grouping of employees throughout an entire factory organization, wherever work is measurable, is rather a new development in industry.

In automobile factories and most accessory plants, the character of product is such as to make parts move progressively from one operation to the next to a very great extent.

It must be taken into account that an individual-effort system of payment to workers entails considerable routine expense. The earliest method, after rates had been set, was for each worker to make out a report at the end of the day stating how many pieces he had completed under each operation; or a shop checker came for this information and inserted the quantities on a prepared form. A sys-



R. K. Jack, Chief Engineer, Olds Motor Work



J. M. Watson, Metallurgical Engineer, Hupp Motor Car Corp.



G. E. Goddard, Asst. Chief Engineer, Dodge Bros.



E. Planche, Chief Engineer, Dort Motor Car Co.

tematic check on quantities after each operation was, of course, impracticable with large-volume production unless some special means were provided; so, there was much opportunity for collusion between shop checkers and workers and there is no doubt that many took advantage, particularly on parallel operations, of the management's inability to obtain an actual check.

Well-organized factories, operating under the individual-effort plan in recent years, have developed various methods for obtaining physical checks on quantities after each operation.

These methods are all good in theory. No doubt they pay their way when compared with having no definite check, and they may be entirely practicable in small shops or for certain classes of work, but let us consider the modern automobile factory. The lot method not only ties up a large inventory of parts in process, but to check off and extend thousands of job tickets, daily, also involves a great expense. One such factory had in excess of 25,000 job tickets for each working day, each one of which had to be carefully audited as to quantity and rate, extended for total and then credited to the account of the employee.

IT was the desire to simplify the factory routine, and to escape from this mass of detail management without sacrificing the principles of quantity checks, that prompted the development of the group-bonus plan. Certain fundamental principles of industry had to be recognized and taken into account. The most important of these are

(1) Under any incentive plan, the worker must continue to maintain an individual interest in the rate of production
(2) He should be guaranteed a satisfactory hourly wage
(3) He should be paid for all time saved instead of for only a part of it
(4) He should be able to compute his own earnings, accurately and quickly

Under the group plan, it would not make much difference in theory whether a fixed group-price were established or some form of bonus or premium payment were used. Our past experience, however, indicated that it was preferable to set standards of output in *time* rather than in money value.

In regard to a uniform base-rate for all members of a group and their division of the earnings purely on an hourly basis, it is obvious that this method would prove unsatisfactory as a general policy; because, even in the same group, some operations may require more skill than others. Then there is the added consideration that employees who have been long in the service should be on a higher wage plane than beginners. The standard-time bonus-table as adopted offers every facility for differentiating between base-rates and permits a flexible system to suit the varying labor and factory conditions.

TABLE A—BONUS TABLE FOR PRODUCTIVE WORKERS

Percentage Efficiency	Bonus	Percentage Efficiency	Bonus	Percentage Efficiency	Bonus
75	1.0	117	40.4	159	90.8
76	1.6	118	41.6	160	92.0
77	2.2	119	42.8	161	93.2
78	2.8	120	44.0	162	94.4
79	3.4	121	45.2	163	95.6
80	4.0	122	46.4	164	96.8
81	4.6	123	47.6	165	98.0
82	5.2	124	48.8	166	99.2
83	5.8	125	50.0	167	100.4
84	6.4	126	51.2	168	101.6
85	7.0	127	52.4	169	102.8
86	7.6	128	53.6	170	104.0
87	8.2	129	54.8	171	105.2
88	8.8	130	56.0	172	106.4
89	9.4	131	57.2	173	107.6
90	10.0	132	58.4	174	108.8
91	11.0	133	59.6	175	110.0
92	12.0	134	60.8	176	111.2
93	13.0	135	62.0	177	112.4
94	14.0	136	63.2	178	113.6
95	15.0	137	64.4	179	114.8
96	16.0	138	65.6	180	116.0
97	17.0	139	66.8	181	117.2
98	18.0	140	68.0	182	118.4
99	19.0	141	69.2	183	119.6
100	20.0	142	70.4	184	120.8
101	21.2	143	71.6	185	122.0
102	22.4	144	72.8	186	123.2
103	23.6	145	74.0	187	124.4
104	24.8	146	75.2	188	125.6
105	26.0	147	76.4	189	126.8
106	27.2	148	77.6	190	128.0
107	28.4	149	78.8	191	129.2
108	29.6	150	80.0	192	130.4
109	30.8	151	81.2	193	131.6
110	32.0	152	82.4	194	132.8
111	33.2	153	83.6	195	134.0
112	34.4	154	84.8	196	135.2
113	35.6	155	86.0	197	136.4
114	36.8	156	87.2	198	137.6
115	38.0	157	88.4	199	138.8
116	39.2	158	89.6	200	140.0

TABLE A is based on the theory that a bonus incentive of 20 per cent should be paid to a worker, in addition to his hourly base-rate, for attaining an efficiency of production of 100 per cent; and that, for a greater speed of production, he should be paid for all time saved. The table is constructed so as to give a gradually disappearing percentage of bonus, as efficiency of production falls below the standard. During the past eleven years, this bonus table has been used extensively in our plants; first as an individual-effort incentive and, in later years, as a group incentive.

The standard time of a single operation is determined by time-study. For this purpose the decimal stop-watch is used. By standard time is meant the time required by the average competent workman, taken repeatedly, over an extended period, eliminating lost and waste time. It will contain allowances for legitimate tool-changes and for rest and delay to the worker. It is our practice, for convenience, to designate standard time in decimal hours rather than in minutes. For this purpose a conversion table has been devised, because the detail time-study is observed in decimal minutes, while the standard time is converted into hours.

GROUP standard-time is obtained by totalling the individual standard-times for all operations embraced by a group. It thus always appears as one-man hours, independently of how many workers may subsequently be assigned to a designated group. All detail operation standard-times and the group standards are listed on a shop routing for ready reference.

To obtain a clear idea of the application of group standard-time and its use as a basis for a wage-incentive plan, let us consider a single production line manufacturing and assembling pistons in an automobile-engine plant. This unit has its operations arranged in sequence, in what is known as a progressive line of manufacture. It starts with the rough-machining of the casting and ends with the finished product with piston-rings inserted. The production line includes both machine and bench-assembly operations. Parts move without a break from one operation to the next in a steady flow. Some operations may be done by a single workman; others may have several workers in parallel, depending on the volume of production and with what detail it is practicable to subdivide operations.

It is proposed to keep no check on quantities passing intermediate operations or on those completed by individual workers on operations in parallel but to give credit for finished pistons passing final inspection. This particular production line may be located in a department also producing connecting-rods or any other line of manufacture. Such a line embraces a production unit of the factory, and is technically known under the group plan as a *division*. Its workers are primarily interested in the production of pistons; they know little or nothing about condi-



A. F. Knoblock



T. J. Litle, Jr., Lincoln Motor Co.



F. E. Watts, Chief Engineer, Hupp Motor Car Corp.



W. R. Strickland

tions on the connecting-rod line and should not be grouped with it.

A STUDY of the piston-line division indicates that there are two distinct classes of machine work, besides bench operations. The machine operations are lathe turning and grinding. There are thus three major operations, and the workers group themselves naturally into these three classes of work. It is thus seen that a division may consist of any number of distinct groups. They are bound together because they receive credit only for the finished product at the end of the division, while they are distinct and independent so far as efficiency measurement and bonus reward are concerned. A group is debited with the actual man-hours of the workers in the group and is credited with the group standard-hours multiplied by the number of pieces passing the division. That is, the quantity count is not taken at the group operations but at the end of the division of work. The ratio between standard hours and actual hours constitutes the efficiency measurement for which a bonus percentage is paid. For convenience, the entire pay-period of 1 or 2 weeks is run on a cumulative basis, and bonus is computed on the average efficiency attained for the period. Obviously, for a given product, the fewer actual man-hours there are in a group, the higher the efficiency of production will be and the greater the per cent of bonus earnings. The incentive is, therefore, to obtain a high rate of production per man per hour consistent with good quality of product.

Each member of a group receives the same percentage of bonus at the end of the pay period; but it is computed on his wage earned while assigned to the group; and the total amount earned by each worker will, therefore, depend on his hourly base-rate and number of hours worked. No job tickets are used. A shop timekeeper will handle from 300 to as high as 600 group workers. A list of employees is tabulated daily for each group, and elapsed time is taken at the end of the day from the entrance time-clock. If a worker is transferred out of or into a group, a transfer slip noting the time is recorded by the timekeeper and the elapsed hours are charged accordingly. Standard-hours credit is obtained from the finished inspection reports of quantities, multiplied by the group standard-time.

A GROUP may produce various parts having different time-standards, and therefore different direct-labor costs and, since we use no individual elapsed-time job-tickets, labor costs are computed from the group cost per standard-hour. For given base-rates, the labor cost will be constant per standard-hour and per piece for all efficiencies above 100 per cent. If the average efficiency falls to 90 per cent, the labor cost will increase less than 2 per cent.

In the above discussion, we have assumed that the production line has its operations arranged in sequence. Such lines are, of course, ideal for the grouping of workers. But in the class of factories we are considering, there may be anywhere from 5 to 40 per cent of the direct-labor operations that cannot be arranged progressively. Such departments usually consist of miscellaneous small machines, automatics, grinders, or minor bench operations. However, it has been our practice up to the present to group such departments according to similar operations, being careful to retain the personal interest of the worker in the group production. Credit is given only for finished parts as they leave the department. So far, such grouping has been entirely successful. If there were any special departments of work in such factories that could not be grouped to advantage, there would be no objection to leaving them on an individual-incentive basis or even on a straight day-rate basis.

INDIRECT labor has been grouped extensively wherever a "community of interest" can be maintained between workers. They must have a common interest in the results of their own efforts. Storeroom labor, unloading materials from car, boxing and loading automobiles for shipment and similar classes of work where the effort is measurable, have been grouped with very good results.

To have a group plan remain in successful operation over an indefinite period, it is necessary to maintain the interest of the individual worker in the group effort. It

TABLE B—WAGE TABLE FOR PRODUCTIVE WORKERS COMPUTED FROM TABLE A

Employe's Hiring Base Rate	Hourly Earnings at 85 to 130 Per Cent Efficiency									
	85	90	95	100	105	110	115	120	125	130
$0.25	$0.268	$0.275	$0.288	$0.300	$0.315	$0.330	$0.345	$0.360	$0.375	$0.390
0.26	0.278	0.286	0.299	0.312	0.328	0.342	0.356	0.374	0.390	0.406
0.28	0.300	0.308	0.322	0.336	0.353	0.370	0.386	0.403	0.420	0.437
0.30	0.321	0.330	0.345	0.360	0.378	0.396	0.414	0.432	0.450	0.468
0.32	0.342	0.352	0.368	0.384	0.403	0.422	0.442	0.461	0.480	0.499
0.34	0.364	0.374	0.391	0.408	0.428	0.449	0.469	0.490	0.510	0.530
0.36	0.385	0.396	0.413	0.432	0.454	0.475	0.497	0.518	0.540	0.562
0.38	0.407	0.418	0.437	0.456	0.479	0.502	0.524	0.547	0.570	0.593
0.40	0.428	0.440	0.460	0.480	0.504	0.528	0.552	0.576	0.600	0.624
0.42	0.449	0.462	0.483	0.504	0.529	0.554	0.580	0.605	0.630	0.655
0.44	0.471	0.484	0.506	0.528	0.554	0.581	0.607	0.634	0.660	0.686
0.45	0.482	0.495	0.518	0.540	0.567	0.594	0.621	0.648	0.675	0.702
0.46	0.492	0.506	0.529	0.552	0.580	0.607	0.635	0.662	0.690	0.718
0.48	0.514	0.528	0.552	0.576	0.605	0.634	0.662	0.691	0.720	0.749
0.50	0.535	0.550	0.575	0.600	0.630	0.660	0.690	0.720	0.750	0.780
0.52	0.556	0.572	0.598	0.624	0.655	0.686	0.718	0.749	0.780	0.811
0.54	0.578	0.594	0.621	0.648	0.680	0.713	0.745	0.778	0.810	0.842
0.55	0.589	0.605	0.633	0.660	0.693	0.726	0.759	0.792	0.825	0.858
0.56	0.599	0.616	0.644	0.672	0.706	0.739	0.773	0.806	0.840	0.874
0.58	0.621	0.638	0.667	0.696	0.731	0.766	0.800	0.835	0.870	0.905
0.60	0.642	0.660	0.690	0.720	0.756	0.792	0.828	0.864	0.900	0.936

must be simple for computation of individual earnings, flexible so as to meet changing factory conditions and easily understood by each group member.

SEVERAL production men described briefly the wage payment system in use in their particular plants, following Wennerlund's presentation of the group-bonus plan. Some felt that other methods of payment were better adapted to their particular conditions, but great interest was evidenced in the possibilities of the system described.

Wennerlund was questioned as to the effect of the group-bonus plan on inspection and replied that only good pieces are accepted and counted as part of the bonus. When a defective piece comes through, a piece which can be used if re-worked, it is simply put through the line as a new piece and is paid for when it passes inspection. Spoiled pieces that have to be scrapped are not paid for and simply are handled as scrap would be handled under any other system.

When a man is discharged during a pay period, he is paid his base rate plus a bonus equal to the average bonus earned by the group during the period up to the time of discharge.

THE groups should be kept small, Wennerlund said in summarizing his answers to questions, confining the bonus application to small groups of workers on similar tasks. He emphasized strongly the necessity for considering the desires and aspirations of the individual worker in installing and operating this group-bonus plan. He showed that upon its ability to provide an easily visible, and readily calculated reward for individual effort rests the success of any such plan.

He said that these few plants who have tried this system and discarded it have not really tried it at all—they have just "monkeyed with it."

SUCH a plan as described rests fundamentally, of course, upon certain factors not included in the foregoing discussion. Accurate and fair time study work is essential, while an honest attempt on the part of the manufacturer to gage individual service value in setting base rates, a reasonable stability of time standards once they have been set, and a sincere attempt to advance the base rate of loyal and capable employees constitute other basic factors. These facts are mentioned here merely as a matter of interest, although the scope of the paper presented was confined more directly to the operation and functioning of the system itself.

Wennerlund did emphasize in his discussion, however, the necessity for avoiding excess "paper" systems, and showed the need for obtaining from any system only those checks and results of which you actually make use. Effort used in getting information which is not actually used is simply waste effort. The fact that the group-bonus plan gets you out of a lot of "paper business" is one of its chief merits.

Reducing Errors in Gear Production

Noisy gears usually result of manufacturing methods. Better machine tools needed. Errors can be checked.

K. L. HERRMANN, Studebaker Corporation, in his paper on some causes of gear-tooth errors and their detections, told of the efforts which manufacturers are making to secure accurate production gears. Production variables, he pointed out, have a much greater influence on gear sounds than the fundamental or mathematical variables, such as pressure angles, steel or tooth-form details.

He also showed, by illustrating the errors in present gear manufacture, that it is necessary to appeal to the designer of the gear for further help.

He described in detail the various kinds of errors found in production gears, with particular reference to the effect of these errors on gear noise, pointing out that it is not sufficient to check gears for spacing error from tooth to tooth. It is very desirable to check the accumulated error of a number of teeth, because a gear may vary 0.001 in. from tooth to tooth. With eight successive teeth each gaining 0.001 in. on the side of the gear and a similar number of teeth that may be losing 0.001 in., a total error of 0.016 in. might be imparted to the driven gears. This paper is printed in full on later pages of this issue.

DEVICES for checking this accumulated error were illustrated and some of the causes were indicated. In discussion the comment was made that in some shops the hobbing machine is used only for roughing. The number of questions asked the author reflected the common character of this gear problem. Some of the queries brought up were:

1. How is silence secured in the foreign four-speed gearbox?
2. What is the limit on spiral angles?
3. What has been done in the last 2 years to improve gear manufacture?
4. What are the possibilities of silent chain for transmission gearsets?
5. What are the possibilities of gear grinding?
6. What are the possibilities of using single point finishing tools or broaches for the final finish of the gear teeth?

R. S. DRUMMOND of the Gear Grinding Machine Co., in answer to the appeal of President Bachman for comment from some of the machine tool manufacturers, stated that he was particularly interested in the mechanism for measuring errors in the gear teeth. He said that engineers have been skeptical as to the possibility of such measurements, although they are really worth while. The consistent use of these instruments will improve gears and, consequently, promote silence, he believes. He also made the statement that there were about fifteen types of mechanical measurement devices as well as the optical types.

In closing the discussion, Herrmann stated that grinding can be resorted to and that very accurate results can be obtained in this way with a high degree of finish,



W. H. Wilson, Motor Wheel Corp.



V. Bendix, Pres. Bendix Eng. Works, and W. A. Chryst, Chief Engineer, Dayton Engineering Laboratories



S. W. Taylor, Maxwell Motor Co.

but that the gear itself, in this case, must first be accurate. Referring to the question as to whether gears can be hobbed as accurately as they can be cut, Herrmann answered "Yes," and added that his reply would be the same if the question had been asked in the opposite way.

As regards foreign practice, he stated that the lapping methods, etc., possible with small production would be impossible on a large commercial scale here. He stated that 45 deg. in spiral angles is common and used by his organization. He said that the silent chain was a great help in securing quietness, but that accuracy in the sprocket must be secured to the same extent as in gears.

Budgeting Tool Disbursements Reduces Waste

Renewal costs of perishable tools cut 71 per cent.
Quality check influences future buying of supplies.

USING materials in the factory is spending money just as much as buying something with dollars and cents. Budgeting material expenditure is just as practicable and just as effective as budgeting financial expenditures. F. A. Mance, in his paper on "Control of Operating Tool and Supply Cost," showed very definitely how these principles can be applied to the use of tools and supplies in automotive production. Such budgeting simplifies handling of tools and reduces waste very materially.

The Studebaker Corporation made a study of the number, value and type of tools used in past years in the production of each unit and thus determined what constituted a reasonable average allotment for the production of a given unit. They are now able to say with some degree of accuracy how much money in tool cost should be allowed to each department for the production of a certain number of cars. The system simply amounts to budgeting tool distribution.

Each foreman is checked up periodically and is informed whether or not he is keeping within his tool cost allotment. He has a very definite interest in keeping down costs and is given a clear picture of just what tool expense means. He has some definite data, moreover, upon which to start work in trying to reduce waste in this particular.

Mance stated that the cost of renewals of perishable tools has been decreased 71 per cent in the Studebaker plant during the four years since the plan has been in operation. Describing the details of the plan briefly, he said in part:

A CONTROL over expenditures for perishable tools and operating supplies has been successfully established by rating or allotting the amounts to be used by each department for every operation. By this allotment we are able to regulate the amounts of tools and supplies that are used throughout the factories in accordance with the number of cars built. Each item is priced and extended, and the aggregate is totaled. The total represents the amount of money allotted to the department to produce a definite number of cars in a given period of time. In figuring departmental percentages of efficiency this amount is included with labor and production.

TO any one interested in adopting this method we would suggest the following procedure: Start with the selection of a competent and aggressive tool-trouble man for making the survey. Provide work sheets on which to list the department, the part number, the operation, the description of both tools and supplies and the amounts allotted for any given number of cars per month. The allotment can be based on the actual withdrawals over a given previous period, after eliminating the waste on account of abuse and improper methods of use where instances of this kind are found. By this we mean that the allotment should be based on the amounts that should be used. These work-sheets are afterward to be used in making up a standard form in quadruplicate. The standard form should contain additional information as to price, the extensions and the total, as previously explained. The standard allotment-sheets when completed are distributed to the foreman interested, the tool or supply stores, the superintendent of the plant and the supervisor of tools or the methods and standardization department.

Deliveries from stores are made upon approved requisitions, provided the article wanted has been previously allotted and appears on the allotment sheets.

Departmental operating tool and supply reports are made up for every 10-day period by the supervisor of stores and show the amounts withdrawn during that period. They are then forwarded to the accounting department for pricing.

From copies of these sheets each foreman is checked as to the amount he is running over or under his allotment and he is allowed to see these copies during each period in order to acquaint himself with the cost of the articles that he uses.

Handling Salvaged Tools

SALVAGED or restored tools are carried in stock and are given out on requisition in the same manner as new tools, with the exception that the requisition is stamped with the word "salvaged" in red ink. This signifies that there is to be no charge against the department drawing out this material.

The department first drawing out a new tool bears the entire cost of the tool.

The tool-salvage department keeps in touch daily with the various department foremen, advising them of available salvage tools, especially when these are in addition to the tools specified on the allotment sheets. The use of salvage tools so far this year has amounted to $1 per car. This sum represents what the cost would have been had we purchased new tools. The amount of money spent to recondition the tools amounted to 30 per cent of the original cost. This 30 per cent is charged off as expense, and is pro-rated over the entire portion of the plant that is benefited by the use of the tools.

One important factor that has a direct bearing on tool cost is the listing of sources of supply. This list is made up by the methods and standardization department and contains the names of the firms whose tools have given us the best results in actual use over a period of from 1 to 4 years.

In connection with the allotment of tools, we have begun recently a study of the life of perishable tools. Among drills this study consists, first, of a microscopic inspection of the steel structure to determine good heat-treatment. Various sizes of drills that show proper heat-treatment are selected and used for drilling steel forgings of a given Brinell hardness. The actual amount of metal removed per grinding is noted, and the drills are compared as regards life per inch of flute length and number of feet of metal removed.

Several charts have been made and an average has been computed for use as a reference in determining the actual life of drills for a given number of feet of steel of a certain range of Brinell hardness.

Non-Productive Departments

IN all non-productive departments the expenditures for operating supplies are controlled by a fixed sum or budget and are based on car production in the same manner as in the productive departments.

The tool and supply stores are controlled by requisitioning only such items as appear on the allotment sheets. All purchase requisitions from stores must state the amount used in the previous three months, the approximate total cost, the amount in stock at all plants and whether other material can be substituted or salvaged. It is essential that the man who supervises the allotment should check all requisitions before they are approved.

Factory Visits



Photos by Lazarnick

1. *Ready to start through the Cadillac plant.* 2. *Buses took the crowd to the factories from the General Motors Building, where the technical sessions were held.* 3 *and* 4. *Everybody was ready to sit down after they had walked through the Ford River Rouge plant on Thursday afternoon*



H. P. Harrison, H. H. Franklin Mfg. Co., who read the paper prepared by William Dunk, Franklin factory manager



A. J. Baker, Willys-Overland Co., expressed some very definite ideas about buying machine tools



R. K. Mitchell, Maxwell Motor Co., says more attention should be given to special fixtures for general purpose machine tools

How To Buy Machine Tools

Craze for special purpose tools passing. Maxwell and Willys-Overland representatives tell the reason why.

"TIME or rate of production is only one factor that must be considered in the purchase of machine tools. The craze for special purpose and special piece machines is passing. The cost of production, using cost in its broadest sense, is the chief thing to consider in buying machine tool equipment, rather then merely time. Frequently the two do not coincide."

These were the outstanding opinions voiced by A. J. Baker, of the Willys-Overland Co., in his paper on "Selection of Machine Tools." His sentiments were supported heartily by R. K. Mitchell, of Maxwell, in his paper on "Machine Tool Efficiency" when Mitchell said that the high original cost of special machines, coupled with their high upkeep and low resale value, makes it wise to get such tools only really necessary.

Baker pointed out that the source of supply for machine tools in this country is assured, and that there is more than adequate capacity to supply the needs of the automotive industry. He added, however, that progress in design of machine tools of the most economical kind from a production standpoint should not be left entirely to the initiative of tool builders. Production men, demanding certain things, can encourage and make possible more rapid developments.

The chief trouble with the special machines, as opposed to standard types, according to Baker are as follows:

1. The special purpose tool constitutes a heavy overhead charge when not in operation, and will allow overhead to "eat you up" during the slack periods which every plant experiences.
2. The original cost is higher because it has to be specially built.
3. Its resale value is very low. It usually becomes obsolete and must be sold for far less than its inventory value. Thus, your inventory is badly "shot."
4. It is difficult to repair, since the average repair man cannot handle it as he would a standard type.
5. It is harder to service. Replacement parts are harder to get and are more expensive.

Citing an actual investigation which he had recently made, Baker told of getting costs on the replacement of 15 machines which were admittedly obsolete. He figured on replacing these with up-to-date machines of the most efficient type. He found that it would be necessary to spend $132,000 in order to save 32c. per car. The resale value of the old machinery was about $25,000. Thus he would actually have spent $112,000 to save the 32c.

THIS being the case with practically obsolete machinery, he pointed out, great care should be exercised when the replacement of fairly good machinery is contemplated.

When buying machine tools Baker seeks information, not only as regards time, but also as regards the following:

1. Cost per car in labor.
2. Resale value of machine. Can it be resold?
3. Cost of special tools and equipment.
4. Men eliminated by its use.
5. Cars per day with old equipment.
6. Comparative inventory value of old and new equipment.

Finally, he pointed out, the machine tool development needed is that which will come between two extremes.

Labor quality available is low. Therefore the machine cannot be very complicated. Still it cannot be so highly

specialized as to require too skilled repair and upkeep work. The machine of the future will fall between the special piece tool and the very general purpose tool.

He emphasized very strongly the neglect of apprentice training in the automotive industry, stating that this industry has been content so far simply to rob other industries or other manufacturers of its own industry. The need for skilled men is growing and the industry is doing practically nothing to replace the older men who are going out. This situation cannot continue indefinitely.

Following along the general lines of Baker's opinions, and corroborating them in a general way, Mitchell pointed out an additional difficulty in using special piece machines. He said that the average life of a particular design of an automobile part is probably somewhere between six months and a year. Parts design is very unstable. When a part is changed, the special purpose tool has to be changed or scrapped, either process being expensive.

Mitchell spoke also of the "too prevalent tendency to design special tools at the slightest provocation," and told other production managers that they should give more attention to the products of those companies which are producing special fixtures for use on standard type tools. He suggested that all such devices be examined carefully.

Better Brakes and Less Gear Noise

Testing brakes, eliminating engine knocks, and reducing transmission noise discussed by Packard paper. Experimental results given.

H. J. CRAIN and J. Brodie of the Packard Motor Car Co. told the story of some recent investigations into three production problems that have been more or less troublesome. Their discussion of how to reduce gear noise caused more comment from the other production men than did the other two topics treated in their paper entitled "Some Experiences from a Production Note Book."

They said in part:

THE increasing congestion on city streets and the seriousness of the automobile accident and collision situation should be convincing evidence of the need of proper adjustment of motor car brakes. It would seem important that cars should be shipped from the factories with the brakes seated, and adjusted to overcome the rapid wear that usually occurs in driving the first few hundred miles.

This rapid wear is caused by the ironing or smoothing of the brake-lining surface until the high spots have been worn down to the level of the rest of the lining face. It may be due also to slight imperfections in the contour of the brake-band. The Packard company uses two motor-driven machines for running them in, one for the expanding and the other for the contracting. The brake drum rotates at a speed of approximately 1000 r.p.m. in both cases. The drums are cooled by water, circulated about the peripheries of the drums so that the temperatures are never excessive. Pressure is exerted on the brake bands by a weighted lever, the weight being adjusted so that the pressure is only great enough to assure a full bearing of the band on the drum. Each band is run for about 1 min. The two machines are located so that the same operator can handle both; the band of one being run in while the operator is loading the other. It will be found that the bands acquire a polished surface on these machines, and that the irregularities sometimes existing around the rivet holes and throughout the lining surface are smoothed out. By taking this precaution at the factory the maximum brake efficiency is attained at the beginning of operation of the car, and the adjustments usually required in a new car after a few days of service are unnecessary.

THE importance of accuracy in grinding a piston skirt is recognized by all production men. Excessive wear of the surface of the center necessitated the frequent replacement of this center and demanded constant supervision by the foreman in order that the work should not be spoiled by continuing the use of a center that had passed the permissible stage of wear. The study given to this small but puzzling problem has resulted in the adoption of a center



G. F. Brown, The White Co.



W. E. Wilbur and R. A. Gove, Cadillac Motor Car Co.



C. W. Olson, The White Co.

in which the thrust and driving load are taken by a taper roller bearing of heavy load capacity, the wear is distributed over a very large surface, lubrication is easily maintained and the life of the center is greatly prolonged. This design has proved very successful, and, no doubt, other tool designers could apply it to advantage. This particular center is used with Brown & Sharpe Nos. 12 and 14 external grinding machines.

A Puzzling Engine Knock

ALL production and inspection departments have had the displeasure of running down peculiar engine knocks. The following note from Packard experience may shed some light on this trouble. A few years ago when a new model was started through the Packard shops the engines of the first run received at the test stands were all found to have a perceptible piston slap or knock. Numerous remedies were tried, but eventually the real cause of the noise was found largely through accident.

The click came only at the time of the explosion. Investigation revealed the fact that the valves were not centering properly in the conical surface in the cylinder. It was found that the tool used to form the valve test was centered by a spindle inserted in the valve stem guide. This spindle was too much undersize and allowed the tool to float just enough to throw the conical seat out of alignment with the valve stem guide. As a result, the valve spring would not bring the valve fully into the seat; the valve would hang on one side of the valve seat until the explosion snapped the valve into the seat with a very noticeable click. Of course this part of the noise was then obviated without difficulty.

But this correction did not stop all the noise. A more annoying knock was eventually found to come from the piston rings, which were of the diagonal cut type with a slight clearance between the ends. As the explosion-pressure reached the rings they were compressed and their ends snapped. Filing several grooves in the upper edge of the top ring would let part of the explosion in behind the ring, expand the ring and overcome the slap until the grooves had filled with carbon. A ring that slaps in the manner described generally shows bright polished ends. When the proper end clearance had been determined by experiment, the noise ceased. The rings in general use to-day have overlapping joints; the end clearance can be very large, and, of course, this trouble is not encountered.

Causes of Gear Noise

A LARGE number of investigations made over a period of years have led us to believe that gear noise does not always originate in variations of the gears themselves. Such variations undoubtedly contribute to the gear growl or chatter, but the noise can often be cured or dampened by an alteration of another part. We have concluded that the proper mounting of the gears on rigid shafts is a paramount requirement if noise is to be avoided. The most perfect tooth forms, ground, shaped or milled, will not run quietly if they are carried on shafts that spring or are not in perfect alignment. It is assumed that this essential fact is recognized in the engineer's design of transmission and axles. Given a properly designed mounting, it is the factory man's problem to reduce noise. The factors controlling it are largely independent of blueprints. Drawings can only give the characteristics of gear teeth; the production man must see that the actual contours and allowable variations keep them within an acceptable range of quietness.

The front end of a typical transmission is given as an illustration. Particular attention is directed to the mounting of the main drive-gear, which is carried on a roller bearing, the inner race of which is formed by the shaft



C. H. Brennan, W. C. Keys, W. R. Strickland, F. B. Rnoff, H. E. Clay

itself and the outer race is mounted in the transmission case. In the final inspection of a certain model at the Packard factory it was noticed that the degree of gear noise varied from very quiet to objectionably loud. Attention, naturally, was centered on the noisy gears. These were returned to the transmission department and torn down for careful inspection, adjustment and reassembling. Invariably the inspection revealed gears, bearings and shafts that were as near perfection as it seemed possible to approach. This led to the assembling of special gears in which perfection was carried to the utmost degree, a state far beyond that possible under even unreasonable inspection practice. But the noise, if anything, was worse.

It remained for us to tear down and to inspect several transmissions that were passed in the final car-test as being quiet. When this was done it was found that the roller race on the shafts had been ground to the low limit diameter, while the roller race in the shells had invariably been ground to the largest or extreme high limit specified for these holes. For purposes of comparison, six noisy transmissions were then torn down, the bearing diameter was ground approximately 0.001 in. under the former low limit and the transmissions were reassembled and tested. This change caused the noise practically to disappear.

Noisy Transmissions

EXPERIMENTS were made repeatedly with noisy transmissions and, in every case, when this alteration was made and the bearing clearance was increased, the noise was either entirely eliminated or was reduced to a degree that was not objectionable. We concluded that this result was produced by providing a sufficient space for an adequate oil-film. Further experiments along similar lines have always found such a clearance to be necessary in crankshaft and connecting rod bearings.

The remedy seemed a simple one to supply, but we were quite concerned about mounting a bearing under conditions that simulated those it would assume after several months' wear. We had always supposed that bearings of the anti-friction type must be mounted snugly. Before definitely adopting the new practice, wisdom demanded that we check the effect of the greater diametral clearance on the wear of the bearing. Transmissions were run under similar conditions with the standard or snug bearing and with the increased clearance. We found that the snug

bearing wore rapidly during the early stages of the test and eventually reached the state of looseness with which the other bearing started. The loose bearing, on the contrary, practically retained its original clearance. We concluded that the wear of the snug bearing was accelerated because of the absence of an oil-film sufficient for complete lubrication. The loose bearing apparently accommodated an adequate oil-film and the wear was normal. The test was continued for some time and frequent examination showed that the snug or full-fitting bearing continued to wear faster than the loose one. This, we believe, is due to the heavy initial wear that breaks or distorts the ground surface instead of glazing it, as seems to be the case when the bearing is assembled with a proper clearance at the start.

AFTER the transmission using the roller bearing had been changed to conform to the practice just described, it became apparent that the same gear noise existed in the transmission used in one of the other Packard models which had the transmission gear mounted on ball bearings. We altered a few experimental ball bearings by deepening the grooves in the races to allow a minute clearance for the balls, instead of assembling them to a good rolling fit or to the fit of the standard stock. This was done to provide oil clearance, as had been done with the roller bearings. When the loose ball bearings were substituted for the tight ones in noisy transmissions, our previous experience was repeated and the noise decreased. Careful experiments determined the desirable clearance to allow in the races for the reduction of noise, and the manufacturers of ball bearings agreed to supply bearings with various amounts of clearance so that we could determine the requirements of this work.

It was a comparatively easy matter to determine the clearance needed in the case of the roller bearings since diametral clearances could readily be measured. It was found to be difficult, however, to measure radial clearance in the ball bearing races and we were forced temporarily to determine the degree of clearance by the end play or axial looseness. A maker of ball bearings prepared the nomographic chart for the purpose of converting a desired radial clearance into the equivalent axial play. This enabled us to order bearings with a selected radial clearance, which could be held uniform without demanding a finer tolerance from the bearing maker, and cured the gear noise most effectively.

The amount of clearance to be allowed in any case cannot be determined by rule. We have found that it varies in transmissions similar in design but differing in detail dimensions. Our experience leads us to believe that each mounting must be studied individually, by varying the looseness of the bearing until the suitable amount is apparent. In the ball bearings referred to, a total radial clearance of from 0.0006 to 0.0009 in. was found the most satisfactory.

FROM the two cases cited we judged that the same reasoning might apply in determining the proper allowable backlash in gear teeth. Here, again, there is a possibility of not providing sufficient room for a film of lubricant, of squeezing all the oil out of the meshing space, and of causing increased noise. Experiments with gears identical in every respect except in the amount of backlash showed that a very evident drop in the noise of the gears was produced when the backlash was increased to a certain point.

EXPERIENCE in several plants indicates that anti-friction bearings which have been set up too tightly, particularly in transmission work, are noisy. Room has to be left for the oil or else a noisy bearing will result. This was the first point brought out in discussion on this paper.

H. M. Crain asked if it would be possible to make the ball bearings a loose fit in the outer housing. A negative reply was made to this. It was stated that such practice would permit the outer housing to spin in the mounting. Moreover, it is very difficult to measure end play in a bearing as end play depends very largely on end pressure. A far better measure to use as a guide is that of a radial looseness.

George Goddard asked if oil pumping does not increase with the bearing clearance. The opinion was that this is not necessarily so. As a practical measure of proper clearance, the inner race is held tightly and if it is tried by hand to slip the outer race over the ball, a good check may be had on clearance. If the race can be slipped, it may be generally taken for granted that the clearance is about correct.

Problems in Air-cooled Engine Production

Making cylinders, manufacturing a case-hardened crankshaft, and machining duralumin connecting rods topics treated.

PRODUCTION of air-cooled cylinders, making case-hardened crankshafts, machining duralumin connecting rods and experiments with a hot-swaged rear axle drive-shaft were discussed in the paper prepared by William Dunk, production manager of the Franklin company.

"The design of the Franklin cylinder necessitates the use of unit-cylinder construction rather than the regular block-cylinder design," Dunk said. "This fact makes the production of the cylinder a somewhat different problem from that of machining a block casting. In the Franklin cylinder, the head is cast integrally with the body of the casting and steel cooling fins are cast in the outer surface of the cylinder-wall.

"The foundry practice in connection with the production of these castings is of interest. The mold is composed of three distinct sections, the lower section being an assembly of dry-sand cores for making the head of the cylinder and the valve ports. Next above this section is a green-sand section containing the cooling fins, and the upper section of the mold is a green-sand section for the neck of the cylinder between the cooling fins and the bottom flange, the cylinder of course being cast in an inverted position. The core assembly for the head of the cylinder is made up of five unit-cores that are made separately and assembled by pasting-in an accurate pasting jig so that the valve-port cores are held accurately in position while drying. The valve-port cores are provided with prints that are used to locate the upper end of the main cylinder-barrel core; for this reason it is necessary to be very accurate in the location of the port cores.

"In making the green-sand section containing the cooling fins, the cylinder pattern is milled longitudinally with

the proper number of grooves to receive the vertical cooling-fins. These grooves are 1 16 in. in depth, which corresponds to the amount that the fin is imbedded in the cylinder-wall. This section of the mold is made on an air-operated ramming-machine provided with a sand hopper directly above the mold. A very small amount of sand is used in this section of the mold, not over 2 in. of sand being provided outside of the cooling fins. The fins are held in place in the cylinder pattern by simply wrapping a piece of soft iron wire around them and twisting the ends tight. This wire remains in the mold until the casting has been made, and serves to keep the section of green sand that lies within the cooling fins from sagging below the rest of the mold. The upper section of the mold is also made in green sand and is located on the center section by taper dowels. The last operation in making the mold is the lacing of the cylinder-barrel core and the strainer-gate core through which the metal is poured. The cooling fins are made of ordinary cold-rolled strip-steel which has been tinned and folded to a right angle about 5/16 in. from one edge. These cooling fins, when placed radially about the cylinder pattern, form a completely enclosed air-jacket.

"The greatest source of casting loss that we experience in making this piece is caused by loose flanges. Unless the flanges extend at least 1/16 in. below the surface of the cast iron, they will not be properly held in place."

Another interesting manufacturing detail is the Franklin case-hardened crankshaft, which has been in production for the past 2 years. This process was described in detail in AUTOMOTIVE INDUSTRIES of Nov. 18, 1920.

Connecting Rods

Describing the Franklin method of machining connecting-rods, Dunk said:

"THE Franklin connecting-rod is an aluminum-alloy forging, either of duralumin as furnished by the Baush Machine Tool Co. or of 17-S alloy furnished by the Aluminum Co. of America.

"The elastic-limit of the forging is between 30,000 and 35,000 lb. per sq. in.; the ultimate-strength is between 50,000 and 55,000 lb. per sq. in.; and the elongation is from 15 to 25 per cent.

"The forging is heat-treated by heating it to 920 or 940 deg. Fahr., and is quenched in boiling water. It is then allowed to age about 1 week to bring it to a scleroscope hardness of 90 to 100.

"We use about the following procedure in machining the duralumin forged connecting-rod. The forging is first coined under a heavy toggle-press, bringing the length of the wristpin and crankpin ends to within 0.025 in. of the finished size. It is then loaded onto a special fixture on a Blanchard grinding machine that has alternate roughing and finishing stations. It is ground first on one side, then removed from the roughing station, moved to the next adjacent station and finish-ground on the other side. A special multiple-spindle boring-and-reaming machine having an indexing table is used for boring and reaming the wristpin and crankpin holes. The operations which this machine performs are to rough-drill, rough-ream and semi-finish ream.

"The action of the forging in these machining operations is similar to that of mild steel. The power required to drive the drills and reamers is approximately the same as the power we employed formerly with our steel connecting-rod, and the cutting speed does not exceed that for steel by more than 25 per cent. In machining this forging, it surprised us to find that it machined so nearly like a steel rod. We had anticipated being able to machine this rod at a much greater speed than we found possible. The extreme toughness and wire-like quality of the chips are convincing proof that the metal with which we are dealing is something more than ordinary aluminum.

"The forging is next drilled for the rod bolts and is then put over a multiple fixture for parting the cap from the rod and facing the seats for the bolts and nuts. A broaching operation follows for providing slots in which the lower-end babbitt blocks are locked. These babbitt blocks are forced into place and broached to their semi-finished size in an ordinary two-spindle broaching-machine.

Finishing Wristpin End of Rod

"THE finishing of the wristpin end of the rod has been rather difficult, because it is impossible to ream a sufficiently good wristpin hole in the bearing end. Our present method of handling this operation is to semi-finish ream this hole, removing about 0.025 to 0.030 in. of the diameter, then to use a final reaming operation that removes about 0.005 in. and a final burnishing operation that is done with a high-speed burnishing-tool under a copious



C. F. Scott, M. P. Rumney, L. C. Hill, K. K. Hoag

flow of regular medium automobile motor-oil. We find that by leaving a uniform amount of about 0.0005 in. on the diameter we can produce a highly burnished surface in the wristpin hole and maintain very uniform size. However, to obtain the fits required by our engineering department between the wristpin and the connecting-rod, it is necessary to do a certain amount of wristpin selection. When it is finally finished, the alignment of this rod is held to a limit of $\pm$ 0.005 in., measured between the ends of arbors 12 in. long.

Final Operations

"THE finishing to size of the lower end of the rod is left until it is ready for assembly with the crankshaft. This operation is performed on a special type of boring machine in which we use boring bars of five separate diameters, increasing their diameters in steps of 0.00025 in. from the minimum size required up to the maximum; this allows us to cover the entire range in the crankpin bearings with the proper amount of oil clearance. At this time we use an oil clearance of about 0.001 in. for this bearing.

"The weight of the finished connecting-rod runs very uniform, it being necessary to maintain but two standards of weight to keep within the limits specified by our

engineers, which are a variation in weight of any two connecting-rods on an engine of not more than 0.2 oz.

"WE have been experimenting for the past 18 months with the production of drive-shafts by the hot-swaging process but, up to the present, we have not felt justified in following this method of manufacturing in large production quantities. The saving in the amount of material used to make a rear-axle drive-shaft, and the reduction in the amount of labor required by this method, make it a very attractive proposition, and we are not inclined to give up the idea without a struggle.

"Troubles have developed in the source of our experiments. We have been unable to obtain a swaging machine of a construction heavy enough to withstand the load put upon it by an operation of this kind. We had experienced continued breakdowns of our original machine, and we have practically rebuilt it. The problem of producing a swaged shaft, without having the finished product show any twisting effect whatever from the swaging, has been difficult.

"IN performing the second swaging operation, which consists of necking the shaft below the diameter of the splined end, we have not been able to reheat for this operation without excessive scaling, which mars the appearance and reduces the strength of the finished shaft. The procedure that we are following at this time requires three separate swaging operations and three separate heats for making them. If it were possible to take the shaft directly from the first swaging operation and bring it up to swaging temperature again, which is about 2000 deg. Fahr. in our case, and to perform the second or necking operation immediately, we believe we could reduce the amount of twisting and the amount of scaling that we experience at present. The third swaging operation, that of producing the taper and the threaded end, is comparatively simple and gives us no trouble.

"We are now considering the installation of a much heavier swaging machine. We find it can be built to order for us. We are considering also the installation of a second furnace to be used as a booster between swaging operations Nos. 1 and 2."

DUNK'S paper was read by H. P. Harrison, of the Franklin organization. Discussion centered about such topics as foundry scrap, character of bearing metal, ease of starting, etc.

Harrison stated that foundry scrap runs about 10 per cent, while machine shop scrap is less than 1 per cent. He made clear that the bearing metal employed is a hard die-cast babbitt. The groove is not the customary oil groove, but a small pocket on the back of the bearing.

One questioner asked why the Franklin company feared scale accumulation in the re-heating processes in swaging. In reply to this, Harrison stated that the Franklin company worked so close to the limits of the shaft that they did not care to stand the chance of abrasion of the surface sometimes found with scale.

Ease of starting of the Franklin car in winter was questioned. Harrison replied that an electric primer consisting of a solenoid coil for pre-heating the gasoline had solved the difficulties of winter starting. Furthermore, he said, the new pressure type cooling system has made it possible to raise the compression to about 4 atmospheres.

Questioned concerning the relative weight of the steel connecting rod and the duralumin rod at present employed, he stated that the steel rod, with a 1⅝-in. crankpin, weighed 2 lb. as compared with 13 oz. for the duralumin rod with a 2 in. crankpin.

The high scleroscope value of the case-hardened crankshaft and the preparation of the shafts for case-hardening were discussed. Harrison stated that hardness as low as 750 scleroscope had been employed, but usually it was between 800 to 1000.

New Method of Processing Splined Shafts

Piece is drawn through a die instead of being ground as in the past. Warpage overcome. Finished shaft accurate.

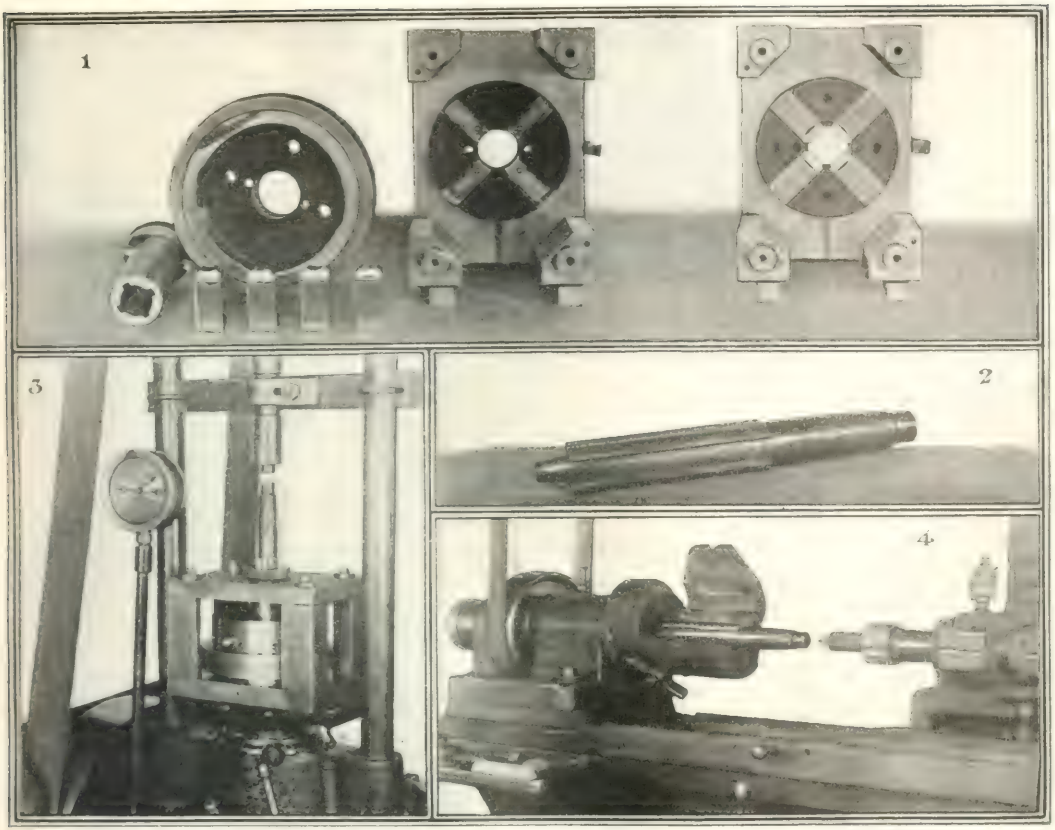
IN order to meet the difficulties of securing accuracy of the finished spline shaft the process herewith described, in which the shaft is drawn through a die after it had been carbonized, has been put into use by the Studebaker corporation. The general practice among manufacturers of transmissions requiring a spline shaft has been, for many years, to finish the spline and body portions of the shaft by grinding after hardening; but it has been found that this process demands extreme care in obtaining and maintaining the desired form.

Details of this new method are given in the paper presented by James A. Ford of the Studebaker Corp. He said in part:

THE die shown in Fig. 1 is constructed according to the same principles that apply to the automatic threading-dies now in general usage, the cutters being in the position that the die chasers ordinarily occupy. In the right-hand part of Fig. 1, the cutters are shown installed in the die. The cam ring is practically of the same construction as that used on a threading die, except that the ring is made stronger. This opening feature is necessary on account of having to pass the shaft back to the die, because the body of the shaft beyond the splines is larger than the body portion between the splines and the shaft will not pass completely through the die. This is illustrated clearly by the view of the shaft shown in Fig. 2.

THE shaft is entered into a bushing that is lined up with the die. Then the shaft is pressed through the die to a stop that has been set at a sufficient distance to permit the shaft to pass through to the shaft neck at the end of the splines, as illustrated by Fig. 3. The cutters in the die are then released and the shaft is removed.

During the experiments with this die it was ascertained that a clearance angle on the cutter of thirty



1. *Cutters installed in die.* 2. *Detail view of shaft.* 3. *Pressing shaft through die.* 4. *Re-centering shaft by grinding against pencil-shaped grinding tool*

minutes was about correct, and it was decided that one pass of the shaft through the die gave the most satisfactory result.

Up to this point we had a shaft that was carbonized, and its body and splines were finished to the dimensions desired. After hardening a number of shafts, we were able to determine just what change took place in them, and an allowance was made for this in the adjustment of the die. The change was uniform to a reasonable degree in all shafts, and this enabled us to determine what the standard allowance should be.

THE next problem was that of overcoming the warpage in a shaft after it had been hardened. Fortunately, we found that this warpage was outside of the splined portion of the shaft.

It was very difficult to revolve the shaft on its centers and straighten it to the degree of exactness required, and the operation required too much time. However, we found it possible to straighten the shafts easily to within 0.005 in. per ft. of being parallel with the true axis of the shaft. Therefore, we straightened the shafts to within the 0.005 in. per ft. limit.

AFTER having been hardened and straightened to within the 0.005 in. per ft. limit, the shaft is gripped in a fixture mounted on the spindle of an internal-grinding machine, as illustrated by the two views shown in Fig. 4. It is then revolved true with the splines while it is being re-centered by grinding against the pencil-shaped grinding-tool, shown also in Fig. 4.

After the new centers have been established true with the spline portion of the shaft, the remainder of the operations follow ordinary shop practice.

The process described by the author was devised to eliminate the difficulties incident to the finishing of the splined and body portions of a spline shaft, such as is used in transmission gearing, by grinding with a formed wheel after the shaft has been hardened, and is the result of a series of experiments.

THE accuracy of the finished shaft was the primary consideration and three other groups of important considerations are stated, as well as four specific difficulties that were expected to appear upon departure from former practice.

Illustrations are presented to show the tools used, and the method of using them is commented upon step by step. The shaft can be straightened to within 0.005 in. per ft. of being out of parallel with the true axis of the shaft, after the shaft has been hardened and it is then re-centered true with the spline portion.



I. B. Scofield
Ford Motor Co.



P. E. Haglund,
Ford Motor Co.

Work of Ford River Rouge Plant Broad in Scope

8000 *cylinders per day in* 1922 *contrast with* 70 *per day in* 1907. *New cylinder molding machine developed.*

PRODUCTION men were given an illustrated lecture tour through the big Ford River Rouge plant on Thursday morning. P. E. Haglund and I. B. Scofield conducted the tour in their paper entitled "Cylinders from the Ore to the Finished Part." The paper was an excellent preliminary to the actual visit made to this plant on Thursday afternoon.

THE authors traced the steps from the ore to the finished cylinder castings.

The work is conducted in such a way that the ordinary pig iron stage is eliminated. As explained by P. E. Haglund, the fact that the pig iron stage is eliminated does not mean that the castings are made directly from the product of the blast furnace, as has often been reported. It is necessary to draw from the cupola to secure the proper analysis for the iron before the castings are made. The plan, however, does eliminate the stage in which the iron is run into pigs, thereby eliminating the wasted heat lost by re-heating this amount of metal.

The authors contrasted the present methods in which 8000 cylinders are cast per day with those used in 1907, when 60 per day was good production. It would be impossible, as they pointed out, to cast the 8000 cylinder blocks per day on the floor, as is customary in the usual type of foundry. Not only would the floor space required be too enormous, but the gas and smoke would make working conditions practically impossible.

In this new plant, two big economies have been effected by first bringing the ore to the men and thereby cutting out the cost of transporting the material from place to place, and second, by decreasing the cost of material. The latter, of course, has been the most difficult; but, by mining practically all their own iron and coal, the Ford Motor Co. has been able to accomplish this result. The body of this paper consisted of a step-by-step description of the coal and iron ore from the time it leaves the mines until it passes through the plant as finished castings or as valuable by-products.

AN interesting point brought out is that the only waste in product of the plant, that is the slag, is soon to be utilized for cement and will be used largely for construction work at the Ford plant.

Another interesting development is the new cylinder molding machine which is now being experimentally studied. If this proves out as it promises, another step toward the elimination of manual labor will have been made.



W. J. Alles, Dodge Bros.
F. J. Lamborn, Dodge Bros.



N. C. Banks, President Gear Grinding Machine Co.



F. T. Ellis, Cadillac Motor Car Co.
A. V. Widman, Cadillac Motor Car Co.

S. A. E. Production Meeting

Production Errors in Gears

Difficulties in manufacture have more influence on gear sounds than changing pressure angles, steel or tooth form details. Causes of trouble found in hardening process, cutting machines and in some cutters. Methods of checking gears in production.

MOTOR-CAR production-men, as a rule, do not lay claim to being specialists in all the various arts and sciences that enter into the finished motor-car: so, in the matter of gears, we do not pretend to know all the details that enter into their design and production. Very few of us are familiar with the mathematics relative to the involute gear-tooth forms that the engineering fraternity stresses considerably in connection with gear noise. We are much more familiar with the noises of the finished product, which are recognized as knock, rattle, growl, hum and sing. When these occur, naturally those men who have made a life study of gear subjects are called in, and they make recommendations.

As a rule our gear experts offer widely varying remedies for the same cause. If one is using a 20-deg. pressure-angle, we can advise a 14½-deg. angle and have a large number of supporters in both the engineering and the production fields. If both 20 and 14½-deg. angles have been tried, we can easily advise a stub tooth or full length. If all six combinations have been tried, it is easy to recommend topping-off or no topping-off; and, if this does not work, we recommend a different *steel, cutting machine* or *cutter*. While all of this goes on, sufficient time has elapsed to start all over, with the first recommendation. Of all these recommendations we find many past and present supporters of national reputation.

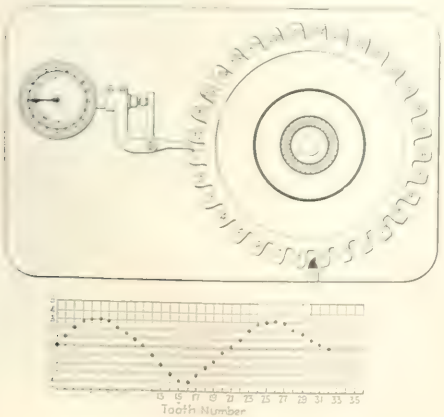


Fig. 1

It is the purpose of this paper to show that production variables have a much greater influence on gear sounds than changing pressure-angles, steel or tooth-form details; also, by showing the errors present, to obtain definite help from the gear-cutting tool and the machine designer. We will confine this discussion, for the time being, to the transmission, which is the simplest type of gearing used in the motor car.

Gear Noises

WE have already referred to the various kinds of gear noise. The first is a knock that might be caused by a nicked tooth or a single tooth of a pair of running gears that are in mesh. If this single tooth or nick happens to be in the transmission constant-mesh pinion and it is driven at 1000 r.p.m., there will be 16 distinct blows per sec. Elementary physics show that, up to this point, these blows can be distinguished by the human ear as individual blows. With this same gear, rotating at 1000 r.p.m., if there are two nicks and they are a uniform distance apart in the gear, the gears will have 32 knocks per sec. This noise still will be distinguishable as individual knocks by some ears, but by others it will be noted as a distinct tune. However, if the two nicks happen to occur in this gear an uneven distance apart and the transmission is speeded up, one can note readily the place where the gear noise changes from an individual knock into a sound that is usually designated as a rattle.

It is evident that influences similar to the nicks referred to above can be produced by inaccurate conditions in the gears. For example, should the tooth spacing in the transmission drive-pinion mentioned be such that the driven gear, instead of rotating at a uniform speed, is forced to increase and decrease its speed at every revolution of the

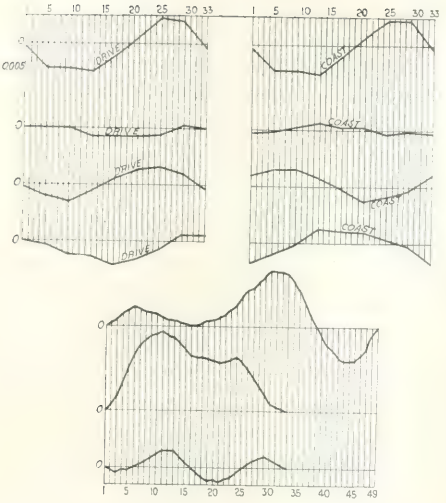


Fig. 2

pinion, very similar sounds will occur. If on one side of the driving pinion the teeth are 0.015 in. ahead of their proper position on the periphery of the pinion, the driven gear must gain and lose a corresponding amount in its steady motion. In so doing, it may strike on the back of its tooth rather than on the driven side, especially when idling, and produce a series of blows which still further increases and confuses the rattle.

It is not sufficient to check gears for spacing error from tooth to tooth. It is very desirable to check the accumulated error of a number of teeth, because a gear may vary 0.001 in. from tooth to tooth. With eight successive teeth each gaining 0.001 in. on the side of the gear and a similar number of teeth that may be losing 0.001 in., a total error of 0.016 in. might be imparted to the driven gears.

Fig. 1 illustrates a very simple device that has been used for checking tooth spacing. The gears are mounted on a bushing and one tooth comes against a stop. A dial indicator is arranged so as to be in contact with some tooth one-fourth, one-third or one-half way around the gear. When the dial indicator is set at zero, with the tooth against the stop at any one point, the distances between the two points can be measured and, if the gear be correct for indexing, placing any of the two teeth in the gear in similar positions should not cause the dial indicator to vary, especially if the gear runs true.

Checking Tooth Spacing

WHEN the gear is first put on the indicating apparatus, the dial indicator is set at zero. We then put a mark at zero on the chart in Fig. 1 for tooth No. 1. The next step is to index the gear around one tooth. Any reading obtained is marked above the tooth number in the vertical line. We next index the gear around to tooth No. 3 and again mark the dial-indicator reading opposite the number of thousandths of an inch that it may show. The gear is then indexed to teeth Nos. 5, 6, etc., until all the teeth on the gear have been indexed.

For the purpose of record, we now have a chart showing the accumulated variables. It will be seen from Fig. 1 that at no point is the spacing variable as great as 0.001 in. between any two teeth, but it can be in error a total of 0.008 in. or more when the error between the several teeth has accumulated. A better visual demonstration of this condition occurring in gears is made by means of a gear-tooth-form projector. When a gear-tooth-form is projected upon a screen by this device, it will be noted that the magnification of the shadow is 100 to 1 and that, for every inch on the screen there is at least a 0.001-in. error somewhere in the gear. The shadow on the screen also shows the variation in uniform movement of the driven gear due to an error of this kind; that is, the driven gear, instead of having its tooth in the position of the outline on the screen, has been forced to advance a number of thousandths of an inch. It will be noticed further that this advance and retardation does not occur uniformly; that is, the advance may be confined to a very small number of teeth, remain there for a certain length of time and then be retarded slowly. A gear in this condition will give a rattle very similar to that which might be produced by unequal spacing. This condition can be studied best by charting it as described.

Variations in Finished Gears

A NUMBER of variations as they occur in the finished gear are shown. Fig. 2 shows, first, a rapid drop, then a flat portion showing no change, then a rapid rise, another flat and then a return to the starting point. These curves require very little explanation.

It requires considerable imagination to determine just what happens when a driven gear such as those described is meshed with a driving gear having teeth misplaced as shown in Fig. 3; yet this occurs in daily practice. Fig. 4 shows a gear and pinion neither of which has an index error of more than 0.005 in.

In addition to the two gears having a rather irregular action between themselves, their increasing and decreasing movement is carried on to the countershaft and the idler, which often have similar defects in themselves. Accumulating errors in gears often cause the fourth gear in a train to be as much as 0.25 in. away from its correct position and this change occurs in varying amounts depending on the number of teeth in the gears of the gear train. From this it is seen readily that the countershaft does not rotate smoothly and that the gear on the other end of the countershaft, in addition to the variable movement given it by the errors in the first two gears, imparts its error to the gear meshing with it. The action of the fourth gear will also lack uniformity in addition to that imparted to it by the driving gear, to the extent of the error on the fourth gear. If the ratios between the gears

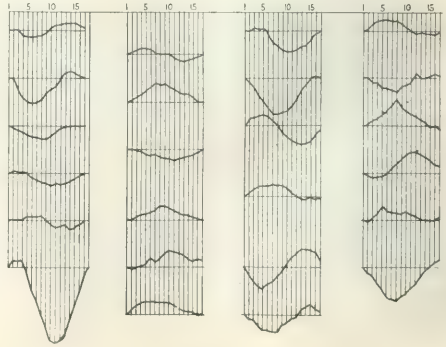


Fig. 3

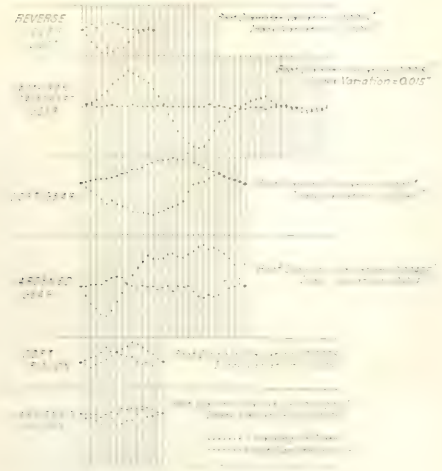


Fig. 4

referred to are a direct proportion such as 2 to 1, these several shocks will occur uniformly, the error of the first uniformly with each revolution of the respective gears; however, if the ratios should be odd, such as 16 to 31, it will be difficult to estimate the change of speed that takes place.

Hum or sing is not nearly so difficult to analyze as the matter of rattle in a transmission gear. With this same transmission run at a speed of 1000 r.p.m. at the pinion shaft, if the pinion should happen to have 16 teeth, it will be found that 250 teeth per sec. go into and out of mesh. If the teeth are not correct in shape and the gears are under a slight load, there may be 250 blows per sec. under certain conditions, which we are told corresponds to the tone of middle C on the piano. Should fewer teeth go into and out of mesh, and this may be caused by a slower speed, a much lower pitch can be produced. In a similar way, because of the speed reduction that occurs in the usual type of transmission between the drive pinion and its countershaft, the tone produced by the reverse idler is very low and, instead of producing a hum or sing, it will produce what we usually call a growl. Errors in the sliding gears, because of their higher speeds, will produce higher pitch growls and approach a hum.

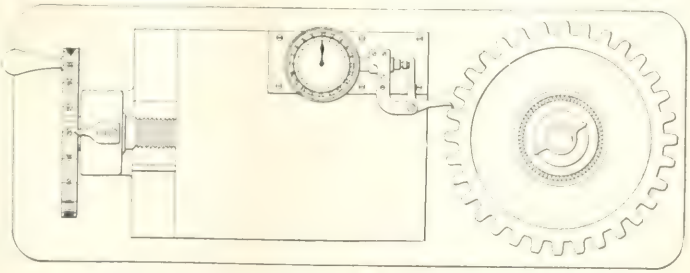
A GREAT many instruments have been developed for the purpose of analyzing tooth-forms producing these sounds. The one that we have worked out and have chosen to use is shown in Fig. 5. It consists of a dial indicator mounted on a guided slide. We place the gear in a definite position with respect to the indicator, start at the point of the tooth and set the indicator at zero. The slide is then moved toward the gear 0.010 in. and the indicator-reading marked on the chart shown in the lower portion of Fig. 5. The slide is then moved 0.010 in. more, the reading is marked again, and this is continued until the bottom of the tooth is reached. By taking the gear that has just been charted off the bushing and placing another gear in its place, other tooth-forms will be compared with the first.

The charts reproduced in Fig. 6 show some variations occurring in production, these particular charts having been made from gears with which special care had been taken to secure good gears. This was done by men who were not previously familiar with the method that was going to be used for the gear inspection. Fig. 7 shows some curves that occur in production from the same hob, and also curves made at different hours of the day.

Cutting Machines

THE causes of the errors referred to are various. Some of them occur in hardening, some in the cutting machines and some in the cutters. We have found these errors in all of the types of machine that we have used. For the purpose of this discussion we are selecting a hobbing machine.

The hob is a generating tool that produces a gear such as is shown in Fig. 8. It will be seen readily that if all tooth-heights of the hob are the same, each hob-tooth generates, roughly, a flat in the tooth-form. If any of the teeth in the hob is high, a wider flat will be produced as shown in Fig. 9. Should the tooth-heights be correct and the hob be mounted in the machine with a run-out, a leaning tooth can be produced, depending on the sideways setting of the hob with the gear. Also, should the hob be correct and the end-thrust collar in the hob spindle be out of parallel, giving the hob a slightly reciprocating



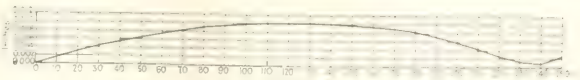


Fig. 5

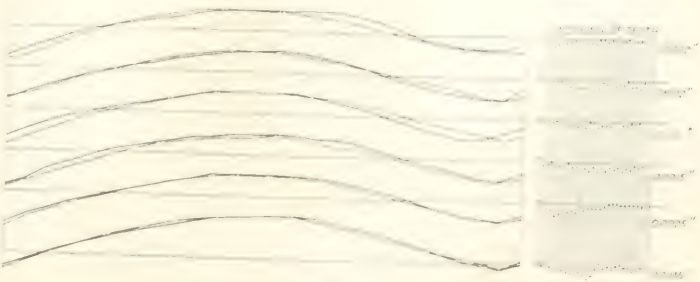


Fig. 6

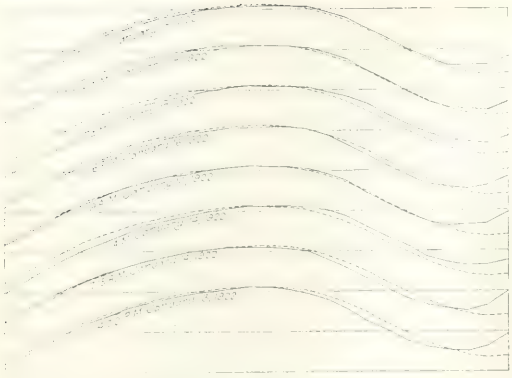


Fig. 7

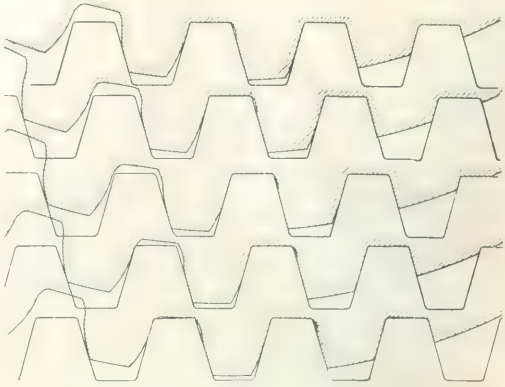


Fig. 8

motion with each revolution, an error can be produced that may compensate for the hob run-out or may add to it. Should the thrust collar at the rear end of the spindle be adjusted loosely so that the spindle may have end-play, the hob, as it cuts on one side, will be forced over and then back with each tooth of the gear and produce corresponding errors in the tooth-form. Again, if the gears in the hob-grinding spindle have inherent index-errors in them, or should the gears driving this gear be concentric or improperly spaced, their errors will be transferred to the different teeth of the gear being cut. If the hob spindle is tight for a portion of the revolution and loose for a certain portion of the revolution, a sagging will occur in the driving-gear train which will be very detrimental to the tooth-form. Some hobbing machines are built so that the bevel gears in the hob drive-spindle give a thrust in the opposite direction to that given by a spiral pinion driving a hob-spindle gear. This permits a back-and-forth movement of a hob-spindle drive-shaft which leaves its impression on the tooth-form.

IN most hobbing-machines the bearings are kept fairly tight, and a great many operators insist that the hob spindle be kept warm. This also applies to the worm-shaft driving the wormwheel and, to a certain extent, to the work spindle. Unless the machines are extremely well adjusted, the thrust collars on the spindles so fitted score very easily and cause the spindles to be tight or loose, depending on various portions of its revolution. This causes a corresponding sag in the gears driving the *index* wormwheel and seems to be the main cause of the index errors already referred to. Another source of error is looseness in the gibs of the hob saddle. It is very difficult to move the hob slide from the face of the tooth without having some play between the gibs. This amounts, in a very similar manner, to the error that is obtained by having end-play in the hob spindle. Another contributing error to tooth-form is depth of cut. There will be considerable error in the tooth-form if the hob is sunk several thousandths of an inch too deep. Should the hob be straight-sided, the pressure-angle will increase with the depth of the cut and decrease as it is raised above the pitch-diameter. Another factor having considerable influence is the outside support for the hob spindle. We have had considerable difficulty in placing this outboard support of the hob spindle back in exactly the same place, giving us exactly the same condition of hob spindle as before.

When the work spindle is caused to rotate ahead of or behind its proper position, we necessarily have certain tooth-form errors in addition to index errors, and also in addition to those produced by the hob, its spindle and driving mechanism. There are conditions under which some of the errors referred to are counterbalanced by other errors. However, there are also conditions in which these errors accumulate. Considering the number of gears in a hobbing machine and the number of possibilities for errors outside of these gears, it is largely a matter of chance whether suitable combinations can be obtained to produce proper tooth-forms.

OF the various kinds of gear that we have cut and which we have had cut for us by a large number of different manufacturers, we have found that the errors from a general definite shape have apparently more to do with noise than any existing type of gear. The nearer to being correct a 14½-deg. pressure-angle-tooth gear is, the quieter it will be. We have never yet been able to secure 14½ and 20-deg. pressure-angle gears that had similar errors. The indications are, however, that the differences in sound due to the differences in the pressure-angle are very slight when compared with the differences in sound due to different errors in the same gear. We are using 14½ and 20-deg. pressure-angle gears regularly in production, and there is little to choose between them.

The details of tooth-form are of some importance. Continuing with transmission gears, Fig. 10 shows the first layout which we make. This is with a view to determining the amount of tooth length necessary to give a 100-per cent arc of contact. With this information in hand, we select a hob form such as is shown in Fig. 11 and, using this on paper, we roll out two tooth-forms as shown in Fig. 12, one for each of the gears that are

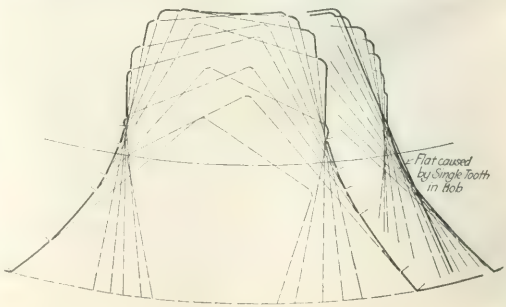


Fig. 9

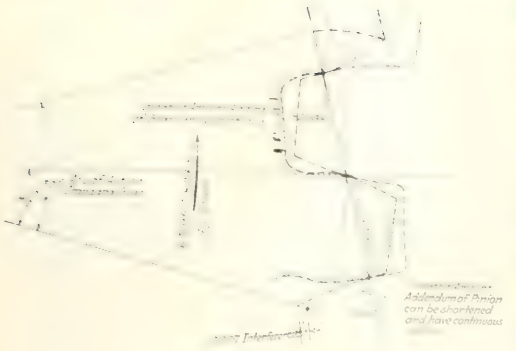


Fig. 10

intended to be in contact with each other. The next step is to roll these gears on each other to determine the interferences, if any, and the amount that they are topped-off; then, if necessary, the hob form is modified and the same procedure carried through. When the hob form is established on paper in this manner, it is charted as shown in Fig. 13 and the hob supplier is asked to conform to this shape. Definite tolerances are given for the amount of variation from this form. On receipt of the hob, we inspect this form on a hob-checking apparatus very similar to that which we use for checking gear-tooth forms, a drawing of which is shown in Fig. 14. If these conform to our standard requirement, it is expected that the hob will be satisfactory. We do not require any test of the hob in a cutting machine, because of the large number of errors that will be introduced by the machine, either in correcting hob errors or resulting in having an apparently correct hob rejected without cause.

We have prepared charts showing the condition of the gear in the green and the condition of the gear in the hard. These charts show such gears and the variations occurring in them. Similar variations occur in gears mating with these gears.

Freedom from warpage in steel is a matter of uniform hardening and cooling; also of removing all forging strains before machining. The question as to whether oil-treated steel is better than carburized is still unanswered as regards warpage. We have hardened more than 5000 gears of different brands of steel and carefully checked them. We find that there is very little difference in the warpage under the same hardening conditions.

THE necessity for grinding gear-tooth forms depends largely on our ability to cut and harden gears, maintaining definite shapes. However, there is a large difference in the number of rejections that we have from gears ground by different processes. Our reports show that out of 5000 gears ground by one method we have had a 14 per cent rejection. This is slightly greater than that which we have had from the hob gear without grinding. By another method of grinding of a similar number of gears, we have had less than a 0.5 per cent rejection, as well as more satisfactory gears. In the first case, four gears of the transmission were ground, and in the second case only two gears of the transmission were ground. All transmissions were passed by the same inspector and inspected to the same standards. We, of course, are looking forward with great interest to the continuation of our experiment on gear-grinding.

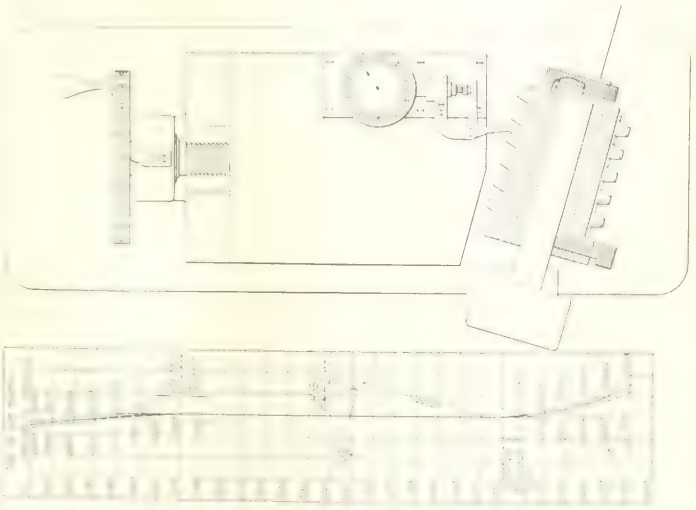


Fig. 13



Figs. 11 *and* 12

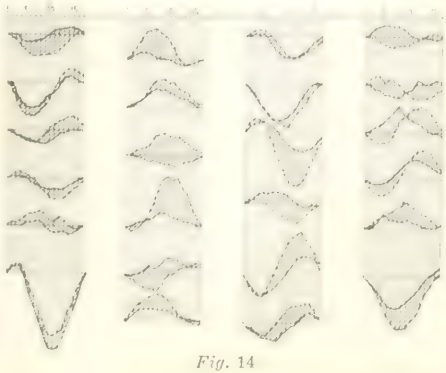


Fig. 14

Highway Engineering Looming Big on Educational Map

Fifty schools send representatives to Washington Conference. Long stride forward taken in unification of thought. Speakers lay down programs for training workers, construction and finance. Sociological phase viewed.

By James Dalton

HIGHWAY and highway transport engineering are now definitely on the educational map. Leaders in the field of technical training have given their approval to a definite program of instruction which looms large on the horizon. The colleges of the country will turn out each year larger and larger classes of young men qualified to take up the work of carrying forward the newest branch of the science of transportation.

The three-day conference arranged by the Highway Education Board, which ended Saturday at Washington, unquestionably was the most important meeting of its kind ever held in the United States. It brought together nearly 400 prominent educators, state highway officials, engineers, attaches of foreign embassies, Government officials and spokesmen for the automotive industry.

These thoughtful men discussed from every angle the vital problem of highway construction and maintenance, highway and highway transport engineering. They gave full recognition to the fact that a great system of improved roads, upon which stupendous sums are being spent each year, cannot be built and maintained properly unless the administrative work is in the hands of trained men. They realized also that with the rapid increase in the volume of highway transport, the day is near at hand when there must be an army of young men ready to direct it along sound and scientific lines.

Admitting these fundamental facts, it is apparent that the actual work of training must be done by the schools and colleges. That is the reason the heads of all the collegiate civil engineering departments in the country were invited to attend the Washington conference. It is significant of the interest in the subject that more than 50 of them accepted and attended every conference session.

One of the most important results of the conference is that most of the committees appointed to prepare reports on various phases of the broad subject, after frequent and earnest sessions, decided that the importance of the work they had undertaken was so great that they must give months of study to the problems involved before they could prepare final reports. For that reason those presented were merely preliminary in character, but even in that stage they evidenced marked progress.

This means that some of the best minds in the country will give careful consideration to subjects of fundamental import to the automotive industry. It is more or less sad but none the less true that educators and engineers appear to be more deeply interested in the construction of highways than are the men most vitally concerned—those engaged in the automotive industry. Makers of motor vehicles had few representatives at the conference but those who were there gave a mighty good account of themselves.

There was A. J. Brosseau, a recognized authority on the subject of highway finance whose paper on that subject was one of the big events of the conference; George M. Graham, the orator of the industry who delivered a brilliant address at the convention dinner, and C. C. Hanch who told the educators the market which awaits all the trained men they can turn out.

The class room and the assembly line of an automobile plant may seem far apart but they are not. Unless the class room can train the engineers needed to build highways and direct the transport over them, there will be no market for automobiles. A few of the far-seeing men of the industry sensed this fact long ago and they have worked tirelessly to make plain the relationship.

THESE addresses marked high spots on the program—

"The Highway Engineering and Highway Transport Fields and Their Need for Trained Men," by Thomas H. MacDonald and C. C. Hanch.

"The Trend of Education for Highway Engineering and Highway Transport," by T. R. Agg of Iowa State College, and Arthur H. Blanchard of the University of Michigan.

"Sending the Highways to School," by George M. Graham.

"Relation of Research to Highway Engineering and Highway Transport," by Dr. W. K. Hatt.

"Problems in Highway Finance," by A. J. Brosseau.

"Sociological Implications of Highway Transportation," by C. J. Galpin.

"Co-operation versus Competition Between Motor Truck and Railroad Transportation," by W. H. Lyford.



From left to right: Dean A. N. Johnson, College of Engineering, University of Maryland and president American Association of Engineers; Dr. John J. Tigert, U. S. Commissioner of Education, chairman Highway Education Board; Arthur H. Blanchard, professor of highway engineering and highway transport, University of Michigan; Thomas H. MacDonald, chief of United States Bureau of Public Roads

IT is evidence of the breadth of vision of these leaders of thought that they have taken a more advanced step than probably ever was taken before by the representatives of any great industry. They have placed all their cards on the table. They have laid down all the facts available for the analysis of experts and educators. They have agreed to abide by the decisions these men reach on the facts presented to them.

They are not asking special favors. They believe the industry they represent is vital to the life of the nation. They are convinced that the construction of an adequate system of improved highways is an absolute essential to progress. They are perfectly willing to leave to the experts the decisions as to how and where they should be built.

The highway problem has come at last to have a human as well as a technical side. The General Federation of Women's Clubs has taken it up. Some of its representatives sat through all the sessions and heard attentively the reading of even technical papers. They went to the banquet and listened interestedly to all the speeches as did a lot of other women. They realize that the building of highways has a direct bearing on the ability of city women to get better food at lower prices when new markets are opened to farmers and they know that the advent of the good highway will do more than anything else possibly can to lighten the drab life of the farmer's wife.

Sociological Aspect Grasped

THE sociological import of highway building has at last been grasped and it is a fascinating theme. Dr. C. J. Galpin, economist of the United States Department of Agriculture, told how good roads and motor vehicles are taking the city dweller from congested urban districts into the suburbs and are carrying some of the joys of life to the farm.

Looking at the subject from a purely selfish standpoint, truthful exploitation of what good roads and motor vehicles have done to brighten the family life of America, will do much to break down opposition to the expense involved in road building. It also will be a potent weapon with which to meet the insidious and selfish attacks of those interests which contend that motor vehicles should be taxed off the highways. Without them there would be no need for roads.

Many things of interest to the industry in addition to the long stride forward in relation to highway engineering education, came out of the conference. Dr. W. K. Hatt, director of the Advisory Board on Highway Research of the National Research Council, discussed "The Relation of Research to Highway Engineering and Highway Transport," and he brought out much which was of direct interest to automotive engineers. For example, he declared they should work in close co-operation with highway engineers in determining the effect of the various kinds of road surfaces on the vehicle itself. Another point was that there should be much more definite data on the effect of grades on fuel consumption.

Notwithstanding the profound effect on the industry of highways, there were present at the conference only two representatives of the Society of Automotive Engineers. It would seem that the industry should be in a position to direct research into these fields, in view of the fact that a large part of the expenses of the Highway Education Board are paid by the National Automobile Chamber of Commerce, the Motor and Accessory Manufacturers Association, the Rubber Association of America, and two or three far-sighted manufacturers who are deeply concerned about the future of highways.

Hatt's paper, taking up the most modern methods of road construction, was one of the most valuable read at the conference and was of deep interest both to the engineers and educators.

Trucks as Aids to Railroads

ANOTHER highly important contribution to the literature and research bearing on transportation, was the paper read by W. H. Lyford, vice-president of the Chicago & Eastern Illinois Railroad, on "Co-operation versus Competition Between Motor Truck and Railroad Transportation." It was characterized by J. R. Bibbins, of the Chamber of Commerce of the United States, as "meriting more serious study than any paper on the subject read in the last five years."

Lyford, who has made a close study of the terminal question, declared railroads should use trucks to supplement their service, especially in the collection and delivery of freight in congested centers. He also advised the abandonment of unprofitable branch railroad lines and the substitution of motor truck service unless local truckers are able to meet the needs of the population to be served. He was given a unanimous vote of thanks for the service he had rendered by the research which made the paper possible.

Thomas H. MacDonald, chief of the Bureau of Public Roads, to whom all State highway departments pay allegiance, declared that Lyford had presented for the first time in behalf of the railroads definite and tangible suggestions for the highway people to follow.

Expects Transportation Breakdown

ANOTHER highly important statement made by MacDonald in relation to the general transportation system of the country, voiced at an earlier session, was, in effect:

"The period of depression which followed 1920 gave highway interests a breathing space in which to accumulate finances and labor to rebuild the roads which had broken down under the unprecedentedly heavy traffic. Now, when they are needed again, they are in as good condition as ever with a greater mileage.

"Conditions similar to those of 1920, which have arisen again, have created a traffic congestion on the railroads which will throw a heavy burden on the highways, whether we will it or not. This condition will continue until a breakdown of the transportation system makes continued industrial progress impossible and then there will be another chance to rebuild and extend the highway system. This work, therefore, should be continued while there is still opportunity to carry it on."

MacDonald also pointed out that the war-time priority ruling against transportation of highway building materials on the railroads is again in effect although the dearth of rolling stock is again forcing traffic onto the highways.

When the concerted movement for the promotion of highway and highway transport engineering education began at the first conference only two years ago, even the handful of men who called it had only a nebulous idea of what they wanted to talk about although they realized dimly that they had a big problem. There were almost as many different ideas in relation to education, construction and finance as there were men at the conference.

Finance the Big Question

THE most striking difference last week was that almost all the 400 men at the meetings were thinking along the same general lines. While even the underlying problems couldn't be stated clearly at the first conference, a solution of some of the more pressing questions already is being reached.

One of the most significant indications that the minds of those most interested in the highway question are moving in the same direction is the rapidity with which an agreement in principle is being reached on that most troublesome question—finance.

Two years ago there was nothing remotely resembling agreement but when Brosseau read his carefully considered paper on that subject last week there were comparatively few who did not accept his contentions as sound.

Fundamentally, there was nothing new in Brosseau's arguments but they were unanswerable in the logic presented to support them. He declared that the public at large should pay the cost of building improved roads with long-term bond issues, except in states where too great a burden would thus be imposed upon taxpayers, and that the cost of maintenance should be paid by the users of the highways, principally motorists. He stressed the importance of maintenance and asserted that if the work was properly done roads would not break down.

The views of Brosseau are shared, in principle at least, by Chief MacDonald of the Bureau of Public Roads. He it is who guards the expenditure of funds appropriated under the Federal aid act. No man in the country has a broader vision of the highway system of the future and its importance to the nation. The motor vehicle looms large in the picture as he sees it.

Highway Education Promotion

THE work of promoting highway education is being carried on under the direction of Dr. John J. Tigert, the genial and human Kentuckian, who is United States Commissioner of Education. The other members of the Highway Education Board are:

Chief MacDonald, F. C. Boggs, Colonel, Corps of Engineers, U. S. Army, representing the War Department; Roy D. Chapin, representing the National Automobile Chamber of Commerce; Harvey S. Firestone, representing the Rubber Association of America; F. L. Bishop, Dean, School of Engineering, University of Pittsburgh, representing the Society for the Promotion of Engineering Education; H. W. Alden, representing the Society of Automotive Engineers, and Walton C. John, secretary.

The comprehensive character of the work undertaken is shown by the list of committees and the thoroughness with which it will be done is attested by the chairmen. The list follows:

Required and Elective Undergraduate Subjects in Highway Engineering.
Chairman: H. Walter Leavitt; Associate Professor of Highway Engineering, University of Maine, Orono, Me.
Required and Elective Undergraduate Subjects for Highway Transport Business and Engineering Positions.
Chairman: L. W. McIntyre; Assistant Professor of Civil Engineering, University of Pittsburgh, Pittsburgh, Pa.
Subject Matter of Basic Required Undergraduate Course in Highway Engineering.
Chairman: L. E. Conrad; Professor of Civil Engineering, Kansas State Agricultural College, Manhattan, Kansas.
Subject Matter of Basic Undergraduate Course in Highway Transport.
Chairman: C. B. Breed; Professor of Railway and Highway Engineering, Massachusetts Institute of Technology, Cambridge, Mass.
Subject Matter of Undergraduate Course in Highway Engineering Theory and Design.
Chairman: C. C. Wiley, Assistant Professor of Highway Engineering, University of Illinois, Urbana, Ill.
Subject Matter of Undergraduate Course in Highway Engineering Laboratory.
Chairman: C. A. Baughman; Professor of Highway Engineering, Alabama Polytechnic Institute, Auburn, Ala.
Nature and Content of Supporting Non-Technical Courses in Economics and English.
Chairman: Dr. Charles S. Howe; President, Case School of Applied Science, Cleveland, Ohio.
Graduate Work in Highway Engineering and Highway Transport.
Chairman: H. C. Smith; Assistant Professor of Highway Engineering and Highway Transport, University of Michigan, Ann Arbor, Mich.
Conferences or Short Courses on Highway Engineering and Highway Transport.
Chairman: C. C. Albright; Professor of Railway Civil Engineering, Purdue University, Lafayette, Ind.
Teaching Highway Traffic Regulation and Safety.
Chairman: C. J. Hughes, Dean, Harvard Engineering School, Harvard University, Cambridge, Mass.
Sociological Aspects of Highway Transportation.
Chairman: Dr. C. J. Galpin, Economist in charge of Farm Population and Rural Life, U. S. Department of Agriculture, Washington, D. C.

Some of Colleges Represented

HERE are some of the State universities which were represented by the heads of their engineering faculties: Tennessee, Pennsylvania, Michigan, North Carolina, Oklahoma, South Dakota, Ohio, Colorado, Southern California, Minnesota, Missouri, Nebraska, West Virginia, Virginia, Georgia, Vermont, Maine, Rhode Island and Illinois.

Other colleges and universities represented were: Virginia Military Institute, Alabama Polytechnic, Virginia Polytechnic, Massachusetts Institute of Technology, New York University, Johns Hopkins, Rensselaer Polytechnic, Kansas State Agricultural, Cornell, George Washington, Catholic, Howard, Case School of Applied Science, Harvard, University of Pittsburgh, Lehigh, Drexel Institute, Columbia, Cincinnati, American, Carnegie Institute of Technology, Dunwoody Institute, Lafayette, Syracuse, Yale, Tufts, Pennsylvania State and Norwich.

State highway engineering departments represented included: Delaware, Connecticut, West Virginia, Nevada, Maryland, Nebraska and Illinois.

Most Important Task Is Awakening of Public To Need of Highways

Tigert and MacDonald warn of hard work ahead. Hanch tells of jobs awaiting trained men in engineering, transport and automotive field.

THE real keynote of the conference was sounded by John T. Tigert, United States Commissioner of Education and chairman of the Highway Education Board, at the opening session when he declared that the most important task ahead is to awaken the public to a realization of the importance of highway transport.

This point was emphasized by Thomas H. MacDonald, chief of the Bureau of Public Roads. He added that it was bound up inextricably with the need for educating the public to the proper use of highways from a traffic standpoint.

A very large part of the population of the United States will be reached by the proposed system of Federal aid roads, MacDonald said, and the highways will carry most of the highway traffic of the nation. He explained that it would take at least ten years to complete this great system aggregating 180,000 miles, and that when it is finished it will be necessary to begin immediately a rebuilding program.

There will be a tremendous need for highway engineers to build these roads and for highway transport engineers after they are laid down. He estimated that from $30,000,000 to $60,000,000 a year must be spent in administrative work in the expenditure of from $300,000,000 to $600,000,000 for road building.

Development of serviceable highways is not keeping pace with demand, MacDonald declared. The increase in the use of motor vehicles is the best index of the need for more roads, he added.

There will be opportunities for trained men in a dozen different fields, he said. Traffic engineering will absorb many of them in the future with the growth of highway transport. These men must have technical education and they must be developed along sound lines. The specialized training should be given as graduate work after a general foundation has been secured. Employment will be offered to those who are technically qualified.

Engineers in Public Service

DURING periods of industrial activity highly trained men are drafted in large numbers from public service. These men are secured by inducements of greater compensation and promise of continuity of employment. When an industrial depression sets in there is a drift of engineers to public service, but it is not as a rule the best trained men that public service secures in this manner. This, Mr. MacDonald says, is an indictment of the attitude toward public service.

A repetition of this cycle may be expected as industrial activity increases, he said. The degree to which these engineers remain in public service will be measured by the efficiency with which public funds are handled.

He urged the conference to concern itself with education in its broadest meaning and strive to awaken the public to a consciousness of the duties of public service. The public, he said, must be educated to the proper use of highways from the traffic standpoint.

The use of the motor vehicle has grown until it is now a major unit in transportation, requiring minds with varied training; but that in this step, which concerns itself with research in a variety of fields, the automotive industry is in a pioneer stage, was the contention of C. C. Hanch, vice-president of the National Automobile Chamber of Commerce and vice-president of the Lexington Motor Co.

He maintains that the industry will progress slowly or rapidly in this respect according to the degree that educators recognize the magnitude of the educational need involved, and the degree to which the industry and the universities make common cause.

The field of opportunity, he said, may be outlined as follows: Those within the manufacturing plants themselves and those in the extension of motor transport.

"The first class offers a field of opportunity in five distinct divisions. Research and design are the first of these. It affords a limited field in every factory where the services of a chief engineer and assistants will be required at salaries on a parity or higher than those of similar employment in other large manufacturing industries.

Problems to Be Solved

"AMONG the problems with which men of this type will have to deal may be enumerated the following:

"Development of strong, light metals, also steels and alloys, with high tensile strength.

"Designing of carbureters which will reduce fuel consumption.

"Improvement of braking and spring facilities.

"Building of a simpler transmission.

"Advance in headlighting system which will obviate glare.

"Simplification of construction.

"Development of equivalents for existing materials.

"Fabricated production is the second phase. Here, again, the field is limited, but obtains in every factory. The chief problems involve questions of serial and mass production. The men in charge must be equipped to bring about modifications in factory practice to meet with changing requirements of design and to effect economies in production. The educational requirement is a study in engineering.

"Purchasing is another field which is common to all factories and requires the services of at least one highly paid man and assistants, whose salaries will depend upon the size of the factory. These men should be thoroughly grounded in business practice, and preferably, should have an engineering knowledge of the materials which they buy. They must also have an understanding of economic trends.

"Sale and extension work is one of the largest fields of employment in the salaried field in the industry. Compensation there, as in all sales fields, depends directly upon the ability of the man. In general, the applicant should

know the principles of psychology, business practise and economics.

"The fifth and last field is a specialized one—the highway transport engineer. This man should be both an engineer and an economist. He is, in fact, a glorified salesman, who must be able to map out selling campaigns on a mass scale dependent upon the growing field of highway transport; as, for example, in the use of the motor bus in connection with consolidated schools, the use of passenger fleets for traveling salesmen, etc. This field is limited, but again the compensation is in proportion."

SPEAKING of the second large class of employment, he defined it as having to do with the operation of the vehicle in the field as a phase of highway transport and with the extension of sales promotional effort by the dealer. He said:

"Highway transport, as such, offers employment for a large and growing group of fleet owners, superintendents, dispatchers and operators. The colleges are generally concerned only with the first two classes. Education for these fields should include a general knowledge of economics, business practice and sufficient engineering to enable the man to build and conduct service stations, etc. This field offers attractive remuneration for the owner and a few very high salaries for the superintendents, depending upon the size of the fleet."

In emphasizing the importance of the dealer, he said:

"He is the pivotal point in the future of the industry. His is the immediate contact with the public. He should have a general training in business practice, economics and psychology. He must be a leader. The field is very large and the reward in proportion. If he is selling motor trucks then he should have some grounding in engineering."

He pointed out that "beyond these fields and as a direct offspring of the motor industry, there are the allied fields of the city planning commission, the traffic engineer and the transportation expert of the state highway department. These fields come under the head largely of public service. They will require many men of vision, with a thorough grounding in economics, sociology and engineering."

Urging that the aspect of national defense should be considered in the highway educational program, Major General Lansing H. Beach, chief of engineers, U. S. A. War Department, stated that his department was heartily in accord with all highway development movements and vitally interested in the work of the Bureau of Roads. He contended that commercial highways should follow as closely as possible military needs, for these highways must be built before the emergency arises.

SINCE educated men are needed badly in highway and highway transport development, effort must be concentrated on finding the men and giving them the necessary training, Dr. C. F. Scott, president of the Society for the Promotion of Engineering Education, urged that the conference state just what it wanted in the way of trained men, how many men it could use in this field and allied fields and when they wanted them, immediately or five or ten years from now. He questioned whether the highway field wants men who will produce in a measure immediately or men who will mature in the broadest degree in, say, twenty years.

The supply of trained men furnished by the engineering schools for highway work will depend on the demand for these men, Dr. Scott said. If the field of highway engineering will give the men the opportunity for development, then the field will get them. Growth, he said, depends on experience, and in order to get men to enter this field they must be assured that they will get experience. Leadership comes from development, and the chance to develop must be given if the right sort of men are to become interested and attracted toward this field.

True leadership, he said, is the spirit of service.

Suggested College Course in Highway Transport

THAT it is not advisable to give a four year college course leading to a degree in highway transport, was the decision of the committee headed by Prof. C. R. Breed of the Massachusetts Institute of Technology, to consider the subject matter of a basic undergraduate course in highway transport. It was held, however, that instruction in highway transport should be required under certain circumstances and offered as an elective in others. It was further decided that a course in highway transport should constitute a part of the undergraduate curriculum in those schools in which students are trained for highway engineering. The following outline for a highway transport course was suggested:

General Introduction.
- Classification and Natural Functions of Different Agencies.
- Interrelation of Railways, Highway and Waterways.
- Public's Interest.
- Individual's Interest.

Service to be Performed.
- Commodities adapted to Motor Transport.
- Economic Length of Haul for Different Commodities.
- Quick and Dependable Delivery.

Highway Transport Surveys
- Road Condition Survey—Structures—Pavements.
- Traffic Survey.
- Industrial Survey.
- Competing Transportation Agencies.

Classification of Equipment.
- Passenger Cars—Buses.
- Trucks—Tractors—Trailers.
  - Choice of Body.
  - Proper Type and Size of Truck.
  - Capacity Ratings.

Operation.
- Management.
- Routine—Dispatching.
- Fleets.
- Pay Load — Dead Load — Return Load.
- Inspection and Repairs.
- Selling Transportation.

Costs
- Fixed Expenses.
  - Taxes—Insurance—Interest—License.
  - Supervision—Overhead.
  - Depreciation.
- Variable Expenses.
  - Maintenance.
  - Operating.
- Same Items Often Under Both Fixed and Variable Expenses.
- National Standard Truck Cost Keeping System.

Freight Classification and Rates.
- Prevailing Railroad Rates.
- Perishable and Non-Perishable Goods.
- Raw and Manufactured Products.
- Total Comparative Costs Door to Door by Different Available Transportation Agencies.

Regulations.
- State Laws.
- Truck as Common Carrier.
- Municipal Regulations.
- Taxes—Licenses.
- Size and Weight Restrictions.

Pay for Highways With Long Term Bonds But Keep Them in Repair, Brosseau Advises

Declares in highly important paper on road financing that maintenance is equally as important as construction. Plan for financing.

"PROBLEMS IN HIGHWAY FINANCE" were discussed by A. J. Brosseau, president of Mack Trucks, Inc., who is regarded as the authority of the industry on this particular phase of highway building. His paper was regarded as one of the most important on this subject ever presented, for it dealt with the latest trends of thought in relation to the financing of highways.

The contention of the enemies of improved roads, and those who are lukewarm to their construction, has been that they should be built on a "pay as you go" basis and that they should not be a "burden" on future generations.

"We are proposing," he said, "that this generation shall undertake to build these roads, charge the cost to capital account, pay for them by long term bonds, use them and pass them on to the next generation in as good or better condition than when we built them. We propose that each generation shall pay a fair rental charge for the use of these roads in the sum of amortization charges, and interest, plus maintenance. Shall we not, then, proceed as would a business man, or a farmer, when setting up his establishment? The full cost of the factory or the farm would not be assessed against the first year's income, but would be carried over a term of years, during which time the returns would be enough to meet all charges and a pay profit as well."

OUTLINING what he considered an ideal program of highway finance, Brosseau laid down these points:

"First—The preparation of a construction budget by every state, estimating the cost of the primary and secondary roads to be built, year by year, for the next ten years.

"Second—That, based upon the stage of development of that program at this time, the cost of construction—all or part—shall be met by bond issues, except those states where the construction program is practically complete.

"Third—That a budget of current operating costs be set up to defray interest on bonds, amortization charges and maintenance. The amount necessary to pay interest and amortization should be included in the general tax levy. The cost of maintenance should be assessed against the user.

"Fourth—That all expenditures should be under the control of the state highway departments.

"Fifth—That regulatory powers should be as flexible as possible and lodged only within the state highway department, to be administered in accordance with the needs of the public."

As a summary for consideration where state highway bond issues are necessary, he proposed that:

"First—Bond issues should be serial in form and issued for as long a period as fifty years. The fund should be expended under rigid engineering control and provision must be made for sufficient current income to pay interest, amortization charges and adequate maintenance.

"Second—Interest on bonds and amortization should be paid for from general taxation. Maintenance costs should be charged against traffic.

"Third—Maintenance should include all charges up to and including construction save where an inferior is replaced by a superior type of surface.

"Fourth—Only that type of road shall be constructed which is adequate for the needs of the present and future traffic. This shall be determined by careful surveys both of traffic and economic possibilities."

"A SURVEY of highway development as it is to-day shows that we are annually appropriating sums aggregating more than $1,000,000,000 for city and rural highway construction and maintenance. A further survey of our needs shows that this program must be continued for ten years or more if we are to arrive at a connected system of highways which will render the greatest possible service to the public.

"If we were dealing with this question in the untroubled days before the World War, the matter of finance would be a relatively easy one and we would not be so much concerned with ways and means. But it is necessary to remember that to-day the nation is carrying a heavy tax budget, and, what is more important, that the state and county levies are at higher levels than they have been in the past. Accordingly, we must weigh well all of the elements entering into any appropriation for any purpose, and only those must be made which we know will surely return a direct profit to the public. Further, we must seek to definitely allocate those profits so that the burden will be borne in as large a measure as possible by those who are the beneficiaries.

"Broadly speaking, we will all agree that those who are alive to-day and those who come after them down to the children of the third and fourth generations, will benefit from highway construction, provided that, once constructed, the highway is maintained. Some might go further and say that the highway, if maintained, will be of benefit for all time, but looking at this as practical men, we can concern ourselves only with a definite period of time wherein the inventive genius of the country would not have opportunity to upset our present scheme of transportation by new methods. This might well be from fifty to one hundred years.

"IT would then appear as a general proposition, assuming the ability of our engineers to maintain a highway once built, that the cost of highway construction should first of all be divided between this generation and those to come, which, of course, at once implies long term highway bond issues.

"Here again, however, we come at once to practical limitations, the extent of which must be finally determined by economic research.

"Can the highway engineer maintain the road once built?

"We have been accustomed to hear that roads have



From left to right: C. C. Hanch, vice-president of National Automobile Chamber of Commerce; D. C. Fenner, of Mack Trucks, Inc.; M. B. Leahey, general sales manager, Durant Motors, Inc.; Ezra W. Clark, advertising manager, Clark Equipment Co., Buchanan, Mich.

broken down under heavy motor traffic and that money expended for them has been wasted. Is this true? Fortunately, in this field we appear to be arriving at a definite demonstration of facts. Engineers tell us, for example, that 40 to 50 per cent of the cost of construction of a highway is permanent, assuming that the highway has been properly located. The right of way, the grade, the drainage, bridges, shoulders and engineering costs need only be paid for once. It is the surface which wears.

"Engineering records show that here the loss is less than is popularly supposed, since in the rebuilding of a surface it is possible to salvage much of the material and use it for a base for new surfacing.

"This leaves us with a definite need for constant maintenance and that maintenance is limited not by physical but by financial ability. We have placed too much stress upon the original construction and not enough upon the constant maintenance.

"Can we assume proper location of the highway? Here again is a field for the student of political administration in its relation to economics. The state engineer, looking at a map which shows the economic development of a state, the routes of through travel, and the feeder lines, has before him a bird's-eye picture which enables him to determine positively and accurately where highways should go. We cannot expect the local official to be able to gage this so well. Centralization of authority seems essential if the public's funds are to be properly conserved.

"SHOULD we seek to develop all highway construction through bond issues?

"This question is one which cannot be fully answered until those preceding it are taken into account. Before we expend any funds we must know that the benefits to be derived from the improvements of a highway are more than sufficient to justify the cost of that improvement.

"We must then be sure when bond issues are proposed that the improvement promises something more than the cost of maintenance.

"Before granting the authority to issue bonds, provision must be made for the proper control of construction expenditures, adequate maintenance and sinking funds.

"These points checked off, we are likely to find that we have come down to a consideration of the improvement of the main state systems, which will average about 7 per cent of the total mileage of this country. When completed, this system will place all of us on main roads, or but a few miles away, and through the feeder lines we will be enabled to reach the great highway and deliver our commodities to market.

"Here, then, is the field in which the cost of highway construction should be divided between this generation and those to come. We are proposing that this generation shall undertake to build these roads, charge the cost to capital account, pay for them by long term bonds, use them and pass them on to the next generation in as good or better condition than when we built them. We propose that each generation shall pay a fair rental charge for the use of these roads in the sum of amortization charges, and interest, plus maintenance.

"SHALL we not then proceed as would a business man, or a farmer, when setting up his establishment? The full cost of the factory or the farm would not be assessed against the first year's income, but would be carried over a term of years, during which time the returns would be enough to meet all charges and pay a profit.

"This must not be taken to mean, however, that we should at once proceed arbitrarily to say to every state: You must have a bond issue to take care of your road improvement program. As in all other phases of this complex problem, there are a host of limitations to be set up, and it is only through investigations by trained men that we shall ultimately find the correct answer. Dogmatic statements must be avoided. Prejudice must be eliminated.

"Analyses of highway development to date show that there are two general sets of conditions which apply. The first is found in those states which, like New York, Massachusetts, and some of the other Eastern and perhaps Middle Western sections, have to deal with a developed traffic problem and have already met with many of the conditions mentioned.

"THE other condition is that of the Southern or Western States, where valuations are low, mileage is high and traffic not yet developed. Here the problem is one of construction, largely. The general tax burden is high, and any attempt to meet the needs of highway development from current funds would result in so retarding the program that dollars would be lost in diminished or retarded economic development where pennies would be saved.

"The question which here must be answered is: 'Do the increased profits resulting from highway construction under bond issues offset the difference in cost as between "pay-as-you-use" and "pay-as-you-go" methods of financing?'

"Looking at this from the viewpoint of the business man suggesting clues to be run down, I want to state at the outset that if you consider this problem from the standpoint of building, let us say 100 miles on a pay-as-you-go policy in ten years' time as against 100 miles in one year with a bond issue, in the first case, in ten years you will have paid all of the principal charges of that 100-mile construction, but will have obtained only an

average use of fifty miles for the entire ten-year period, while 100 miles built in one year give the use of the entire mileage.

"THIS immediately suggests again the question of the benefit to be derived. In either case it must be assumed that there is to be a benefit, or the program should not be undertaken. The difference, then, is the interest charged. Against that there is the ten-year use of the 100 miles, and engineering investigations now under way indicate that the difference in operating costs of transport alone over the good road as against the bad would be sufficient to defray the interest charges many times over, even if we discarded the social benefits which inure.

"Thus far we have discussed as beneficiaries only two general classes: this generation and those that follow.

"If the highway bond issue plan is to be carried out, however, we must set up the conditions under which these bonds will be issued, and in order to do so we should determine more specifically the question of beneficiaries in order that, in setting up our source of revenue, we shall be as equitable as possible.

"At once a new set of questions presents itself for examination.

"What is the effect of highway improvement upon agricultural valuations?

"What is the effect of highway improvement upon urban valuations?

"What is the effect of highway improvement upon the operating costs of the user, the agent of the public?

"The answers will vary according to the topographical conditions, the economic conditions, the extent and character of the traffic. Each state will have to meet this situation as its own needs demand, and these needs can only be finally determined by specific inquiry and investigation upon a very broad scale.

"THERE are few to-day, however, who will deny the influence of highway development upon the farmer. The truck gardener, the dairy products man, and even the producer of heavy staples, has found his markets favorably affected by highway improvement. Perhaps more important, the educational and social advantages derived from highway extension have opened a new vista to all.

"Likewise, the development of urban properties, and particularly of suburban properties, has been perceptibly affected. No one who drives a motor vehicle or a horse will question the beneficial effect of highway improvements.

"How far the use of large units made possible by road improvement has affected the economics of all three groups mentioned, is a point which few can discuss fully yet, particularly with regard to road improvement costs, but here again there is a definite problem to be worked out.

"So that while the relative amounts may differ, it seems that any fair plan for construction should be based upon general taxes for construction purposes, since all classes are enumerated in the three broad divisions mentioned.

"When maintenance is considered, however, a different answer presents itself. The damage to the wearing surface is done by traffic. Traffic benefits first by maintenance in lowered operating costs, so traffic should be expected to meet this levy.

"YET at once the question arises as to what is maintenance? Shall we say that a manufacturer building a new plant or installing new machinery to take care of increased business should consider *that* an item of current expense? Could the farmer or business man who attempted to assess such costs against his crop or output in a single year, expect the buyer to pay it cheerfully? Likewise would the extension of a highway or its widening be an item in maintenance or construction? There seems to be a close parallel in these two instances, and undoubtedly where cases of this kind occur, ordinary business practice will prevail.

"The same problem presents itself when a road is lifted from a low to a higher type to the extent of the difference in cost.

"Another consideration which must be made a matter for thorough study is found in regulation of traffic on the highways. The whole question of finance is tied up in this point, because, after all, the only justification for any highway improvement, as I have already noted, is the service which the highway renders, and that service should be permitted to grow without restraint as long as it is sound economically.

"IF we restrict traffic unwisely, maintenance costs may be less, but transport operating costs may be swelled out of all proportion, and since the public pays the bill in any case, we should seek to make highway transport in its entirety function at the lowest possible cost.

"Here we can suggest a prolific field for investigation. Overloading apparently damages both road and vehicle. Seasonal limitations appear to be necessary under certain conditions, and still with a railroad congestion such as obtains to-day, *which* is of the greater public moment—the maintenance of a low grade highway surface, or its destruction by goods which must be moved? There should be definite restrictions on maximum loads, of course, at least until the highway builder can catch up with the highway user—a goal still far in the future—but it is not necessary to consider that phase in detail now.

"I only wish to point out that unwise regulation, just as abuse of the road by the user, may operate to the detriment of the public interest, and therefore both should be carefully guarded against, particularly where we are concerned with the general aspects of a broad financial program predicated upon the need for traffic development."

AN animated discussion followed the reading of the paper. Chief MacDonald of the Bureau of Public Roads, who presided, said there was a feeling that motor trucks should pay for damage done the highways, but he pointed out that the streets were filled with taxicabs, and that even if they don't wear out the pavements the roadways have to be made wider to carry them and other passenger carrying vehicles. It was his contention that trucks require depth in highway construction and that passenger vehicles require width. Such being the case, he held that it was not fair to impose the major part of the burden on trucks.



From left to right: Lewis W. McIntyre, assistant professor of civil engineering, University of Pittsburgh; Dr. Charles S. Howe, president of Case School of Applied Science, Cleveland

Railroads Should Use Trucks to Supplement Service, Lyford Avers

Vice-president of Chicago & Eastern advises freight cartage in congested centers and abandonment of unprofitable branch lines.

"UNLESS there is a radical change from present practices in railway transportation in the United States our great system, which is the wonder of the world, will become a hindrance to the further progressive development of this country."

This was the rather startling statement made to the conference by W. H. Lyford, vice-president of the Chicago & Eastern Illinois Railway, in a paper on "Co-operation versus Competition Between Motor Truck and Railroad Transportation." He took up only the handling of freight and did not discuss passenger traffic. He is firmly convinced that the carriers should use the motor truck to supplement the service now given. One of his proposals was that the railroads should offer shippers a cartage service, at fixed tariffs, which would transport goods from the point of origin to the car and from the car to their destination.

Lyford would have this system apply not only to less than carload but to carload lots. It would obviate the necessity of huge terminal and storage facilities and would insure prompt loading and unloading of rolling stock.

He believes another field for the profitable use of the motor truck by the railroad is between communities which are served by branch lines of railway on which the traffic is too light to pay the expense of any kind of railway transportation. Such branches are innumerable, he said, and it is his belief that they should be abandoned. A less expensive truck service should be provided if the trucker will not occupy the field.

Lyford said in part:

"THE fields within which complete transportation of goods can be furnished by highway alone or by railway alone are limited.

"There are very few industries or residences in continental United States which are not connected with each other by highway and it is physically possible to perform complete transportation of goods by highway, between almost any two industries or residences. But such transportation is most economical only when limited to the movement of goods between homes or industries which are within reasonable trucking distance from each other.

"The determination of such reasonable distance depends on many conditions and a competent truck expert will place it anywhere between 25 and 150 miles. Of course there are emergencies and peculiar industrial conditions which, in rare cases, make trucking economical over a distance of several hundred miles, but such cases are negligible in the consideration of the whole field of highway transportation.

"On the other hand, comparatively few industries and practically no residences are connected with each other by railway. Therefore the field for complete transportation of goods by railway is restricted to the movement of carload freight between those industries which have direct rail connections. In that limited field the railway is the most economical means of transportation. A fair example is the movement of coal from a mine to an industry located on a side track.

"In this country, four different agencies are competting with each other for the transportation of the same goods: parcel post, the express company, the railway and the trucker.

"Competition for the local carriage of goods within city and suburban areas ought to be welcomed by the railways, as they perform this service at an actual loss, while the trucker can perform it at a profit. On the other hand, competition with the railway for the carriage of goods through rural districts, along main lines of railway, is harmful to the railway and unprofitable to the trucker.

"FOR parcel post there is complete co-operation between railway and highway transportation, as the government has its own cartage system. There is like co-operation in the express business, as the express company operates its own trucks and wagons. For freight traffic, there is hardly any co-operation between the railway and the motor truck.

"I have marshalled the foregoing facts, without any idea that they would be new to you but that they might form a background for the statement:

"That unless there is a radical change from present practices in railway transportation in the United States, our great transportation system, which is the wonder of the world, will become a hindrance to the further progressive development of this country.

"Five years ago, when our railway system was placed under Federal control, its march of progress was halted and it has never regained its stride. Its development has not kept pace with the industrial development of the country, because its revenues have not been sufficient to attract the additional capital necessary to finance the cost of normal additions and betterments to road and equipment.

"The public is clamoring for lower rates, while existing rates are not high enough to produce the net railway operating income which, as determined by the Interstate Commerce Commission, the railways are entitled to earn. Still the tendency of the Commission is to reduce rates and there is no reasonable hope of increasing them.

"I have arrived at the definite conclusion that the problem can be solved only by remedying the following evils:

"First—Too low compensation paid to the railways for carrying parcel post and express on expensive passenger trains.

"Second—Lack of organized collection and delivery service, which lack makes it necessary to furnish unreasonably large and expensive freight terminal facilities, and an unreasonably large supply of freight cars.

"Third—The use of box cars for the transfer of l.c.l. freight between railway stations in large terminal areas. The trucker could perform that necessary service more quickly and economically. Thousands of box cars thereby would be released from an unprofitable service and would increase the carrying capacity of the railway.

"Fourth—The use of box cars as trap cars, for moving l.c.l. freight through terminal areas for industries which have rail connections, and the iniquitous absorption by the railways of trap-car, subway and lighterage expenses, which is equivalent to furnishing free cartage to the favored few large traders, in discrimination against the average trader, who is obliged to provide or pay for his own cartage.

"Fifth—The operation of branch lines on which the traffic is too light to sustain railway transportation and which could be served better and at far less expense by the motor truck.

"THE most important field for co-operation between the railway and the truck is offered by collection and delivery of l.c.l. freight in large cities. Comparatively few trucks are used in this service, first, because there is no co-operation between the truckers themselves, and second, because there is no co-operation between the trucker and the railway. As the collection and delivery of l.c.l. freight in large cities is now conducted, the delays to trucks in reaching the station door and in loading and unloading the truck, make unprofitable the use of the truck in station service, so that by far the greater part of this service is performed by horse-drawn vehicles. Truck transportation is only profitable when the truck can be kept moving the greater part of the time.

"Notable experiments have been tried in the United States for handling the collection and delivery of the freight of one railway company in a large city and, so far as I have been able to learn, none of them have been successful. No single railway company receives and delivers freight from and to every part of a large city in sufficient volume to make profitable the collection and delivery of such freight by a trucking organization. I am satisfied, however, that the combined l.c.l. freight of all the railways reaching a city could be collected and delivered by a properly equipped single trucking organization, working in full co-operation with the railways, at less cost than is now paid by the traders in that city for their cartage, and still yield a reasonable profit to the trucking organization.

"I am well aware that the average railway manager in this country fears to encourage the establishment of collection and delivery service because of the danger that the railway will be required to pay the cost of the service and thereby increase the terminal expenses. I would not recommend that the collection and delivery service be forced upon the trader, but rather, that it be offered to him under separate cartage tariffs at rates which would be less than the trader's present cartage expenses.

"THERE is a second field for co-operation between the motor truck and the railway, which would require a more radical departure from present methods than the one just mentioned, but which would produce even more beneficial results to all parties concerned. It is the organized delivery of carload freight from public team tracks in large terminal areas.

"As already stated, this freight is now loaded, unloaded, collected and delivered by the trader, or at his expense. In different cities the trade is allowed from 2 to 5 days within which to unload cars after he has received notice that they are ready to be unloaded.

"Competition between the railways to outdo each other in affording privileges to the traders has brought about a situation which is crippling the freight car supply and thereby is injuring the trader more than he is benefited by the allowance of an unreasonable time within which to load and unload carload freight.

"At the present time there is a serious shortage of freight car equipment in all parts of the country. The railways, the commercial organizations and public authorities are urging the traders everywhere promptly to load and unload cars in order to reduce the idle time of freight cars and supply the crying need for more cars to move accumulated freight. Notwithstanding these appeals, the car shortage is not being substantially remedied.

"In my judgment, a new system of delivering carload freight must be adopted and it will require the co-operation, not only of the railways and the truckers, but also of the traders, warehousemen, the Interstate Commerce Commission and the State Utilities Commissions.

"I REALIZE that this is a radical change and would deprive the trader of a substantial amount of free storage which he has always enjoyed and would require him to pay warehouse charges on such inbound freight as he is unable to receive on the day of its arrival. This apparent disadvantage, however, could be, to some extent, offset by cheaper cartage furnished by an organized collection and delivery service and the warehouse charges might be reduced substantially by co-operation between the railway, the trucker and the warehouseman.

"Another field for the profitable use of the motor truck is the transportation of freight between communities which are served by branch lines of railway, on which the traffic is too light to pay the expenses of any kind of railway transportation. Such branches are almost innumerable and are scattered over every part of the country. They were built before motor transportation was perfected and, undoubtedly, they have performed a necessary public service, but they have outlived their usefulness.

"The transportation furnished over such branch lines could be performed better and more cheaply by motor conveyances over the public highways. No more such branch lines ought to be or will be constructed, if the trucker will take over the field and occupy it intelligently and efficiently. In recent years I have known of several cases where railways seriously have contemplated the construction of branch lines to reach small cities and towns and, on investigation, have found that they could better afford to establish their own truck service and the proposed branches have not been built.

"I will go further and state that I think that all such money-losing branch lines along which transportation by truck over existing highways could be furnished at less expense, should be abandoned. The better and less expensive truck service should be substituted by the railroad company if the trucker will not occupy the field.

"FIVE parties are interested in bringing about the changes we have outlined:

"The whole public would be benefited in that the city streets would be relieved from the congestion caused by wagons and trucks carrying small lots of freight to and from the railway stations. The new rural highways would last longer, as the co-operation of railway and truck would put an end to long-distance trucking.

"The trader would get better service at less cost.

"The motor-truck industry and existing cartage companies and private truckers who would co-operate with the railways would vastly increase their field for profitable operation.

"The warehousemen would profit by the addition of the storage now furnished by the railways.

"The railways would cut down their terminal expenses and would increase their capacity for service.

"The trucker has a distinct advantage over the rail-

way, in that highways are constructed by the general public, through some form of taxation, while the railway is constructed at the private expense of the railroad company.

"In the early history of this country public lands and moneys were contributed to a few railway companies to induce them to build railways in territory which greatly needed transportation, but such donations have long since been repaid by the enhancement in the value of the taxable property, whose development has followed the railroad and would not have occurred without the railroad.

"The railway, through taxation, pays a large share of the cost of constructing and maintaining highways, while the trucker pays no part of the cost of constructing or maintaining the railway. If the trucker is to compete with the railway, either he should pay a substantial part of the cost of constructing and maintaining the highway or the railway should be relieved of taxation for highway purposes.

"If, however, the trucker, first, would perform that part of transportation furnished by the railway at an operating loss and on which the trucker could make a reasonable profit; second, would cease to compete with the railway for the traffic which the railway can carry at a profit and on which the profit of the trucker is very doubtful; and third, would co-operate with the railway in handling traffic which requires transportation both by rail and highway; in other words, if the truck would supplement the railway service instead of competing with it, then it would be to the interest of the railway that the expenses of the trucker should be reduced to the lowest possible limit, and, in my judgment, the railway could well afford to pay substantial taxes for highway purposes and to make no objection to the free use of the highway by the trucker.

"There is a steady and, for the trucker, an alarming growth of public sentiment in favor of imposing upon the trucker a more substantial part of the cost of maintaining and renewing public highways, which, it is claimed, are destroyed by heavy trucks almost as fast as the highways can be constructed. If the public were satisfied that the truck was only used as a common carrier where the railway could not furnish as good and as cheap service as the trucker furnishes, I believe the public would cease demanding that greater burdens be placed upon the trucker, which would increase the cost of his service.

"No single scheme of operation will fit all terminal situations.

"I believe that for every city there is a practical solution which, with the full co-operation of railways and trucks, would result in the movement of freight through the city stations as soon as it arrives there and would thus enable the railway to furnish much more transportation service without increasing its facilities and without increasing its charges for transportation.

"The truck should supplement the railway and not compete with it. Wherever complete transportation can be furnished by the truck more efficiently and cheaply than by the railway, the truck should be used. Wherever the railway service is adequate and profitable and less expensive than truck service, the railway should perform the service. Where the best and cheapest service can be furnished profitably by railroad and truck combined, the railway and the trucker should co-operate in furnishing that service. The railway and the truck should keep out of each other's special territory and less expensive service."



From left to right: Walton C. John, secretary of Highway Education Board; Dr. W. K. Hatt, director of Advisory Board on Highway Research of National Research Council.

Official Observers from Foreign Powers Gather Data to Promote Highway Building

OFFICIAL observers from several foreign governments were in attendance at the highway conference. It is expected that their reports and recommendations to the home governments will have a great influence on highway construction in their respective countries. Many of the foreign agents are civil engineers and have had some experience in constructing highways. The Latin-American countries were well represented at the meeting.

Just how this vital information affecting highways and highway transport is given to the dealers and car users in foreign countries is illustrated in the case of the Cuban government. Porfirio Bonet, Cuban Commercial Attache, is a practical civil engineer and will report his observances to the Cuban Minister in this country. The report will cover various phases of the meeting, especially plans for extending highway construction and motor transport.

Senor Bonet stated that the Cuban Minister would forward his report to the Secretaria de Obras Publicas, Havana. If the government believes the report worthy of publication it will be printed in pamphlets and circulated to automotive dealers and others interested in highway construction in Cuba. The technical angle of the conference here will be reported to the Division of Roads in the Department of Public Works in Havana, and to the Society of Civil Engineers which co-operates with the government in promoting highway construction.

Senor Bonet stated that he was wonderfully impressed with the development of American highways and motor transport systems during the last decade. He expects that the Cuban people will materially benefit from the progress of their American friends because American cars predominate the Cuban market.

Some of the foreign representatives at the conference were: Octavio Beeche, Minister of Costa Rica; Dr. Neumeister, Commercial Adviser to the German Consulate in New York; Arturo Padro, Charge d'Affaires a.i. Legation de Cuba; G. A. L. Dumont, Colonel, French General Staff Military Attache; Dr. A. Z. Stangler, Commercial Attache, Czechoslovak Legation; Axel Leonard Astrom, Envoy Extraordinary and Minister Plenipotentiary, Finland; Colonel Alessandro Gaidoni, Aerial Attache, Italian Embassy; A. W. Campbell, Chief Commissioner of Highways, The Dominion of Canada; Dr. Santiago F. Bedoya, Second Secretary of the Embassy, Peru; Edgar L. G. Prochnik, Charge d'Affaires of Austria, Austria; Dr. J. B. Hubrecht, Secretary of Legation and Charge d'Affaires, Netherlands.

Farmers and City Dwellers Benefit Equally From Use of Automobile

Graham paints vivid picture of increased happiness for all classes which has come with universal use of motor vehicle.

TWENTY-FIVE million automobile passengers daily, the movement of one billion and a quarter tons of freight annually by motor trucks, the expenditure of six hundred million dollars annually on highways, and an investment of one and one-half billions of dollars in automobile manufacturing plants, are a few of the achievements of the automobile industry within two decades, as charted by George M. Graham, vice-president of the Chandler Motor Car Co., at the conference dinner Thursday evening.

Mr. Graham, long hailed as the "silver tongued orator" of the automotive industry, made one of the most brilliant addresses of his career.

The address, made before 300 engineering and highway transport educators, State highway engineers, Federal officials and manufacturers assembled from all sections of the country, pointed out the vital necessity for further education of public, State and Federal officials, and outlined in detail the financial, economic and sociological advantages of motor transportation.

He was introduced by Dr. John J. Tigert, U. S. Commissioner of Education, who is also chairman of the Highway Education Board. Other speakers included Dean A. N. Johnson, College of Engineering, University of Maryland; General Mason M. Patrick, Chief, Air Service, United States Army, and Colonel George A. L. Dumont, French Military Attaché.

"It is hard to realize," said Mr. Graham, "that anything so vital to human kind as transportation should have been so slow in its development. The Man of Nazareth, founder of the faith, and George Washington, founder of his country, living 1800 years apart, knew only the same mediums of transportation. On land they could be hauled by man or beast. On water they were dependent upon the straining muscles of the oarsman or the vagaries of the wind. Yet during all that long period transportation stood still.

"In other directions marvelous advances were made. Inventors achieved both for good and ill. They discovered gunpowder. They invented printing. The great art works of all time, painting, statues, buildings, mountain peaks, of human genius, all came to the world while transportation remained primitive. Actually, the history of modern transportation can be written within the last 120 years. While much has been accomplished, much remains to be done. Education is urgently needed to give highway transport an efficiency that previously it has lacked. Up to date we have to a large extent blundered along.

"I doubt not that there have been made automobiles that did not fit the highways, and highways that did not fit the automobiles. There have been iniquities of taxation. There have been faulty choices of routes. There have been many economic mistakes, based mainly on the fact that the science is so young and the elements so huge.

"I believe that education is ready for this immense task, because its great modern keynote is practicality. This was not always so. The student cannot afford to waste his time, and the colleges, therefore, may live up to their high ideals of service to the public, demonstrated in turning out yearly useful and efficient specialists. But perhaps the greatest boon of transportation concerns itself rather with the lowering of the costs of the necessities and enjoyments of life so that happiness may be widespread. This has an importance that carries it into the realm of economics and statesmanship. It is the reply to the malcontent or Bolshevist who raises his voice against our institutions.

"The automobile is vital to all sections and all classes of people. It gives the farmer access to the nearby town and thus ends his isolation. It brings the school nearer to the children. It shortens the distance from the doctor's office. It is the connecting link between the farm and market. It moves produce when prices are right and develops not only a broader market but a more stabilized one.

"Equally decisive is the advantage to the city worker of moderate means. His car permits himself and family to escape urban squalor and congestion for the health and beauty of the suburbs. It is available to himself and family for a hundred valuable services. The interest

"THE whole program of transportation —in all its phases it must be regarded as that of a single problem, presenting a great many aspects—is among the most pressing and difficult that the entire world is facing at present.

"As you and your associates are probably much better aware than most other people, the transport facilities of the whole world, whether by rail or by water, or whether represented by the great network of public highways, have been confronted with a most difficult situation for a number of years. It is one which demands the very best and wisest treatment from the standpoint of both the technical and economic and financial authorities.

"We are all agreed that the country needs good roads and more of them, but we also have been brought to realize that they are not to be had without very great expense. Your organization is one of those particularly well equipped to deal with the industrial and technical side, as well as the financial aspects of this problem and I most earnestly hope that your Washington convention will produce some useful illumination of the problem."—WARREN G. HARDING.

of the millions, the truest basis of economic law, demands better highway transportation.

"The benefit will spread itself principally to two great classes as follows: First: To three and one-half million farmers dependent upon their automobiles. Second: To as many more city dwelling families with incomes of less than $4,000 per year, who with the farmers, own two-thirds of all the automobiles sold.

"The motor vehicle actually gives this country some 11,000,000 transportation monopolies, all, whether truck or passenger car, subject to schedules and routes made by the owner. This means individual transportation.

"I should like now to be more concrete and to make recommendations concerning the subjects to which educators should give thought in arranging their courses.

"The subject is so big that it involves almost a whole new system of education. I genuinely believe that the various branches of highway transport cover a wide enough range to furnish the exclusive subjects of training for a very considerable college.

Types of Men to Produce

"Without attempting to sub-divide the work or to deal with its minor phases, there seems to me six main types of men you must produce. There are highly remunerative opportunities for all.

"The following is the list:

"1. Road builders,
"2. Motor car producers,
"3. Highway financiers,
"4. Highway lawmakers,
"5. Transportation analysts.
"6. Real estate experts.

"Perhaps the biggest task of all falls to the road builders. In this class I naturally include the highway commissioner, the highway engineer, purveyors of materials and the contractors who actually do the work. To this group is allotted the major responsibility of building roads of sufficient carrying capacity to take whatever traffic be demanded by the nation's economic needs.

"These roads must not only join present populous points but must open new territory. Along with the roads there must be provided adequate maintenance at not excessive cost.

"It has been pointed out by the field marshal of good roads, Chief MacDonald, that our greatest problem is to see that our highways keep pace with increasing highways rolling stock. There has been three times as much investment in rolling stock between 1910 and 1921 as has been expended in the same period for highways construction. It is an enormous responsibility to plan an adequate highway system for a country covering three million square miles.

Highway Program Huge

"Six hundred million dollars were expended last year by Federal, State, county and township divisions upon highway construction and maintenance. In the program is involved the biggest expenditure ever assumed by this country except for war projects. Its total dwarfs the cost of the Panama Canal.

"There are questions of proper routes, studies of subgrade and proper surfacing. The men who will assume this responsibility cannot be too efficient, cannot be too highly trained."

Speaking of the work of the automobile manufacturers, whom he especially represented, Mr. Graham said:

"We want to build automobiles and motor trucks that will adequately serve the public in transportation of persons and commodity, but inflict upon the highways a minimum of damage.

"We constantly aim to lower the price of our units so we may have more users. We seek to get lighter weight without sacrifice of stability, riding comfort or safety. Perhaps the engineer to solve these problems is now a student in one of your colleges. He will be well rewarded for the industry deals in big elements and can afford to pay.

"We have one and a half billions of dollars to invest in our plants. We produce more than two million units of transportation yearly. The wholesale value of cars, trucks, tires and accessories in twelve months amounts to three and one-half billions of dollars. We expend for material one and a quarter billions yearly.

With regard to safety education Mr. Graham said:

"Our industry cannot register too strongly its opposition to overspeeding and overloading. It will welcome any program that will safeguard pedestrians, particularly children. At the same time, the motor vehicle as a medium of great public service must be reasonably protected in its rights.

"There is, also the great issue of the regulation of motor vehicles as common carriers so that they and other mediums of transportation may not suffer unfair competition. Assuming that this become inevitable, it should be friendly to highway transport and not punitive. It should protect the rights of road users and prevent abuses. The expert on highway enactments will find plenty of call for his services. There must also be trained transportation experts who can tell where traffic should properly be allocated. This is the fifth kind of a specialist you can develop. These men can find clients in all lines of activity.

"They will make investigations and advise great manufacturers and merchants where and when they should use railroads, steamships and motor trucks. They can also be of help to the farmer in advising him as to the best means of reaching his market, having in mind all questions of perishable product, seasonable demand and cost of delivery.

Experts Render Real Service

"Transportation adds so much to living costs that it is not difficult to estimate the service that trained experts could render.

"Somewhat related will be the traffic expert who will assist in city planning.

"In forwarding highways development, the educator gives new force to an ancient alliance. Sentimentally and historically the highway has great claims upon him.

"When the settler had blazed his trail through the forest, he built the rude schoolhouse. Ignorance has had no more relentless fee than this combination. The humblest road leads finally to the schoolhouse. The two have been the Damon and Pythias of learning. Except for them there might have been no Lincoln. Now the schoolhouse is outstripping its colleague. Much road mileage remains primitive, but the homes of education have undergone a transformation. The little wooden shack has become the great stone palace of study. Worthy structures have multiplied in all sections of the land. The smallest county boasts its fine high school. If there be but one worthy edifice in a community it is usually dedicated to education.

"Gentlemen, for the good of us all the highway must not be permitted to lag. It must keep pace with the school, so that the union of the two, both freed of politics and both intelligently administered, may render its priceless service to the nation.

"There could be no higher aspiration, no more dignified career, no better citizenship, no more practical patriotism than to strive for this result."

Sociological Aspects of Highways Interest Women



From left to right: Mrs. John Dickinson Sherman, vice-president of the General Federation of Women's Clubs; Miss Florence C. Fox, United States Bureau of Education; Mrs. Edith McClure Patterson, chairman of committee on women and finance, Department of Applied Education, General Federation of Women's Clubs

Leaders of National Federation of Clubs See What Good Roads Mean to Women

A GOOD many people in the automotive industry who appear indifferent to the importance of the development of a greater system of improved highways might well take a lesson from the thoughtful leaders of the General Federation of Women's Clubs. They have begun to realize that good roads have a very real relationship to household economics.

Two of the leaders in this specialized field of education are Mrs. John Dickinson Sherman, vice-president of the General Federation, as well as a member of the sociological committee of the Highway Education Board, and Mrs. Edith McClure Patterson, chairman of the committee on woman and finance of the Department of Applied Education of the Federation.

Both of them look upon good roads as an important element in reducing the cost of living. They will permit the farmer to sell his products to a wider and better market and they will reduce his marketing costs.

For these reasons these broad-visioned women have undertaken a campaign of education which will enlist the housewives in the campaign for a larger system of good roads. They, too, are voters and they will be able to exert a profound influence in state referendums.

Mrs. Patterson, who is a niece of the late John H. Patterson of National Cash Register fame, takes the position that the women of the country expend about five-sevenths of all the money contained in the pay envelopes received by the men of the country and that up to this time they have displayed a sad inability to spend this stupendous sum to the best advantage. She believes that vast amounts can be saved annually if the housewives learn how to market to the best advantage. One of the best ways to bring this about, in her opinion, is the expansion of the highway system which will bring the farmer closer to his markets.

Highways Will Brighten Life on Farms and Relieve Congestion in the Cities

HIGHWAY transportation from a sociological point of view was discussed by C. J. Galpin of the division of farm population and rural life of the Department of Agriculture. A good many of the delegates, as well as most other people, hadn't thought much about road building as a subject for sociological investigation and discussion, but they immediately grasped its possibilities. From the viewpoint of human interest it was one of the most valuable papers presented to the conference.

A committee headed by Dr. Galpin presented a preliminary report which will be followed by another after more mature deliberation. The work which is being done along this line is expected to do much to break down the resistance of farmers to the expenditure of large sums for highways. Once they realize the real social benefits accruing to them from the expansion of the improved roads system they will be less inclined to feel that the city fellow is "putting something over" on them.

Serious Consideration Necessary

"There are two situations in America worthy the attention and serious consideration of all persons who are charged with the responsibility of planning our highways," Galpin said. "I will forego, for lack of time a discussion of the more general social and humanistic phases of our subject and base my claim that sociology is a party to highway construction, on these two situations as types.

"The first situation—and the better known of the two, is the congestion of people being born, living and dying in the residence quarters of most American cities. The second situation—no less acute and no less freighted with far-reaching results, although as yet only dimly recognized by the public in general—is the inaccessibility, taken by and large, of the American farm population, to modern facilities for trade, professional service, hospitals, schools,



From left to right: John H. Mackall, chairman State Road Commission of Maryland; Pyke Johnson, secretary of highways committee, National Automobile Chamber of Commerce; A. W. Campbell, Canadian Commissioner of Highways; Clifford Older, chief highway engineer of Illinois

amusements, and churches. Let us look a little more closely into these two situations.

"IN 1920 America had sixty-eight cities, each with a residing population of from 100,000 to over five millions, with a total population of 27,429,326. One hundred years ago one city in America reached a population of 100,000 persons. Fifty years ago only fourteen cities came up to 100,000 persons each. America has at present 219 cities with a resident population of from 25,000 to 100,000 each, with a total population of 10,340,788; 459 cities, from 10,000 to 25,000; 721 cities, from 5000 to 10,000. The congestion of resident city population concerns especially the 287 cities with a range of population from 25,000 up to five millions.

"It has been evident to sociologists and humanitarians for many years that national well-being suffers from urban residential congestion, by reason of the restricted floor space of urban land in residence areas. Child life and home life are the immediate victims of this congestion. It is difficult to draw a picture which exaggerates the physical, psychic, and social penalties exacted upon a congested population.

"One antidote for this urban congestion is the well-known suburban movement. The benefits of country homes are possessed now by a few fortunate people who do their work in city blocks, but go home to live in space and quiet in the country. The highway engineer is needed sorely at this moment—the engineer with daring imagination, to help scatter the dwelling-houses and residence facilities of every one of these 287 cities far and wide into the outlying open country and thus in some appreciable degree to de-house, de-home and de-residence our congested American cities.

"Automotive traffic in city streets is driving into our consciousness day by day, the crime of rearing and housing our race in business areas, manufacturing districts, and the crowded streets of motor transport in our American cities. A large factor in decentralizing city homes is the transportation problem; and greater hope now arises in the humanitarian heart than ever before as one sees the new transport uses of the American highway. I would like to challenge the genius of highway engineers to help change this urban situation in the interest of the American home.

"IN 1920, America had living on farms a population of 31,614,269 persons, young and old. This is almost 30 per cent of the total population of the United States—slightly less than one-third, and a little less than the total number of persons living in cities of from 25,000 up to five millions. Rural sociologists pretty generally agree that our farm population is tremendously handicapped in the struggle for social equality with people of other occupations in respect to its living conditions—not to mention its economic difficulties—by reason of its present comparative inaccessibility to the modern social facilities and advantages of life. I invite your attention to this situation for a moment, because it is not as simple as one might suppose.

"The fact is that the problem of this inaccessibility of farm homes to the commodities and skilled services and institutions of our modern age, is not simply a matter of waiting until farmers or some other body of people can afford to improve all the rural highways. It is far more complex than that problem, difficult as that may be.

"Rural sociologists are pointing out that the farm population of thirty-odd millions is not being brought into immediate contact with the best commodities of the world and the best thought of the world, through the agency of country stores, small groups of inefficient hamlets and villages, and totally inadequate local institutions—in the main through no fault of the farmer himself. Whereas the thirty-odd millions of people living in cities of 25,000 population and over, are being brought into immediate contact with the commodities, skills, and thought of the world, through the agency of all the devices and facilities which the ingenuity of the age has created.

"THE matter turns into a huge transport problem. How to get the commodities of living; how to bring the skills of service; how to mobilize the institutional wisdom of the world—from the world at large, and bring it to such evenly distributed rail and water terminals, that through an adequate highway system, a certain group of the farm population may find collected most of the things they desire at one of these terminals. In brief, this farm population situation calls for a system of adequate, complete terminal towns, connected by rail and water to wholesaling cities. These terminal towns—ranging in population from 1500 to 5000 souls, each connected by an adequate highway system to a group of farm population ranging from 2000 to 7000 souls respectively, would take the curse off from farming, and, in the words of Theodore Roosevelt, 'Open the door to a good kind of life on the farm.'

"Highway engineers should know this social situation of the farmer, not only in order to help solve it, but also in order not to unwittingly block the coming of a new day for the farm by fastening a highway system upon the farm, which will chain the farmer to frontier facilities for another generation.

"America already has 1320 terminal towns of from 2500 to 5000 population. These, for the most part, stand ready to fall into a system of complete, efficient railway terminals."

Educators Map Out Course For Teaching Highway Regulation and Safety

Committee headed by Dean Hughes of Harvard decides whom to teach, what to teach and how to teach it.

FROM the viewpoint of the industry probably the most important report presented was that of the Committee on teaching highway traffic regulation and safety, headed by Dean C. J. Hughes of the Harvard Engineering School. The report was divided into four parts: Whom to teach; What to teach; How to teach it, and Recommendations. The report follows:

I. Whom to Teach.

A. Those who will design, construct and maintain highways.

B. Those who will design, construct, maintain and operate motor vehicles.

C. Those whose business will be to make highway regulations and enforce them.

II. What to Teach.

A. Design of highway and rolling stock from standpoint of traffic regulation and safety.

(1) Determination of proper width, crown, kind of surface, treatment of curves, parking spaces, safety zones, cross walks, car tracks, street intersections and other details of construction from standpoint of traffic efficiency and safety. This is a logical part of the regular instruction in highway engineering.

(2) Design and construction of motor vehicles from standpoint of safety; brakes, gears, headlights, signaling devices on cars, steering apparatus, tires, non-skid devices and various types of guards.

B. Design of signs, signal and illuminating apparatus and devices.

(1) Traffic guides for pedestrians and drivers, lines in or on pavements, signs, stanchions, traffic-mushrooms, dummy-cops, semaphores, crows-nests and such other devices as may be developed for the guidance of traffic.

(2) Lights. Lights for vehicles, lights for traffic guidance and general illumination.
Color, shape and movement of signs and lights, and light intensities. Ways and means by which best types can be determined and standardized.

C. Regulation of traffic for efficiency and safety.
Compilation and comparison of existing regulations and determination of underlying principles with the ultimate object of determining a unified code which will be generally applicable and acceptable.

D. Traffic administration.

(1) Registration and licensing of vehicles and drivers.

(2) Testing and examination for qualification of drivers.

(3) Education of drivers.

(4) Education of general public in traffic regulations and safety.

(5) Finance.

III. How to Teach It.

A. Regular instruction (course work).
When the fundamental principles have been determined and codified they should be made a part of the regular instruction for all engineers who are likely to deal with any kind of highway transportation problems; but before this is done it will be necessary to make a comprehensive study of these problems. Since subjects to be taught include so many fields of knowledge the instruction must involve many departments of the university, such as psychology and economics, as well as engineering. Instructors from these departments should be brought in and their instruction made an integral part of the course work.

B. Research (the investigation of all phases of design and traffic problems, collection and comparison of data and codification of underlying principles).
There are various methods and agencies which may be utilized:

(1) The National Research Council, acting as a correlating agency for various aspects of the same problems to be worked out in properly equipped universities.

(2) Organizations such as The Eno Foundation for Highway Traffic Regulation, which has already done considerable effective work in this field.

(3) Organizations for the study and promotion of traffic safety.

(4) Automobile and other commercial and industrial associations.

(5) Federal, State and local governmental agencies.

C. Practical training.
Properly organized summer training for undergraduates and graduates by the industries and by Federal, State and local agencies concerned with highway transportation. It is beginning to be recognized that the schools cannot teach practice.

D. Educating the practitioner.
Engineering and motor magazines, as well as general publications, should be more systematically and effectively utilized in disseminating principles and changes in practice.

IV. Recommendations for Gathering Materials and Determining Principles.

The Committee believes that a study of the underlying principles of the best practice in relation to traffic regulation and safety is of fundamental importance. The Committee, therefore, recommends that the Highway Education Board ask The Eno Foundation for Highway Traffic Regulations, Inc., to take up these problems as a continuation of the work of the Council of National Defense for the investigation, codification, publication and standardization of general highway traffic regulations; thus insuring continuity and permanency in the study of these important problems.

Highway and Automotive Engineer Must Join in Research, Hatt Says

Research expert declares consideration must be given to effect on vehicles of roads over which they are operated.

AN analytical paper on Research in Highway Education was presented by Prof. W. K. Hatt, Director, Advisory Board on Highway Research of the National Research Council, in which he said, in part:

Highway engineering is a branch of engineering as distinct as that of railway engineering, and in many respects demanding wider powers from the engineer.

The practice of research is necessary for the advance of the art of the highway engineer to overtake the demands of highway transport that have arisen so quickly and increase so rapidly.

Highway education must not be narrowed to apply alone to training of civil engineers for building roads. These civil engineers now in practice are well upon their way to the accomplishment of their special duties. A need is for instruction in the economics of highway transportation. The part of the national income now spent in highway transportation is disproportionately applied to the vehicle and to the road.

College students should be prepared by a scientific training and consideration for the economics of transport to adjust these items of expense arising from the vehicle and from the road. A discussion of the earning power of capital expenditures in road construction in terms of reduction of transportation costs must enter into highway transportation courses, and a body of sound doctrine promulgated through the colleges.

TEACHERS of highway engineering have sooner or later to discuss the selection of various types of roads to fit specific situations; and also to discuss the factors governing policies in surfacing second-class roads. This discussion must certainly concern itself with the cost of maintenance of the surface. But where are reliable maintenance data? In many cases maintenance charges only indicate that the money came from the maintenance fund, but do not determine its specific use. The relative traffic on the several roads and the distribution of this traffic throughout the year may not have been measured. The quality of materials and climatic conditions, cost of labor, etc., also enter into the comparison; and finally, there is no good measure of the completeness of the maintenance.

What is needed is some uniform accounting system for maintenance costs simple enough to be operated by the ordinary maintenance foreman. Analysis of the data will then permit judgment upon problems confronting highway officials.

The teacher cannot go very far in his discussion without considering the operating cost of the vehicle on the various classes of roads. And when he comes to consider the economics of location, he will have to present data of fuel consumption on grades, and other operating expenses which depend on the characteristics of the vehicle, the use of gears, the limit of maximum speed, etc. How far have our friends, the automotive engineers, progressed in this field?

Of course these data are being gathered more or less slowly in some fields of highway research and fairly rapidly in others. It appears to me that the organization represented here to-day will serve the colleges well by providing some agency to assemble the data from completed and current research, uncover the underlying principles, and prepare a series of brochures for the use of teachers in colleges, supplemented by a supply of lecturers who would present a large view of the problems of the industry of highway transport. Teaching without a basis of scientific information upon which to teach is not an effective process. Such an agency for this service would be provided with a sufficient corps of competent analysts and be financed on a five-year basis.

A CONSIDERATION of the industry of highway transport, with its engineering and economic problems, fits in very nicely with the courses in engineering administration now operative in so many colleges.

Many problems in highway engineering are accompanied by corrolary problems in economics of highway transportation. For instance: How much can an engineer afford to spend in capital costs of construction in reducing grades? The answer must depend on volume of traffic and on operating costs of road and vehicle. Decisions upon changing second class into paved roads involve cost of road maintenance, tire, gasoline, and repairs and depreciation to vehicle. Reliable data appear to be largely wanting.

The cost of highway transportation reflected in the vehicle greatly exceeds that arising from the road. Great are the possibilities of economies in this industry through research into costs of transportation in the fields of vehicle design and operation. The work of the Bureau of Standards in carburation and on tires is notable.

The reflex action of improved grades, alignment and surfaces on change of design and upon operating costs of vehicle also suggests itself. *It is increasingly evident that the highway engineer and the automotive engineer must join forces in highway research.*

THE study of methods of financing road construction of various classes and distribution of expense between those benefited await traffic surveys similar to those now under way in Connecticut. The study itself needs the services of trained economists.

The large volume of valuable data, accumulated at the cost of hundreds of thousands of dollars, at the Bureau of Public Roads, Bates and Pittsburgh test roads, and other test roads, in studies of soil properties, strength of slab and effect of loads, that underlie the mechanics of slab design, should be brought together and analyzed to uncover the principles of action. Then either an engineer can be given the formulas for fitting the road to the load, or final co-ordinated researches can be planned to settle these questions.

The economical life of pavements in given situations must be learned from carefully gathered statistics, so that highway engineer officials may not have to depend upon the views of those urging the adoption of a particular type.

The findings of laboratory tests upon materials of construction should be scrutinized in the light of experience in

operation to determine to what extent they are predictive of the service value of the road.

It must be realized that universities are now active, because the Census of Highway Research recently completed by the Advisory Board shows that out of the total number of 475 reported projects, some 189 of these or nearly 40 per cent are under way in the universities. The research is carried on in the following fields: Economics, 15; operation, 4; design (road), 48; design (vehicle), 5; construction, 3; materials, 114; total, 189.

Horner Tells of Trucking Methods Used in England and Motor Bus Efficiency

F. C. HORNER, in presenting his paper on Mechanical Road Transport Practice in England, France and Germany, gave an outline of his observations in studying this subject in these countries for over a year. Little information regarding France was given. He said that the six-wheel bus used in Paris is still considered in the experimental stage. He dealt only briefly with transport in France and Germany, saying in respect to the latter country that the high cost of fuel makes the use of commercial vehicles there too expensive to be economical except in certain special cases.

In England the things which stand out most prominently are the high load efficiency obtained per unit, the scientific use of four-wheel trailers, demountable bodies and the use of mechanical handling and loading devices at loading stations and on the vehicle itself. From an operating standpoint, the care given in routing and scheduling is important, while the garaging maintenance and repair methods and the careful training of drivers are worthy of special note.

Among the old and large trucking firms is one concern which does a large business in handling cold storage meat from the docks to the London market, and in the haulage of heavy freight from stores, railway terminals, etc. They are extensively using demountable bodies and four-wheel trailers. In large sorting depots they have equipment for handling the demountable bodies and are always striving to improve the service by the use of more efficient methods of operation at both loading and unloading points as well as in the actual operation of the vehicles.

Some of the railways use fleets of trucks equipped with demountable "flats" which are exchangeable between horse drawn vehicles and the motor trucks. This company covers an area of 120 sq. mi., but the average distance each ton is carried is only four miles. It has, however, increased the average weight carried per day from 8 tons 5 cwt.. to 10 tons 18 cwt. since the first "flats" were introduced. This is understood to be a great improvement over ordinary methods under similar traffic conditions.

ONE firm which does a large business in transporting its own products, as well as raw materials, uses all types of road transport from Ford vans to 6-ton steam wagons drawing four-wheel trailers. In transshipping from road to rail they use a type of unit container constructed from duralumin. This container only weighs 40 per cent as much as an oak container and has a capacity of 3 tons of tea in packages. Its use saves much in freight as well as in maintenance. Experiments are being made with a 1-ton fixed body of this material.

Speaking of the motorbus, the advantages of a vehicle designed especially for this service were emphasized, as was also the need for having the service safe, efficient and economical. The charabanc is often operated by small owners while the bus is controlled mostly by companies of considerable size. The charabanc is some times used for tours requiring as much as two weeks, but most trips are for a day or less.

Horner quoted from an address of the British Director General of Roads in which it was pointed out that it is no longer economical to follow the undulations of the terrain in road building. "Directness of line, smoothness of gradient and uniformity of construction are prime considerations; the easiest curve and the amplest sight line must be studiously sought."

Horner said that the English truck operator has learned that overloading is a costly way to make money and is likely to incur heavy fines. Railways who operate trucks have strict rules against overloading and a driver who violates these rules loses his bonus for the day's work.

American Population Problems Hinge on Highway Planning and Building

THE committee on sociological aspects of highway transportation said in its preliminary report:

"As educators plan to provide engineers for modern highway construction, the woman in the farm home will become an active leader in the movement within the range of her influence to the extent in which she is informed that only through the construction of modern highways will the comforts and conveniences now enjoyed by the average city woman be taken to the farm.

"The rearrangement of village life because of highway transportation is something measurable. We are beginning to hear about neglected villages with inferior people living in them, little stagnant pools of humanity where people live a cheap, forgotten existence. The more aggressive families and individuals have moved away. The country around them is sometimes filled with competent and ambitious people on farms who have no patience with the kind of people who make up the little neglected village. All the stronger parts of the population go off to the bigger growing villages. Now the cause of this fact is better roads, and automobiles to run on them. For social work and an understanding of rural social life this magnifying of some villages and depreciating of others is to be borne in mind.

"Good roads are essential in bringing about a closer relation between rural and urban communities and especially is this true as it concerns the women. The city home maker benefits by cheaper cost of food products and the rural woman benefits by being able to dispose of these products and an opportunity to come into contact with the women of the cities.

"In view of the evident fact that the location of improved highways and especially the establishment of permanent systems of highways, are determining factors in the distribution of the American population into residential and social groups, either to the advantage or detriment of national well-being, the committee earnestly makes the following recommendations:

"The U. S. Commissioner of Education is requested to bring to the attention of the heads of engineering schools in the United States the sociological aspects of highways planning. He is further requested to suggest that a short series of lectures be provided each year by the school, college, or university, for engineering students interested in highways; the purpose of these lectures being to present and discuss the American population problems which hinge upon highway planning, construction, and transport."

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The AUTOMOBILE
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Why Not Take Noise Out of Truck

THERE seems to be a general disposition among truck manufacturers to regard with indifference the noisy operation of the vehicles they manufacture. A similar indifference characterized at one time the attitude of passenger car builders. It required a long campaign against the muffler cutout practically to eliminate this nuisance. Manufacturers came to realize that noisy vehicles created prejudice and resulted in sales resistance.

A similar handicap now afflicts the truck and motorcycle industries, although it is less apparent because there are fewer of them. Cutouts are not often supplied by truck makers and mufflers are frequently of such construction that they soon lose their effectiveness, while other parts are so noisy that the vehicle can often be heard a quarter mile or more away. In addition, the warning signals used in some cases make an unearthly racket which is quite useless and leaves those in hearing distance in no happy frame of mind.

All of this creates prejudice which, in one way or another, has a detrimental effect on the use and consequently the sale of trucks. It helps crystallize sentiment which is expressed in adverse legislation or ordinances which prohibit the use of trucks on some highways and otherwise handicap users. Anything which is a public nuisance—and the noise which a truck makes is just that—is certain to react.

There seems to be no good reason why trucks should not be as quiet or nearly as quiet as passenger cars. Just a little more care and attention to detail will bring this about. It's well worth while to make serious efforts in this direction.

The Last of the Hydrogen Ships?

THE recent destruction at San Antonio, Texas, of the Army dirigible C-2, will probably hasten the abandonment of hydrogen and its replacement by helium in all Army and Navy airships. The fire hazard is so great in the case of hydrogen filled ships of the type now used that future military ships will be designed to employ helium as the lifting medium. This is doubtless a wise policy so far as Government-owned ships are concerned, but the high cost of helium and its lower lifting capacity are serious detriments, even though it were available in large quantities, so far as commercial dirigibles are concerned.

The other alternative, as has been pointed out before in these columns, is the development of engines for using less volatile fuels and of non-inflammable fabric or other materials which will retain the hydrogen and prevent its ignition even though a flame comes in contact with the surface of the container. There is doubtless much experimental work to be done before this alternative becomes a reality, but research work in this direction is in progress, at least so far as the engine is concerned. All-metal airplanes have been constructed, but whether all-metal construction can be successfully applied in the construction of dirigibles remains to be seen.

If this comes about competent engineers believe that hydrogen can be employed with comparative safety. On the other hand a combustible gas such as hydrogen will always increase the fire hazard as compared to a non-combustible such as helium, no matter what engine fuel or gas container is employed.

It is hard to conceive of a container which might not be ripped open, for example, in an accident similar to that which occurred in the case of the C-2 when strong gusts of wind caught it as it was being taken from the hangar. From a comparatively small rupture hydrogen might issue and burn as a jet, but a large tear might easily release large volumes of gas. Hydrogen and air form a highly combustible mixture the ignition of which might easily result in an explosion of sufficient violence to wreck a ship.

No doubt the problem of safe commercial flight in lighter than air craft will ultimately be solved, but there is still much to be done before such an ideal is realized.

An Old Skeleton Dressed Up in New Clothes

By James Dalton

McCREADY SYKES, who says that in the past he has been "intimately engaged" in the development of the good roads movement, with "an active part in drafting legislation in furtherance of its aims," is the author of an article in a recent issue of *Commerce and Finance*, in which he inquires, "Has the Good Roads Movement Gone Far Enough?"

Mr. Sykes is greatly concerned because the States of the country have bonded themselves for $1,071,506,981, of which $367,687,100, or 34.3 per cent, has gone for the construction of highways. He finds no particular fault with an expenditure of $213,891,400, or 20 per cent, for waterways and harbors, but he does ask this significant question about bond issues for highways:

"Is it not possible that the railways could use a portion of this outlay, if it were loaned to them, with greater benefit to the public?"

This naive inquiry causes us to wonder whether the proposal is about to be made, in behalf of the railroads, that the States shall come to their relief and perhaps finance the construction of much needed additions which would take them into districts now served by motor vehicles. The neglect of the needs of the railroads has been very sad, indeed, especially so in the early days when they were given nothing except huge chunks of the public domain. This real estate later became quite valuable.

Mr. Sykes makes the rather surprising statement that "under modern conditions of traffic a highway's disintegration begins almost the week after the traffic barricades have been lifted." It is the more surprising coming from one who has been "intimately engaged" in the development of good roads.

We believe that if Mr. Sykes will carry his investigation a little further he will learn that improved highways never wear out if they are properly maintained. That fact has been proven beyond dispute in Maryland and Massachusetts, to mention only the two States which come to mind first. There is at least one perfectly good road in Maryland, now carrying heavy traffic, which antedates the canal period.

With this fundamentally erroneous premise, Sykes contends that "almost without exception these bond issues for highway purposes transgress the accepted principle that the life of a public debt should not exceed the probable life of the improvement for which it was incurred."

We fear that since Mr. Sykes transferred his efforts from the development of highways to some other field, he has not kept pace with the practices in vogue in highway maintenance. Perhaps the following paragraph from his article expresses his views on the subject of maintenance:

"A road whose surface has thus been ruined (by automobiles operated at a speed exceeding 20 m.p.h.) remains, nevertheless, a practicable highway, able to carry vehicular traffic in summer and winter and affording dry passage for pedestrians. As a speedway for automobiles it is neither inviting nor comfortable, but between such a road and the old country road, impassable in the spring and filled with gullies and bumpy rocks the rest of the year, there is simply no comparison."

Later on, he inquires: "Would it not be better to maintain what we have than to pile up staggering debts for our children who will be paying for roads worn out long before the debt for building them is discharged?"

Acceptance of any such ideas as those advanced by Mr. Sykes would pre-suppose a desire on the part of the American people to stop the wheels of progress and stand still for an indeterminate period.

That is what the railroads have done. They long ago ceased to extend their systems and they have failed utterly to keep pace with the steadily increasing population. They once were able to handle the maximum of freight traffic offered them by the country, but that was a long time ago. Their equipment now is wholly inadequate to cope with the needs of traffic. It is true that they have ordered rolling stock in considerable quantities but when it is delivered it will be little more than a drop in the bucket.

It was inability of the railroads to handle the freight traffic offered them which resulted in the development of highway transport. It is their continued inability to handle it which will result in further development.

Do the railroads expect business in the United States to stand still while they catch up?

It is such specious arguments as those presented by Sykes which the automotive industry must combat by the presentation of the plain truth.

It's the same old story, the same familiar propaganda, couched in a little different language but built around the same framework. The message it seeks to carry is that the States should cease to build highways for the benefit of motor vehicles. The inference is that the people of the United States should let their roads wear out so the railroads can carry not only the freight but the passengers which are now transported by trucks and passenger cars.

Output in October Reached 244,000

Total for 10 Months Placed at 2,119,000

Almost Equals Production for Full Twelve Months of Banner Year, 1920

NEW YORK, Nov. 1—October has produced another surprise for the industry.

That month not only broke all previous production records for the tenth month of the year but it proved to be the seventh consecutive month in which the 200,000 mark was exceeded. Counting October, nearly as many motor vehicles have been produced in the 10 months of this year than in the full 12 months of the banner year, which was 1920.

The report of the National Automobile Chamber of Commerce to its directors to-day states that the approximate production for October was 244,000, or nearly 40,000 over September and bettering the previous best October—1920—when production was about 200,000. This report is based on shipping reports for the first three weeks of the month from N. A. C. C. members and for Ford for the full month.

Total production for the 10 months is estimated at 2,119,000.

Ford Back in Production

The big increase over September is explained by Ford getting back into production. The four-day layoff of the Ford plants in September prevented that month from holding its place in line. Ford is not back to capacity production as yet, according to reports from Detroit, which place his daily average at the present time at about 4800, whereas his capacity is 5200. With Ford going at his limit, it is more than likely October would have run close to June, the peak month of the year with 289,011.

This enormous delivery of cars in October was not accomplished without great effort on the part of the various traffic managers, for it is very evident that the transportation situation is becoming more serious. It is still extremely difficult to get freight cars.

Driveaways are increasing, which is to be expected in view of the railroad situation, although Ford seems to be meeting with a good break in luck, for his car shipments have been improving while his driveaways have decreased within the past months.

Business in Brief

NEW YORK, Nov. 1—General trade and industrial activity lacks uniformity due to weather irregularities. Wholesale and jobbing trade shows an advance and commodities as a whole tend upward in spite of some declines. Employment is good with indications that lines now complaining of scarcity will before long find an increased supply of unskilled labor available.

A slight easing of car shortage is noted in some sections, but the Pacific Coast, southern coal and lumber districts, northwest spring-wheat sections and lower lake regions are complaining of acute conditions.

Car loadings are slightly below those of the last week in September, although showing a gain over last week. They are only 3.4 per cent below the peak totals touched during the second week of October, 1920. Total loadings were 983,470 for the week, a gain of 15,301 over the previous week.

Textiles easily lead in strength of prices and widespread buying. It indicates the stimulating effects of recent tariff legislation. Steel is easier while scrap metal, pig iron and coke are lower. This is regarded as indicating the removal of the artificial barrier of scarcity caused by the rail and coal strikes. Railways continue to be the best buyers and it is reported that leading interests have been forced to go into the open market for steel to fill orders.

Soft coal output continues to gain with indications that the peak production has yet to be reached. 10,200,000 tons were produced in the week ending Oct. 21. Anthracite output approximated 2,000,000 tons.

Industrial stocks were carried to new low levels by profit-taking and bear drives. Rails suffered with the rest but gaining stability. Call money rose to 6 per cent. Liberty issues were particularly weak and the new Treasury 4½'s sold for the first time below par.

Closed Car Demand Keeps Up Schedules

Difficulty Still Experienced in Getting Material and Making Deliveries

NEW YORK, Oct. 30—Production continues to be maintained at a high rate in the face of obstacles occasioned by the railroad situation. It is increasingly difficult to get through shipments of materials, despite various means adopted to expedite deliveries. The diversion to other uses of such rail equipment as would be available for automotive manufacturing centers has necessitated a wider use of motor trucks, augmented by the employment of boats for shipments from more distant points.

The popularity of the closed car is a dominant factor in the maintenance of high production programs. Some factories are reporting a shortage of bodies for cars of this type, due to the unexpected demand at a season when in other years there has come a perceptible falling off. Where there has been a curtailment of manufacturing schedules it has been due to the inability to obtain a sufficient body supply rather than to any pronounced decline in sales.

Driveaways Increasing

With the freight car shortage situation becoming more serious, the industry is experiencing as great difficulty in shipping its products as in getting its material. Although driveaways are increasing in number they are unable to take care of all the orders in dealers' hands. Manufacturers located at such points as Detroit and Cleveland are making use of boat shipments, to a great extent, to get their products into dealer territories. The Northwest, in particular, where there is strong evidence of renewed buying interest, is being fed in this manner; but even there deliveries are behind.

The export field is experiencing somewhat the same excellent conditions as regards sales as are apparent in the domestic market. It is very likely that the present year will prove the second best in point of shipments in the history of the industry, exceeded only by 1920. A marked in-

(*Continued on page* 901)

Rubber Restriction Relief Sought

Association Moves by Cabling London

Committee Named — Thought Curtailment Will Mean Higher Prices for Tires

NEW YORK, Oct. 30 — Great Britain's sanction of the plan to compel restriction of output by means of a graduated scale of export duties on all rubber shipped from Ceylon, Malaya and the Straits Settlements has resulted in the appointment of a special committee representing the Rubber Association of America "to proceed with an investigation of the effect of the proposed crude rubber restriction."

This committee will take steps at once to bring about close contact with the Rubber Growers' Association of London for the purpose of giving joint consideration to the development of a plan for safeguarding the interests of the crude rubber grower and the consumer.

Directors of the Rubber Association of America held a special meeting for the purpose of naming this committee, which consists of: Chairman, H. Stuart Hotchkiss, president of the United States Rubber Plantation Co. and attorney for the United States Rubber Co.; B. G. Work, president of the B. F. Goodrich Co.; Horace De Lisser, chairman of the board of directors of the Ajax Rubber Co.; A. H. Brown of Meyer & Brown, crude rubber importers, and S. G. Carkhuff, secretary of the Firestone Tire & Rubber Co.

Co-operation Offered

This committee at once cabled the Rubber Growers' Association asking that a committee be sent here to discuss plans which will protect the mutual interests of consumers and producers. Hotchkiss, in the cable, declared that "it is thought the proposed restriction carries with it great danger to the entire industry, planters and manufacturers alike, and that closer contact between the growers and consumers will be beneficial to the industry as a whole." Up to to-day no response to the cable has been received.

The special meeting of the Rubber Association's directors was brought about by the sharp advances in the price of crude rubber which followed the announcement that the British government had sanctioned the proposed taxation plan. Members were anxious to have determined for them the effect of restriction on the stability of the industry. Several suggestions were received by the directors such as enlisting the aid of the Department of State and the Department of Commerce of the American Government and also cabling a protest against the passage of this restriction act to the colonial governments of the Far East. The appointment of the Hotchkiss committee was the compromise reached.

The restriction is expected to go into effect to-morrow, the idea being to limit production until prices become more satisfactory. The plan adopts as the stand-

(*Continued on page 905*)

Railroad Situation Is Big Factor in Retarding Progress of Business Throughout Country

By Hugh Chalmers

Director, Maxwell Motor Corp. and Chairman of the Board of the Joyce Manufacturing Co.

Detroit, Oct. 30.

THOUGH the business of the country to-day is good and is showing steady improvement, there is no question but that it would be much better if it were not for the recent railroad strike and the resulting congestion and confusion under which the industries of the country are laboring.

What the railroads need, as I view it, is new blood in the executive ranks. Practically all directing officers of the railroads are men who have grown old in the service, advancing from post to post according to their years with the company. Such a system offers a barrier to new ideas and modern methods. Business men should be brought in from the outside frequently to supply an enlivening influence to a business which has been accustomed too much to routine methods.

The railroads could study with a great deal of profit the methods of Henry Ford in the management and organization of his affairs. Railroads need men of genius like Ford to keep their service up to a high efficiency standard. They must pay wages that will keep employees at maximum efficiency.

Furthermore, it is the duty of the Government to provide regulations that will prevent any possibility of suspension of transportation service such as has been witnessed this year. The great body of the American people cannot be made the victim of a recurrence of such a situation. If necessary, the Interstate Commerce Commission should be disbanded and a new commission formed which would have absolute control of all public utilities. It does not make any difference whether such a commission has the confidence of the railroad executives or labor organizations as long as it has the confidence of the public. With a commission backed by the public and armed with proper regulatory authority there would be no disturbance of transportation facilities in the future.

The coming year should be one of the best in the automobile business. Buying has fallen off now, but only in comparison with the rest of the year, and not in comparison with the same season in other years. Manufacturers are handicapped by shortage of closed bodies, and the big demand of the season is for closed work. Those manufacturers who are able to get closed bodies in quantity are maintaining operations on schedules approximating those of the earlier year. Plants which have fallen off largely in production are those without adequate closed body supply. Several manufacturers are months behind on closed body orders.

Manufacturers must prepare to meet the closed car demand of the future. There will be a large increase in closed body demand next year over that of 1922, and percentage of closed production this year has been larger than in any year previous.

Durant to Use Factory in Elizabeth for Bodies

NEW YORK, Oct. 30—Part of Durant's big plant at Elizabeth, N. J., will be utilized for body building. It will be occupied by the new body building concern which is being organized by Jay Hayes and Victor Preston of the Hayes-Ionia Co. of Grand Rapids, Mich.

As yet no name has been selected for the company, but it is understood that it is a separate and distinct organization from the Hayes-Ionia Co. While it will not be a part of the Durant organization at present, it is thought that it will be taken into the fold later.

Apperson to Obtain New Working Funds

First Mortgage Bonds to Be Issued to Provide for Production of Light Car

CHICAGO, Oct. 30—New capital of $700,000 is to be provided for the Apperson Bros. Automobile Co. of Kokomo, Ind., under a plan of re-financing which contemplates the bringing out next spring of a new light car in addition to the regular 8-cylinder model.

The new finance is to come from an issue of first mortgage gold bonds which will be offered through the firm of A. S. Terrill & Co. of Chicago and New York. The bonds will bear 7 per cent interest and will mature $40,000 annually beginning Oct. 1, 1924, the balance Oct. 1, 1932. The trustees will be the First Trust & Savings Bank of Chicago, and George L. Davis, vice-president, Howard National Bank, Kokomo.

Detailed plans for the new light car are not yet ready for announcement. The car probably will be known as the Apperson Junior. It is specifically stated that the standard 8-cylinder Apperson chassis will be continued. The production for next year is estimated at 2500 8-cylinder cars and 4000 of the smaller models.

The balance sheet prepared on the basis of the new financing shows that the company's total current assets are $1,863,156 as compared with current liabilities of $606,073, or about three to one.

Profit of $300,000 Indicated

A statement by Edgar L. Apperson, president of the company, says that the result of operation to Sept. 30, 1922, indicates a profit for the year ending Dec. 31 exceeding $300,000. Average annual earnings for the five years, 1916 to 1920, inclusive, are given as $199,238. The loss for the year 1921, after writing off depreciation of inventory, is given as $9,311. The parts business is said to amount to over $300,000 a year.

The purpose of the bond issue, as stated by Apperson, "is to provide for additional models and add to working capital." The bond issue will be secured by a closed first mortgage covering all plants, real estate and fixed assets of the company.

Following is the condensed balance sheet prepared on the basis of the new finance arrangement:

ASSETS

Current:		
Cash	$186,568	
Accounts receivable	273,922	
Notes receivable	52,624	
Inventories	1,350,041	
Total current assets		$1,863,156
Deferred charges to profit and loss		1,619
Investments		17,500
Fixed:		
Real estate, plant and equipment, depreciated value		1,363,104
Total assets		$3,245,379

GASOLINE COSUMPTION ESTIMATED FOR 1923

WASHINGTON, Oct. 30—Gasoline consumption for the calendar year of 1923 will be 5,670,000,000 gallons, it is estimated by the American Petroleum Institute. The figure is arrived at by an estimate showing that there will be 13,500,000 gasoline engines in use in 1923, each using an average of 420 gallons of gasoline.

At the present rate of refining methods—one barrel of gasoline secured from each four barrels of crude—the total petroleum requirements of crude oil will be 540,000,000 barrels.

LIABILITIES

Bills and accounts payable		$606,073
Reserve for taxes	$15,301	
Bond issue	700,000	
Preferred stock	600,000	
Common stock	1,250,000	
Surplus	74,004	
		2,639,305
Total liabilities		$3,245,379

Revere Closes Its Doors on Eve of Sale of Plant

LOGANSPORT, IND., Oct. 26—Judge Paul M. Souder announced the holding up of the sale of the Revere automobile plant of this city until the middle of next week. It is understood that at the time of the announcement of the postponement of the sale that only one bid had been received. Whether the judge will approve of the sale if no further bids are received was not disclosed in the announcement.

The plant closes its doors to-night, after having been operated continuously under the receivers, the Citizens' Loan & Trust Co. of this city. It is said that until recently, the employees of the plant have been kept busy.

Locomobile Transferred Formally to New Company

NEW YORK Oct. 30—By order of Referee Keogh the property of the Locomobile Co. of America at Bridgeport, Conn., has been formally transferred by the trustees to the new Locomobile Co. of America, a New York corporation, which is controlled by W. C. Durant. The new interests are proceeding along the policy decided upon when Durant first took over Locomobile.

The schedule calls for the manufacture of 800 cars during the 1923 season, and 1000 men will be employed at the Bridgeport plant. No new models will be added nor will there be any price changes. The sales organization will be strengthened in all parts of the country, and new district representatives added in those sections where the conditions demand them.

Fewer Hudson, Essex Models Will Be Made

Four Types Dropped — Action Fits in With New Dealer Financing Plan

DETROIT, Nov. 1—Hudson Motor Car Co. has reduced the number of Hudson and Essex models to seven by taking out of its line the four higher priced closed models, including a touring limousine, limousine, cabriolet and sedan.

This is a material change from past policies, for in one year Hudson and Essex produced as many as 12 different body types. Before the Essex came into being there was one season in which Hudson alone had nine models.

The new policy is to enable the dealer to concentrate on a few fast selling models rather than to attempt to cover the entire field of motoring demands. The closed car proportion of the entire Hudson-Essex production now is 56 per cent and even this will be greatly increased in 1923.

Decision to reduce the number of models is made to aid in the carrying out of the Hudson company's new dealer finance plan, which aims to lessen the problems of the dealers handling the two lines. Realizing the financial problems of the smaller dealer, the company has developed a plan which permits of the handling of cars throughout the year at an unusually small expense.

The details are very much along the lines of the usual national financing plan, but it is claimed that because the expense to the dealer is small and the plan combines the virtues of dependability and an economical interest charge on the money advanced it cannot help but be successful.

Rolls-Royce of America Issues $2,000,000 Bonds

NEW YORK, Nov. 1—Rolls-Royce Co. of America, Inc., is issuing $2,000,000 15-year 7 per cent sinking fund gold bonds of an authorized issue of $3,000,000. The proceeds will be used for refunding higher interest-bearing obligations and the remainder for working capital.

While this issue will be used in no way for plant expansion, it will facilitate a slight increase in production, officials declaring that it is possible to increase output to more than 450 cars a year.

The plant is now running at capacity. Earnings since May 1 have been at the rate of over twice the interest charges and orders on hand, it is said, will enable the company to exceed this mark.

AMERICAN PETROLEUM MEETING

ST. LOUIS, Nov. 1—The third annual meeting of the American Petroleum Institute will be held at the Hotel Statler in this city on Dec. 6, 7 and 8.

468,355 Estimated As G. M. 1922 Sales

Total Value for First Six Months Promises to Make Year Company's Best

NEW YORK, Nov. 1—Estimating the last quarter, total sales of the motor vehicle manufacturing units of the General Motors Corp. in 1922 will aggregate 468,355, which will give the corporation the greatest year in its history. With net sales of $218,859,267 for the first six months of the year, it is very likely that in dollar value 1922 will top 1920, the best previous year, when the net for the twelve months was $567,320,603.

Stockholders are given this information in facts and figures, prepared by the Department of Financial Publicity of G. M. C. There are 70,000 stockholders at the present time, a considerable growth in the last year. At the end of 1921 there were 66,837 of all classes, while in 1920 there were 36,894; 18,214 in 1919; 4379 in 1918 and 2920 in 1917. Of the 70,000 there are 41,144 owning 100 shares or fewer and only 7410 who own more than 100 shares of common.

Preferred Stocks Worth $380

On June 30, 1922, the book value of the preferred and debenture stocks was over $380 per share; and of the common stock $14 a share.

"Few realize that the combined value of the products sold annually by the General Motors group during the past few years is greater than the annual revenue of any railroad; and further, is exceeded by few industrial corporations," the booklet says.

Net sales by years ended Dec. 31, follow:

1922*	$218,859,267
1921	352,527,386
1920	567,320,603
1919	509,676,694
1918	269,796,829
1917**	96,295,740

*Six months ended June 30.
**Five months ended Dec. 31.

The excess of current assets over current liabilities (net working capital) June 30, 1922, was $122,725,264. Cash in banks was $35,527,973. Sight drafts, $10,430,382; notes and accounts receivable, $21,899,134, and inventory, $94,166,601. Current liabilities include accounts payable, $22,184,843; taxes, payrolls, etc., $16,979,253, and accrued dividends, $1,068,354.

2,000,000 Cars Since 1905

Facts and Figures says:

General Motors, since 1905, has produced over 2,000,000 passenger cars. Of this number approximately 75 per cent, or more than 1,500,000, were in use on Jan. 1, 1922. According to the National Automobile Chamber of Commerce, there are 9,300,000 passenger automobiles in the United States. To be conservative, at least one out of every seven passenger cars is a Greater Motors product. Since one out of every seven is a General Motors car it follows that this group carries approximately one billion passengers annually—approximately the number of passengers carried by all the steam railroads in this country.

General Motors Produced 316,136 Cars and Trucks In First Three Quarters of Current Year

NEW YORK, Nov. 1—The combined sales by the car and truck divisions of General Motors in the first quarter of this year totaled 71,039; the second quarter, 135,751; and the third quarter, 109,346. This makes a total for the first nine months of 1922 of 316,136, which exceeds the full 12 months of 1921.

The sales for the year to end Dec. 31, 1922 (last quarter estimated), compared with the actual sales of the three preceding calendar years, follow:

	*1922	1921	1920	1919
Passenger Cars:				
Buick	134,000	83,888	116,213	119,853
Cadillac	22,000	11,130	19,790	19,851
Chevrolet	249,000	75,667	144,502	132,710
Oakland	26,000	12,661	37,244	54,451
Oldsmobile	23,000	20,245	26,241	33,345
Commercial Cars:				
Chevrolet	2,900	1,489	4,938	2,682
GMC Trucks	5,600	2,760	5,137	7,730
Oldsmobile	1,500	466	8,383	7,782
Totals:				
Passenger Cars	454,000	203,591	343,990	360,210
Commercial Cars	10,000	4,715	18,458	18,194
Miscellaneous**	4,355	6,493	30,627	13,334
Grand total	*468,355	214,799	393,075	391,738

*Based upon the actual sales for the first nine months of 1922 together with estimates for the last three months.
**Includes tractors, and also cars and trucks not now manufactured.

Kelsey Remains Manager When Receiver Is Named

NEWARK, N. J., Oct. 30—Judge Bodine of the United States District Court at Trenton has appointed Stewart A. Young of this city receiver for the Kelsey Motor Co. upon application of C. W. Kelsey, vice-president and general manager. In petitioning the court, Kelsey acted for his mother, Mrs. J. W. Kelsey of Philadelphia, from whom he borrowed $10,000 to lend the company. Liabilities are placed at $90,000, but the assets are said to be five times this amount.

Temporary shortage of funds, caused by a change in the financing of the company, is assigned by Kelsey as the reason for the receivership. It is asserted that the receiver soon will straighten out matters and will be discharged within 90 days. Manufacturing operations will be continued with Kelsey as general manager.

The Kelsey company, organized about two years ago, is manufacturing a friction drive car. Recently a gear drive model was added to the line.

416 M. A. M. A. MEMBERS

NEW YORK, Oct. 30—The Motor and Accessory Manufacturers' Association has just broken a record, a membership record. It now has enrolled 416 companies, a net gain of 25 in the last 12 months. This is the highest total reached in its 18 years' existence.

Money Easier, Banks in Southwest Report

KANSAS CITY, MO., Nov. 1—The monthly review by the Federal Reserve Bank of Kansas City, covering conditions in the Tenth district, show a very interesting accession of prosperity to this district. The condition of 79 selected member banks reflects the loosening of money, and the largely increased volume of production and distribution.

The Federal Reserve Bank itself and the branches in Omaha, Denver and Oklahoma City, show higher levels of discounted and purchased bills and also notes of circulation, during September, than since June. The gross deposits of the selected member banks are the highest of record; as are the combined loans and discounts and investments.

Another statistical angle reflects improvement negatively—car shortage continues, retarding distribution. Farmers in western Kansas, it is known from other than Federal reserve sources, lack cars for wheat shipment, and the report points to very general distress over lack of cars in many sections of the district.

Other reports aside from the Federal Reserve bulletin, are that with the stiffening prices in many commodities, especially cotton, retailers are buying and placing orders more freely, though conservatively.

VAN KERR IN RECEIVERSHIP

CHICAGO, Oct. 30—A petition in bankruptcy has been filed in Federal Court here against the Van Kerr Co., manufacturer of spark intensifiers for use on spark plugs. Fred E. Hummel has been appointed receiver.

Studebaker to Build 110,000 Cars in 1922

Schedule for Fourth Quarter Calls for 20,000—Regular Dividend Declared

SOUTH BEND, IND., Nov. 1—Directors of the Studebaker Corp. at their meeting to-day declared the regular quarterly dividend of 2½ per cent on the common capital stock and the regular 1¾ per cent on the preferred. The extra dividend on the common was eliminated.

It had been expected that the directors would continue this extra dividend which was granted three months ago, when the regular dividend on common was increased from 1¾ to 2½ per cent, thus placing the stock on a regular 10 per cent annual basis, as compared with the previous rate of 7 per cent.

The Studebaker report for the quarter tells of capacity operations and the sales demand ahead of production. There were 29,924 Studebakers produced and 30,199 sold. Production schedules for the fourth quarter call for 20,000 cars, which will make 110,000 for the year as against 66,000 in 1921.

While the net profits of the third quarter—$4,483,973—are less per car than those of the second quarter, because of price reductions of about 10 per cent in August, they are nevertheless high enough to satisfy the management.

The consolidated balance sheet of the Studebaker Corp. and subsidiary companies is as follows:

ASSETS

	Sept. 30, 1922	Dec. 31, 1921
Cash	$20,123,734	$8,334,799
Sight drafts outstanding	4,137,804	1,822,393
Investments	3,563,590	2,178,170
Net receivable (less reserves)	6,176,207	4,035,221
Inventories	15,101,740	22,209,885
Deferred charges	623,219	394,262
	$49,726,297	$38,974,732

QUICK ASSETS

Plants and property	$38,903,832	$37,290,413
Housing development	1,706,095	2,255,715
Trade name and goodwill	19,807,276	19,807,276
Total	$110,143,411	$98,328,138

LIABILITIES

Accounts payable—current	$4,046,504	$3,492,414
Reserve for taxes	3,642,646	2,904,373
Reserve dealers' discount and deposits	1,292,641	1,306,446
Other payable reserves	2,799,875	2,545,160
	$11,781,667	$10,248,394

ALL LIABILITIES

Preferred stock	$9,450,000	$9,800,000
Common stock	60,000,000	60,000,000
Special surplus	4,455,000	4,050,000
Surplus	24,456,743	14,229,743
Total	$110,143,411	$98,328,138

The statement of comparative profit and loss and surplus as of Sept. 30 is as follows:

THIRD QUARTER

	1922	1921
Number produced	29,924	23,338
Number sold	30,199	21,086
Net sales	$35,065,894	$29,058,893
Net profits before taxes	4,934,370	4,251,867
Less reserves for U. S. and Canadian taxes	450,397	988,667
Net profits	4,483,973	3,263,200
Less dividends	2,565,375	1,221,500
Surplus	1,918,598	2,041,700

FIRST NINE MONTHS

	1922	1921
Number cars produced	87,951	56,163
Number cars sold	90,252	55,552
Net sales	$108,488,756	$80,593,998
Net profits before taxes	17,621,133	11,644,326
Less reserves for U. S. and Canadian taxes	1,980,759	2,000,000
Net profits	15,640,374	9,644,326
Less dividends	5,008,375	3,664,500
Surplus	10,631,999	5,979,826
Prior surplus	18,279,743	13,467,047
Total surplus	28,911,743	19,446,874

Prices Reduced of Dort Four; "Six" Lists Fixed

FLINT, MICH., Nov. 1—Coincident with the announcement of the Dort six comes the information that some minor changes have been made in the four, together with a price reduction. Following are the new and old prices on the Four:

Model	Old Price	New Price
Phaeton	$885	$865
Roadster	885	865
Yale sedan	1,095	1,070
Yale coupe	1,045	1,020
Harvard sedan	1,385	1,370
Harvard coupe	1,265	1,240

Prices of the Dort six are as follows:

5-pass. phaeton	$990
3-pass. roadster	990
5-pass. Yale sedan	1,195
3-pass. Yale coupe	1,145
5-pass. Harvard sedan	1,495
3-pass. Harvard coupe	1,365

Fiat Makes Radical Cut in Prices of Two Models

NEW YORK, Oct. 31—Fiat has announced a radical price reduction on its large 4-cylinder line, model 501, and 6-cylinder cars, model 510. Model 501, the small 4 cylinder line remains unchanged. The new prices are as follows:

Model 505

	Old Price	New Price
Phaeton	$3,500	$2,500
Sedan	5,000	2,900
Landaulet	4,700	2,900

Model 510

	Old Price	New Price
Phaeton	$5,400	$3,700
Landaulet	5,500	4,500
Brougham	5,500	4,500

MASON TO INCREASE

NEW YORK, Nov. 1—The Mason Tire & Rubber Co. will advance tire prices approximately 5 per cent Nov. 15.

Los Angeles Public Confused by Prices

Some Dealers Advertise Cars F. O. B. Factory—Others at Delivery Point

LOS ANGELES, Nov. 1—Despite recent agitation favorable to advertising prices of motor vehicles for delivery at California points, the majority of dealers continue to quote factory prices. Some have switched over to local delivery prices and as a result the buying public is very much confused.

Agitation in favor of advertising local prices is growing and the solution for the whole affair might be brought about if a dozen of the largest distributors in this State would depart from an established custom.

Some dealers maintain they should have the privilege of selling their merchandise as do dealers in other commodities. They maintain the public knows nothing about the cost of most articles at an eastern factory point and cares less, but the buyer is concerned as to what his outlay will be. It is cited that the highest quality and most expensive furniture originates in the East. In their national advertising the furniture factories refrain from price quotations. The California merchant advertises the sales price to the buyer and that in the end proves the only factor worth consideration.

Dealers Are in Quandary

As the result of the agitation of the advertised prices of automobiles, the dealers themselves are in a quandary as to the course to pursue. When a person reads a section of the newspaper devoted to automobile advertising he is interested in the price. That is more because the automobile manufacturers have emphasized price above quality, judging by the display made. A survey of the advertising columns leaves the reader guessing and unless he knows the location of every factory whose product is advertised and can approximate the freight charges, the advertising becomes a Chinese puzzle.

The question of "handling charge" also enters. Knowing the factory price, the customer asks the cost of the freight and can figure the war tax. In many instances there still remains a discrepancy between the total of these three sums and the actual retail price. The dealer says the difference represents the "handling charge."

ELGIN STILL OPERATING

CHICAGO, Nov. 1—The Elgin Motor Car Corp., for which a receiver was appointed in Federal Court two weeks ago, is operating under permission of the court to produce as many cars as the materials and units on hand are sufficient for without the purchase of additional materials. This point will be reached within a few days.

Trucks Finding New Markets, Says Fenn

Industry in Wonderful Shape at Present, He Reports After Tour of Plants

NEW YORK, Oct. 30—The motor truck industry, all things considered, is in wonderful shape at present. It is doing 75 per cent more business now than it was at the beginning of the year; all its plants are busy, some of them at capacity, and new markets have been opened that promise much business in the immediate future. September was a rare production month, showing an increase of 35 per cent over the same month a year ago.

These are the conclusions reached by F. W. Fenn, secretary of the motor truck division of the National Automobile Chamber of Commerce, after two weeks spent in visiting some 15 factories in different parts of the country.

Demand for Rail Cars

In speaking of the situation, Fenn says:

General business is the barometer of the truck industry. When business is good we will sell trucks and lots of them, and I am glad to report that business is coming back. There is a labor shortage in all the industrial centers, the demand for trucks is surprising everyone and new markets are opening for us which tell us that we are just scratching the surface right now.

I find a great demand for rail cars. The railroads are coming into the market and not only want these rail cars but also need trucks for short hauls and for store-door deliveries. The carriers are finding that they must either take to the motor trucks and store-door deliveries or spend millions building new terminals on the outskirts of the big cities. The electric railways, too, are proving good customers through frankly taking up the motor bus as a feeder to their main lines. The boom in highway building also has helped matters.

Of great benefit to the industry is the decisions of the public service commissions of New York and California, which have held that trucks and buses are necessary to the public and have granted franchises for the operation of business despite the protest of the trolleys.

Good Farm Outlook

I also feel that the farmers are going to prove mighty good customers. As soon as they sell their crops and get some ready money, I think we are going to hear from them in a substantial way.

In my swing through the country I found everyone busy and very optimistic. Mack, Federal and White are going strong. At Diamond T I found great activity because of the fact that the American Railway Express is taking most of the output. Four-Wheel Drive at Clintonville is building flanged wheel trucks for use on the railroads of Porto Rico, Japan and China. Foreign business with them is good.

Graham at Detroit and Clintonville has announced a complete line of bodies for smaller haulage work, which has met with great success. The Graham is powered with Dodge engines and distributed by Dodge Brothers dealers. The Walker electric at Chicago reports many orders and great activity in the sales department, while the Watson Wagon Works at Canastota, N. Y., is doing so well that it has discharged the receiver who has been at the helm for some time.

TRACTOR MAKES LONG CROSS-COUNTRY TOUR

WATERTOWN, WIS., Oct. 30—One of the longest cross-country tours ever made by a tractor is that now nearing its end at New Orleans. On Oct. 8 a Monarch tractor, manufactured by the Monarch Tractor Co., left the factory with greetings from city officials and the chamber of commerce. The tractor is preceded by E. L. Woods, sales manager of the company, in a phaeton.

At Madison, the governor and other State officials signed the log, and the same is being done at all other State capitals through which the unique caravan is passing. Demonstrations are being made at frequent stops along the route. A report of the tour with a complete log will be made at the National Good Roads Show, to be held in Chicago Jan. 15-19, 1923.

Toledo-Chevrolet Plans to Add Three Buildings

TOLEDO, Nov. 1—Contracts for three new buildings involving the expenditure of approximately a half million dollars, including equipment, will be let soon by the Toledo-Chevrolet Co., according to George D. Moore, vice-president and general manager.

One new building will enlarge general machine shop space, an addition will be built to the heat treating department and a heating plant will also be constructed.

The total addition will provide an added 100,000 sq. ft. of manufacturing space and will make possible the equipment for employment of 2500 men in place of the normal 1500 which can now be employed.

The local plant manufactures transmissions and differentials for Chevrolet cars and is the only General Motors unit in this city.

Associated Motor Opens New Executive Offices

DAYTON, Oct. 28—Executive offices of the Associated Motor Industries have been opened here in a three-story building which has been completely remodeled for the purpose. The building is about 250 x 150 feet. The sales department, with spacious display rooms, is on the first floor. Officers of the company occupy offices on the second floor, and departmental offices are located on the third floor.

Milwaukee Reports Month Opening Well

Situation There Better Than in Any November in History of Industry

MILWAUKEE, Oct. 30—The beginning of November will find the automotive industries generally in a greatly improved condition and one that is far more secure than it was on the same day in 1921 or 1920. In fact, reports from all sources lead to the belief that manufacturers regard the immediate situation as far superior to that existing at this season at any time in the history of the industry, especially since the prospect facing it is so substantially sound as it is at present.

Passenger car factories are still being operated at a high rate. In the case of the plants which at no time this year have been running at maximum, the best capacity reached is still being maintained. Others that were producing at their limit have not experienced any cause for material let-down.

The Nash four-cylinder car division in Milwaukee is still running a night shift. It is employing more than 1000 men and turning out about 75 cars a day, which will be increased early in 1923 to an average of 125 cars a day when the extensions now under construction are in full running order. The run of orders for immediate delivery is sufficient to absorb current output easily, while bookings for later shipment already in hand and in prospect insure a heavy run all winter.

Truck Makers Go Ahead

Motor truck builders are making headway slowly but with a greater degree of certainty. Demand for commercial cars from now until spring is expected to enable such factories to make steady increases in production schedules. Motor-bus and other large-capacity passenger vehicle trade likewise is looked upon to furnish an improving winter demand.

Operations are being limited to specifications in current orders and manufacturers of trucks are proceeding conservatively to avoid the pitfall of over-production. It is believed that in case of any sudden and sharp increase in demand, which is a possibility next winter, there is likely to be a material shortage of trucks, which will be more accentuated in bodies, perhaps, than in chassis.

Parts and equipment manufacturers as a rule are running full time and just about keeping abreast of contract specifications and current orders from car manufacturers and the jobbing trade.

FRANKLIN DEALERS INCREASED

SYRACUSE, N. Y., Oct. 30—The number of Franklin dealers has increased 27 per cent during the past year, according to Sales Manager S. E. Ackerman of the Franklin Automobile Co. Fifteen per cent of this increase dates from the first of this year.

Men of the Industry and What They Are Doing

Harry Moock Promoted

Harry Moock has been promoted to sales manager of the Hudson Motor Car Co., taking the position left vacant by H. B. Phipps, who has resumed charge of the foreign fields in which he created a remarkable record before the war. J. S. Draper has been made assistant sales manager. He formerly was district manager in the Middle East. Moock joined the Hudson company about a year ago, entering this organization after resigning the general managership of the National Automobile Dealers' Association, where his energy and acquaintance among the dealers created a nation-wide reputation for him.

Charles B. Wilson Given Dinner

Charles B. Wilson, former vice-president and general manager of the Willys-Overland Co. in Toledo, who resigned two weeks ago to make way for President John N. Willys to take charge of the plant, has gone to Pasadena to visit a brother before returning to his extensive interests in Pontiac, Mich.

Wilson was tendered a dinner by his associates of the plant, the officers of the company, a number of out-of-town visitors and members of the executive committee of the board of directors. He was presented with a watch and chain by the factory officials.

Goodrich Elects Titus

F. E. Titus, who for the past several years has been director of sales of the International B. F. Goodrich Co., has been elected to second vice-president of this company effective Oct. 15. Titus at one time was manager of the Buffalo and Pittsburgh branches. He was later transferred to the foreign sales department with headquarters in New York, and then was brought into Akron to take full charge of the company's foreign sales.

Shepler May Rejoin Overland

The fact that Harry Shepler, formerly vice-president in charge of production at the Willys-Overland Co. in Toledo, arrived in that city this week from California coincident with Willys' return from New York, has lent color to the local talk that Shepler may again be taken into the official Overland family here.

Shepler was one of the most successful factory men ever identified with the Toledo plant.

Goodrich Promotes Underwood

A. G. Underwood, for several years prominently identified with the interests of the B. F. Goodrich Rubber Co. of Akron, has been promoted to the position of manager of sales for Goodrich bicycle tires, Goodrich motorcycle tires and Goodrich automobile rubber sundries. Underwood started in with the Diamond sales organization on the Pacific Coast, was later shifted to the position of branch manager at Milwaukee and just prior to his taking a position with the central organization at Akron, was Goodrich district manager of the Minneapolis territory.

Gamble With Rock Island

William Gamble has been appointed purchasing agent for the Rock Island Plow Co., Rock Island, Ill. For thirty years, he has been a member of the Moline Plow Co. of Moline, Ill., for the past year or two being located at Poughkeepsie, N. Y. He will make his headquarters at Rock Island.

Brennan Sales Manager

B. G. Brennan has been appointed general sales manager of the Inland Products Co. of St. Louis, which has just moved into its new three-story plant.

Brandes Is Erie Export Head

C. O. Brandes has been appointed export manager of the Erie Tire & Rubber Co., Sandusky, Ohio, with an export office at 5511 Euclid Avenue, Cleveland. He has been in the tire business since 1907 and for many years served as export manager for Firestone.

Spooner Resigns as Secretary

F. Ed. Spooner has resigned as secretary of the Old Timers Club. No successor has been appointed.

Leverone Joins Advance Lamp

Nathaniel Leverone has resigned as secretary and treasurer of the Hill Pump Valve Co., Chicago, to become secretary of the Advance Lamp Works of that city. For a number of years Leverone has been a leader in the Automotive Equipment Association.

Atkinson Has Office in South

G. P. Atkinson, for several years connected with the home office sales organization of the Weston Electrical Instrument Co. of Newark, N. J., has opened an office in Atlanta, for the territories of Georgia, South Carolina and northern Alabama. In addition to Weston instruments, Atkinson has several other lines of electrical equipment.

Hopkins Joins Rackliff

Benton Hopkins, formerly advertising manager of Denby Motor Truck Co. and previously associated with other automotive manufacturers in an advertising capacity, has joined the H. L. Rackliff Co., automotive marketing counselors of Cleveland.

Chase to Present Paper

Herbert Chase, Engineering Editor of Automotive Industries, will present a paper on the "Trend of Engineering Development in the Automotive Industry" at a meeting of the Connecticut Section of the American Society of Mechanical Engineers to be held at Mason Laboratory, Yale University, on Nov. 20.

Franz Opens Office

Frederick Franz, for the past four years chief engineer of the Terminal Engineering Co., manufacturer of the TEC truck, has established an engineering office at 27 Warren Street, New York City, for the purpose of solving special problems of engineering relating to labor-saving machinery for industrial plants.

Promotion for J. F. Hartz

J. F. Hartz has resigned as president of the C. M. Hall Lamp Co. of Detroit and Kenosha, an office he held for the last 12 years, and has accepted that of chairman of the Board of Directors. W. F. Anklam, secretary and general manager for the last 12 years, has been elected president and general manager in recognition of the manner in which he has conducted the affairs of the company. The reports submitted to the board by General Manager Anklam showed the affairs of the company to be in a most prosperous condition.

Zahrt Resigns

W. G. Zahrt has resigned as vice-president of the S. F. Bowser & Co., Fort Wayne, Ind.

DeWaters Visits Paris Show

E. A. DeWaters, chief engineer of the Buick Motor Co., was a visitor at the recent automobile show at Paris, France. DeWaters, who is accompanied by Mrs. DeWaters, is making a study of the trend in automobile engineering and design.

Electric Lines Oppose Chicago Bus Extension

CHICAGO, Nov. 1—The application of the Chicago Motorbus Co., under new ownership, for permission to operate additional bus lines on the city boulevards is being vigorously opposed before the Illinois Commerce Commission by representatives of the surface and elevated electric lines, the Illinois Automobile Club and union labor.

The ownership of the bus company, headed by John Hertz, president of the Yellow Cab Manufacturing Co., has pledged to put more than 300 buses in operation at a cost of more than $3,000,000 if permission to use the boulevards is granted.

DEALERS ARE NOT STOCKING CARS

Evidence That Big Production Is Sold

Few Sections Show Disposition Now to Accumulate Open Models

DETROIT, Nov. 1.—No noticeable stocking of cars is reported from the dealers at this time. Sales managers state that while there are soft spots in the country, particularly in the grain zones, there are enough points where business is good to keep a steady flow without an accumulation.

Production schedules, of course, are being pared this month with the exception of Buick and one or two other notable examples. Taking an average of all manufacturers, there is not in excess of one month's supply of cars on the road or in the dealers' hands at the present time. Preparations made some time ago for an increase in the percentage of closed car models has been largely responsible for keeping this situation clear.

As a typical example, Hupp, which will average 18 per cent closed cars for the entire year of 1922, operated on a basis of 35 per cent closed cars for October. Out of 3500 cars manufactured, 1000 were closed. Sales Manager Hutchinson states that he finds no indication of stocking, and in fact that his weekly reports indicate 200 less cars on hand now than a week ago.

None of the companies report anything but a healthy general condition, with not more than the normal number of weak spots, and a very active closed car demand from the metropolitan centers.

New York

NEW YORK, Nov. 1—Late October and early November have brought a decided slowing-up in demand for open cars in the metropolitan territory. Open cars are coming in from the factories, some by freight and some in driveaways, but they are moving much more slowly and in some cases not at all from the establishments of distributors and factory branches. There is beginning a noticeable though not alarming accumulation of open car stock.

San Francisco

SAN FRANCISCO, Nov. 1—San Francisco, Oakland and Berkeley dealers are taking on no more new stocks than necessary to carry orders. There is no special demand in northern and central California for open cars.

Boston

BOSTON, Nov. 1—Some of the larger Boston distributors are now planning to arrange with their banking interests to stock cars for spring delivery. They will be both open and closed models. They are getting orders for spring delivery now as an indication that after the motor show in March there will be a big demand for cars, and they have faith in the future, when elections, strikes and other unsettled conditions have been swept away.

Indianapolis

INDIANAPOLIS, Nov. 1—There has been no appreciable stocking or storage of open or closed cars to date. The large storage house leased to the dealers' association is practically empty. Sales are still brisk in many lines. Two weeks ago there was a sharp drop in some lines. A shortage is noted in closed types with several dealers. Selling is keeping pace with deliveries. Sales are generally above average.

Kansas City

KANSAS CITY, Nov. 1—No decided general tendency is noted to stock cars here, but there is a decided recognition of the probability that farmers will be able to buy this winter and that they are most likely to buy open models. They are not sold on closed cars chiefly because of supposed unfeasibility on rough

(*Continued on page* 907)

244,000 *CARS AND TRUCKS MADE IN OCTOBER: TOTAL FOR 10 MONTHS IS* 2,119,227

NEW YORK, Nov. 1—Basing the estimate on the shipping returns, the National Automobile Chamber of Commerce announces the approximate production of cars and trucks for the month of October to be slightly in excess of 244,000, which is the best October on record, and the seventh consecutive month this year that production has exceeded 200,000. Total output for the ten months of this year is estimated at 2,119,227.

	Output	Carloads		Driveaways			Boat		
	1922	1920	1921	1922	1920	1921	1922	1920	1921	1922
January	91,109	20,057	6,485	15,357	29,283	3,185	7,479		93	143
February	122,366	25,505	9,986	19,636	43,719	7,507	10,173		99	180
March	172,720	29,236	16,287	27,753	57,273	9,939	16,917		75	560
April	219,558	17,147	20,187	31,334	64,634	14,197	22,381		1,619	2,960
May	256,219	21,977	18,608	33,416	74,286	15,193	28,827	....	2,381	7,406
June	289,011	22,516	20,269	34,230	60,746	18,834	33,857	8,350	3,947	7,737
July	245,414	23,082	19,514	28,412	52,342	15,553	28,022	8,702	3,726	6,855
August	273,425	23,386	20,350	32,563	34,060	14,290	36,603	7,095	3,565	10,028
September	205,405	20,804	20,150	25,950	24,431	13,550	30,005	5,469	3,580	8,002
October	244,000	17,209	17,323	....	14,127	11,257	33,320	2,519	2,300	7,404

Factory shipments for the other months of 1920 and 1921 follow:

	Carloads		Driveaways		Boat	
	1920	1921	1920	1921	1920	1921
November	13,253	14,061	9,497	10,509	659	1,385
December	11,802	12,100	6,469	7,500	89	134

Demand for Closed Cars Is Keeping Up Schedules

(*Continued from page* 894)

crease in sales is expected to follow the improvement of the general international situation. Ford is increasing the output in its foreign plants and general business conditions have had a stimulating effect on sales.

Parts makers report collections better than a year ago, with business for September showing an increase of 62.1 per cent over the same month last year, but with car manufacturers purchasing more conservatively than during the earlier months of the season.

It is probable that tire manufacturers will begin shortly to build up reserve stocks to take care of the spring demand. Finished inventories now are low and will require considerable working up before next year to prevent a shortage.

Trucks are showing a steady advance, with sales for the popular makes in industrial sections of the country running as high as 100 per cent over 1921.

JOHN B. FOOTE DIES

CHICAGO, Oct. 30—John Bergoyne Foote, president and treasurer of Foote Bros. Gear & Machine Co. is dead. He was a pioneer in making cut-steel, case hardened, tough cored gears for heavy duty work.

September Exports Kept Up to August

Passenger Cars Shipped Aggregated 5,862; Trucks, 1,295, and Motorcycles, 1,360

WASHINGTON, Oct. 30—Development of the overseas sales of automotive equipment continued during the month of September, as is shown by the export figures for that month, made public to-day by the Automotive Division of the Bureau of Foreign and Domestic Commerce. Shipments were practically at the same high level as in August, the September totals being 5862 passenger cars, 1295 motor trucks, parts (except engines and tires) to the value of $3,226,764 and 1360 motorcycles. The detailed statements of the shipments are given elsewhere on this page.

The figures announced by the Division pertain only to the United States and do not include the comparatively heavy export shipments from the various plants, principally of Ford and General Motors, located in Canada. For some time Canadian shipments have averaged approximately 2500 cars a month, and reports from various sources indicate that the September distribution from there was going ahead on a normal level.

Review for Three-Quarters

With the September business from the United States, it is possible to review the American export trade for the first three-quarters of the year. Here the same tendencies are shown as in the domestic market. Starting with January, sales abroad have picked up as sales conditions became better, and the result has been that 48,328 motor cars were sold in the foreign market during the nine months' period, an average of nearly 5500 per month.

The truck shipments for the nine months have totaled 8080. The adjoining table shows the classifications into which these shipments fall, both as to passenger cars and motor trucks. Parts shipments for the three-quarters period have attained the surprising total of $128,410,260. In every case the total is far above that of 1921 and compares very favorably with sales during the same period of 1919, in some cases being higher this year. These nine months' figures do not include shipments from Canada.

Export Table of Products of the Automotive Industry Shipped from the United States for September, 1922, and for the Nine Months That Preceded

	Month of September				Nine Months Ending September			
	1921		1922		1921		1922	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobiles, including chassis	2,669	$2,352,434	7,161	$5,142,653	29,845	$35,093,235	56,601	$43,329,558
Electric trucks and passenger cars	....	....	4	6,938	....	....	193	283,723
Motor trucks and buses, except electric	472	481,664	....	....	5,945	8,714,623	....	....
Up to 1 ton	....	....	977	366,121	....	....	5,674	2,268,978
Over 1 and up to 2½ ton	....	....	282	270,893	....	....	1,858	2,296,417
Over 2½ ton	....	....	36	126,805	....	....	548	1,448,305
Total motor trucks and buses, except electric	472	481,664	1,295	763,819	5,945	8,714,623	8,080	6,013,700
PASSENGER CARS								
Passenger cars, except electric	2,197	1,870,770	....	....	23,900	26,378,612	....	....
Value up to $900	....	....	3,852	1,889,239	....	....	30,986	14,946,738
Value over $800 and up to $2,000	....	....	1,857	2,063,754	....	....	15,818	17,525,748
Value over $2,000	....	....	153	418,903	....	....	1,524	4,559,649
Total passenger cars, except electric	2,197	1,870,770	5,862	4,371,896	23,900	26,378,612	48,328	37,032,135
PARTS, ETC.								
Parts, except engines and tires	....	2,570,860	*14,548,700	3,226,764	....	31,126,453	*119,414,004	28,410,260
Station and warehouse motor trucks	12	11,195	7	7,253	299	229,385	123	126,125
Trailers	....	....	85	24,960	....	....	387	164,525
Airplanes and seaplanes	8	31,000	....	....	43	271,940	32	58,130
Parts of airplanes, except engines and tires	....	3,956	*62,220	16,862	....	132,534	*193,016	76,066
BICYCLES, ETC.								
Bicycles and tricycles	....	48,342	1,158	10,679	....	1,353,234	7,228	96,463
Motorcycles	584	151,165	1,360	321,731	9,197	3,011,071	11,804	3,068,780
PARTS, EXCEPT TIRES								
Gas engines	124	17,305	294	50,536	898	268 357	3,671	517,685
Traction engines (steam) except agricultural	2	7,218	3	4,245	67	105,558	28	55,076
Automobile engines	899	133,229	1,194	205,378	6,937	1,390,148	37,521	4,215,477
Aircraft engines	....	....	3	900	....	....	101	63,617
Complete tractors, except agricultural	43	22,261	3	3,475	5,135	5,634,065	37	103,855
Other internal combustion engines	540	71,100	208	49,390	6,700	1,418,122	3,421	569,481

*Pounds.

ASH BUSINESS IMPROVED

ATLANTA, Nov. 1—According to Atlanta mill operators producing ash at their various plants in the southeastern territory, this business from the automobile manufacturers has been the best the past two months of any time this year and gives promise of holding up well all winter.

The big demand is for the thicker grades of ash, and practically all of the important sales are to the automobile trade. Dimensions in best demand are 10/4, 12/4 and 16/4, with prices slightly upward. Nearly all ash mills over the district that are at capacity supply the automobile trades.

ON EL AUTOMOVIL STAFF

NEW YORK, Oct. 31—Edgar P. Day, who for a number of years has represented the *American Exporter* and previous to that the *Horseless Age*, has joined the advertising staff of *El Automovil Americano*, the Spanish automotive dealer paper published by The Class Journal Co., and will make his headquarters in Detroit.

RECEPTION GIVEN OFFICIALS

ELGIN, ILL., Oct. 28—A reception attended by about 500 persons was given by citizens of Elgin last night to officials of the American Steam Truck Co., manufacturer of the American Steamer passenger car, in celebration of the location of the company's factory here. The American company has taken over the plant of the Duty truck company

Wisconsin City May Have Motor Vehicle Warehouse

MILWAUKEE, Oct. 30—Plans for the organization of a bonded warehousing corporation that will be responsible for the storing of more than $1,000,000 worth of motor vehicles during the winter months are under consideration by the automotive division of the Association of Commerce of Green Bay, Wis. The dealers of Green Bay and vicinity again are confronted by the problem of adequate and controllable warehouse space for new car stocks during the slack selling season from the end of November to the end of March, when the most severe weather usually comes.

It is planned to lease the main exposition building of the Brown County Fair Grounds as a warehouse. Practically all dealers would become stockholders in the bonded warehousing corporation, which would provide proper guards, insurance and other requirements. At present there is no bonded warehouse nearer than Milwaukee.

Supplies Low When Mexico Levied Duty

Results of Impost of 10 Per Cent Awaited—Demand for American Makes

MONTEREY, MEXICO, Oct. 27—What effect the placing of a 10 per cent ad valorem duty upon all imported automobiles may have upon the sale of cars in this country remains to be seen. The new duty was fixed by decree of President Alvaro Obregon and came unexpectedly to dealers, many of whom found themselves with depleted stocks.

During the last several months there has been quite a revival in the demand for automobiles of American manufacture, especially for the medium price cars. Dealers made many sales and this kept their stocks low. The 10 per cent ad valorem duty which must now be paid on all cars will be added to the retail sale price, it is stated.

Use of Cars Expanding

Until recently the sale and use of automobiles in Mexico were confined almost entirely to the larger cities, particularly Mexico City, Monterey, Chihuahua, Guadalajara, Tampico, Torreon and a few others. This was due to two reasons—one, the danger which one met with of being held up by brigands in the smaller communities and rural districts and, second, the lack of passable highways. Travel overland, however, is now considered to be safer than at any time since the overthrow of President Porfirio Diaz, nearly twelve years ago.

The Obregon Government is giving much attention to the construction and improvement of public roads. The program for such improvements is extensive, but the lack of money is hampering its fulfillment. Much has been done during the last twelve months in the matter of improving the streets and suburban roads of Mexico City, and this has stimulated the sale of automobiles in the capital.

Good Roads Developed

It is now possible to take automobile journeys of considerable distance out of Mexico City over paved or hard-surfaced highways. Such resorts as Cuernavaca, Chapala, Orizaba, as well as towns which are situated in the Federal District, are now easily reached over good roads. In Monterey the contract was let recently for paving many streets, at a total cost of $1,500,000 United States money. When the revolutionary period began the streets of Guadalajara, the second largest city of Mexico, had just been paved and were in perfect condition. Long neglect has caused many of these former perfectly paved streets to be badly in need of repair. Steps to place them in good condition have been taken, and with the finishing of the work it is expected the demand for automobiles there will show a material increase. In Tampico the large American colony created and kept up a good demand for automobiles all through the long series of revolutionary disturbances.

There has been a general expansion of automobile trade facilities in this country during the last several months. Practically every make of automobile in the United States is now represented in the larger cities. Many new garages and accessory houses have been established.

FILE CREDIT DATA, URGED ON EXPORTER

WASHINGTON, Nov. 1—American automobile exporters should arrange with their American banks to have copies of credit reports on themselves sent to their bank's foreign correspondents, is the advice that is being given by the Bureau of Foreign and Domestic Commerce.

After filing such reports, care should be exercised by the reporter to make sure that financial reports on his standing actually are on file in the foreign banks before customers are referred to these institutions for credit information.

Appleton Will Resume Making Reliance Truck

APPLETON, WIS., Oct. 30—The Appleton Motor Truck Co., which recently was incorporated with $50,000 capital, has for its purpose the taking over of the plant and business of the defunct Reliance Motor Truck Co. of Appleton, manufacturing the Reliance truck, Badger truck axles and other truck parts. The Reliance company was forced into bankruptcy by lack of working capital early this year. At receiver's sale the entire property was acquired by a group of old and new capital, who have incorporated the new company.

The officers are: President, A. G. Brusequitz; vice-president, John Heenan; secretary, William Geenen; treasurer, Matt Rossmeissl; directors, Harry Leppla, W. J. Jamison, Frank Tremel and W. P. Tremel.

In addition to resuming the production of Reliance trucks, axles, etc., the new concern plans to manufacture power farm implements and will start with a check-row potato planter. No heavy manufacturing program is planned for the winter months, but next spring an intensive schedule will be instituted. In the meantime service will be given Reliance owners and a campaign made for general automotive repairs.

WILLIAM D. UHLER DIES

HARRISBURG, Oct. 30—William D. Uhler, chief engineer of the Pennsylvania State Highway Department, is dead, following a brief illness. Col. Uhler was one of the country's leading good roads advocates.

Exports Benefited By New Rail Rates

Reduction Made by Western Roads on Consignments for Pacific Shipment

NEW YORK, Oct. 30—Better rates from middle western points to Pacific Coast ports when consignments are destined for China, Japan, Manila, India, Australia and New Zealand have been allowed through the efforts of the traffic committee of the National Automobile Chamber of Commerce. Eastern lines also are being urged to make a different rate arrangement for exports to Europe and other foreign destinations.

J. S. Marvin, N. A. C. C. traffic manager says that manufacturers are quite willing to concede a higher minimum weight on their shipments if the railroads will grant a correspondingly lower rate. The boxing of motor vehicles makes heavier loading possible, but the railroads have been charging the same rate as for domestic shipments.

The new export rates for shipping via the west coast are as follows:

Automobiles, passenger, K.D., and parts thereof, boxed: New rate, $2.50 per 100 lbs.; minimum weight, 16,000 lbs; old rate, $3.65 per 100 lbs.; minimum weight, 10,000 lbs.

Automobile parts (exclusive of bodies) boxed: New rate, $1.75 per 100 lbs.; minimum weight, 30,000 lbs.; old rate, $2.73 per 100 lbs.; minimum weight, 30,000 lbs.

The foregoing new rates also apply from New York piers of the Southern Pacific and Mallory lines and from the Philadelphia piers of the Southern Steamship Co.

Government Will Film Continental Engine

WASHINGTON, Oct. 30—Gordon Lee, chief of the automotive division of the Bureau of Foreign and Domestic Commerce, announces that the Continental Motors Corp. of Detroit will co-operate with the Department of Commerce in the production of a motion picture film covering the complete mechanical functions of an internal combustion engine. This work will be under the direction of G. W. Yeoman, vice-president of Continental, co-operating with M. F. Leopold, the government motion picture engineer.

Government officials state that the Automotive Library consists now of educational films embracing representation of six-cylinder motor cars of two distinct types and an eight-cylinder "V" type motor car, which, in conjunction with this new film, will permit the government to promote American automotive interests effectively in every country of the world. More than 400 requests have been received from various foreign countries for these films to be shown in universities and educational institutions, motor trade associations, etc.

Rubay Will Market Line of Town Cars

Follows European Model in Design—Chassis Adapted to American Conditions

CLEVELAND, Nov. 1—The Rubay Co. is preparing to introduce a line of small town cars to bear the name Leon Rubay. They are intended especially for city use and are said to follow closely the design of cars used for similar purposes in Europe. The chassis is a French design, but adapted to American conditions by American engineers.

The chassis has a 118 in. wheelbase intended to facilitate maneuvering in traffic, a small four cylinder, 2¾ x 5¼ in. high speed engine, said to be capable of developing 36 hp. at 3000 r.p.m., single plate clutch running in oil, conventional gearset mounted as a unit with engine, full floating axle with stamped steel housing, four-wheel brakes operated by steel ribbons and an aluminum dash.

Rubay Designed Bodies

Only closed bodies of Rubay design and construction will be used. These will include a four-passenger coupé, six-passenger sedan, berlin, cabriolet and brougham.

The engine is a clean design, has cylinders with ⅞ in. offset, separate head with integral manifolds, overhead valves and camshaft driven by helical bevel gears and a concealed water pump. Air supply for the Stromberg carburetor is drawn over the exhaust pipe and through the cylinder block. This passage communicates with the crankcase so that a slight vacuum in the latter tends to prevent oil leakage.

The cylinder barrels extend well into the case, and the cylinders are attached with internal studs so that no external connections appear. Lubrication is full force feed through hollow crankshaft and camshaft. The crankshaft of chrome nickel steel is carried on three main bearings. Connecting rods are of forged Lynite, pistons are cast Lynite, with three concentric rings.

Vacuum Tank in Recess

A vacuum tank is carried in a recess in the aluminum dash. Bosch electric units are employed. Starter and generator are supported beside the gearset, the generator having chain drive with eccentric mounting for adjustment.

Brake drums are of aluminum with steel linings for the expanding, Thermoid-covered aluminum shoes to bear against. Drive and torque are taken by a torque tube. The differential carrier is attached to the rear cover plate. The axle gears give a 5.1 to 1 reduction. Both front and rear wheels are carried on Timken bearings. They are of wood and have Firestone rims.

The front axle is forged from chrome nickel steel. The shafts for operating the front wheel brakes are carried in the channel forming the rear part, the I-section, the cams being in the lower part of the drums. Both sets of brakes are pedal operated, the rear set being also hand operated.

Springs are low and normally flat. A special spring mounting is used, both front and rear. The front end of the front spring is attached to the frame by the conventional eye and bolt. The rear end of the spring is flat and is carried between two hardened rollers mounted in a cast steel spring bracket. The same type of mounting is used for the front end of the rear spring.

It is planned that the new cars will be exhibited for the first time at the New York Salon in December.

Studebaker Adds Coupe to Line of Big Sixes

SOUTH BEND, Nov. 1—The Studebaker Big Six line has been increased by the addition of a 5-passenger coupe which includes such features as nickel plated front and rear bumpers, automatic windshield wiper, rear view morror, Moto-Meter and ornamental radiator cap. The coupe has a two-door body and upholstery is in dark brown velour. Equipment includes heaters, transmission lock, cowl ventilator, automatic windshield regulators, two-piece rain-vision windshield, eight-day clock, and a trunk in the rear.

New Dort Six Followed Along Lines of "Four"

FLINT, MICH., Nov. 1—The new six-cylinder model Dort follows fundamentally the lines of the four. The wheel base is longer, being 115 in. The engine is a Falls model T-8000 with modifications incorporated by the chief engineer of the Dort Motor Car Co. The outstanding features are a built-in pressure feed oiling system and use of silcrome valves.

The drive is similar in construction to the four cylinder model. Wheels are all 31 x 4 with cord tire equipment. Six body styles are offered.

NEW APPERSON SIX

KOKOMO, IND., Nov. 1—The new smaller Apperson six, which will make its appearance during the winter, will list between $1,200 and $1,400, the definite price not having been determined. It will have 122 or 124 in. wheelbase, and the engine will be high powered.

STARTER MAKER ENJOINED

CHICAGO, Nov. 1—In a suit brought by the Connecticut Telephone & Electric Co. of Meriden, Conn., the United States District Court has granted an injunction against the Illinois Starter & Magneto Corp., restraining it from "selling, advertising or offering for sale parts intended as replacements" on Connecticut igniters. This covers breaker plates, breaker arms and springs therefor. The decree was issued by Judge Carpenter.

Coal is Responsible for Greater Output

October Production Meets Demand That September Could Not Take Care of

NEW YORK, Nov. 1—Analyzing the report of the traffic committee, which showed an October production of approximately 244,000, directors of the National Automobile Chamber of Commerce at their monthly meeting to-day decided that the increase was brought about by the increased availability of coal, which was relatively scarce in September. The production in October meets a number of unfilled orders, as well as supplying October sales, which were about 25 per cent under September in most sections of the country. The fall months, though seasonally fewer than the summer, are expected to register the best autumn trade on record.

It was reported that the demand for cars is keeping up despite the season of the year, and that cars are moving at such a rate that dealers have not begun to think of stocking up. It will be another month, at least, before they will begin accumulating a surplus of stock, it is thought.

Activity Explained

This continued activity is explained in several ways. In the first place the continued demand for closed cars has kept up the market, the industry as a whole averaging 32 per cent production on closed cars, a growth of at least 10 per cent in the last year. This has been made possible by increased capacity of the body plants. Another explanation is that prospects who had been waiting for lower prices have come into the market because they are convinced that the manufacturers have met their demands for lower lists. Undoubtedly, too, the Ford reduction has been a great incentive to buying.

The truck business, it was reported, shows surprising strength, and the prospects never were better. Buyers are anticipating a shortage of railroad transportation and purchasing trucks accordingly, while the betterment of general business has been another contributing factor to the prosperity of the truck makers. Shortage in freight transportation is maintaining the truck market at the September level, with Massachusetts, Texas, Pennsylvania and Ohio showing increases.

COL. CLIFTON DECORATED

BUFFALO, Nov. 1—Col. Charles Clifton, head of the Pierce-Arrow Co. and president of the National Automobile Chamber of Commerce, has been decorated by France with the order of the Legion of Honor for services to France during the war. The formal ceremony took place at a dinner at the Buffalo Club.

Stutz Stockholders Approve Bond Issue

Also Authorize Increasing Capital Stock of Company by 63,000 Shares

NEW YORK, Nov. 1—Stockholders of the Stutz Motor Car Co. of America have authorized the issue of $1,500,000 15 year 7½ per cent convertible sinking fund debentures, of which the company intends soon to issue $1,000,000. Approval was given also to an increase of the authorized capital stock by 63,000 shares, making the total 263,000.

Of the additional stock authorized, 33,000 shares will be set aside to provide for conversion of the bonds, and the remainder will be offered to stockholders at $20 a share in the proportion of 3 new shares for 20 shares of old stock held. The bonds, which will be convertible into stock on the basis of 33 shares for each $1,000 par value, will also be offered to stockholders for pro-rata subscription.

Both the bond and stock issues have been underwritten. Proceeds will be used to develop and improve the property.

General Tire Expects Doubling of Business

AKRON, Oct. 30—The General Tire & Rubber Co. has announced plans for three new three-story factory buildings which will be installed with new equipment so as practically to double the company's present tire capacity of 2500 tires daily.

"We now are behind on October deliveries and expect to sell twice as many tires next year as this year," announced Vice-President William O'Neil. "The company has just completed a conference of all field representatives and branch managers at which it told them to prepare to handle twice as much general business in 1923 as they are doing this year."

Service Heads Prepare Program for Convention

NEW YORK, Nov. 1—Preparations for the convention of factory service managers of members of the National Automobile Chamber of Commerce, in Chicago, on Nov. 14 and 15, have practically been completed. The sessions will be held in the La Salle Hotel.

Tuesday morning Thomas J. Hays, president of the Chicago Automobile Dealers' Association, will make the address of welcome, and the scheduled talk for the first day will be made by H. J. Leonard, vice-president of the Stephens Motor Car Co. The remainder of the day will be devoted to discussion of selected topics.

On Wednesday the subject to be considered will be automotive service associations, their relations and benefits to the factory, dealer and car owner. One speaker will be selected to talk from each viewpoint. B. B. Bachman, chief engineer of the Autocar Co. and president of the Society of Automotive Engineers, will speak from the viewpoint of the manufacturer.

Aero Club Can Continue Arrangements for Merger

NEW YORK, Nov. 1—Decision against Henry Woodhouse has been made by Superior Court Justice McCook in two actions involving the Aero Club of America. Action brought by the club resulted in a temporary court injunction restraining Woodhouse from representing himself as an officer of the club and from sending mail to members and others as "Chairman of the Administrative Committee."

The court directed Woodhouse to cancel an order given to the Post Office Department concerning club mail and ordered him to return to the club files of papers which he admits taking.

Justice McCook denied Woodhouse's plea for an injunction restraining the present management of the Aero Club from continuing plans to merge the club with the National Aeronautic Association.

Woodhouse has brought action for reinstatement to determine whether he is still a member of the club and has any standing in court.

ENRICHT CONVICTED

NEW YORK, Nov. 1—Louis Enricht, the 76-year-old resident of Farmingdale, L. I., who claimed to have invented a process of making cheap gasoline from peat, has been convicted of larceny by a Long Island court on complaint of a Jamaica garage owner who had invested $3,000 in the Enricht Peat Corp. and who claimed Enricht made false representations. According to a representative of the United States Patent Office, no patent ever had been issued for the making of gasoline from peat, and it was also declared the method which Enricht claimed was impracticable.

TORBENSEN PROTECTED

NEW YORK, Nov. 1—The Torbensen Axle Co. of Cleveland has obtained a perpetual injunction in the United States District Court of New York, restraining the United Gear Manufacturers Corp. of New York City from using the Torbensen name in selling parts for the Torbensen axle when those individual parts are not made by the Torbensen company.

HENDEE ELECTS OFFICERS

SPRINGFIELD, MASS., Nov. 1—At the annual meeting of the Hendee Manufacturing Co. here, these officers were elected: President, Henry H. Skinner; vice-president, William E. Gilbert; vice-president and general manager, Frank J. Weschler; secretary, Parmly Hanford. Lindsley Hopkins, banker, Atlanta, was made a new member of the board of directors, the rest of the board being re-elected.

Relief from Rubber Restriction Sought

Association Cables to London—Committee Headed by Hotchkiss Is Named

(*Continued from page 895*)

ard production the actual output of each producer during the 12 months—Nov. 1, 1919, to Oct. 31, 1920—amplified in accordance with certain rules adopted. In lieu of existing export duties, a minimum export duty is to be levied on that percentage of standard production which is allowed to be exported under the plan at the minimum rate of duty, the committee recommending that this minimum be fixed at the lowest possible rate, not to exceed one penny per pound.

If a producer desires to export a quantity greater than that allowed to be exported at the minimum rate of duty he will be called upon to pay an export duty on his total export during the period of 12 months, ranging from 4 to 12 pence per pound. The percentage exportable at the minimum rate is 60.

Akron Non-Committal

AKRON, Oct. 30—Although Akron tire manufacturers admit that the steadily rising quotations on rubber and cotton make an increase in tire prices a logical consequence, few, if any, will commit themselves as to the probabilities of their companies boosting prices in the immediate future.

At least one of the larger companies in the Akron district, however, is known to have new price schedules, showing a substantial increase, ready for announcement Nov. 15. Officials of other companies say their present policy is to stand pat on present prices as long as possible and until spring, if it can be managed. The company planning to increase prices is one of those which undercut all competitors during the tire price slashing war of a few months ago, and which placed its standard tires in perhaps the lowest price level.

Watchful Waiting Policy

However, the situation in Akron, based upon past experience, cannot be properly analyzed no matter what the manufacturers say. The history of the tire industry shows that they may say they plan no increases in prices and the next minute boost them 10 or 20 per cent. Smaller companies usually pursue a watchful waiting policy, letting the larger concerns take the first steps toward price readjustment.

It is confidentially believed though, despite this uncertainty of action, that manufacturers will be forced, by the upward trend of rubber and cotton costs, to revamp their price schedules during the ensuing month, and men close to the industry say they would not be surprised to see price increases announced before Dec. 1.

FINANCIAL NOTES

Allan-Diffenbaugh Wrench & Tool Co., Baraboo, Wis., will increase its capitalization in order to handle the larger volume of business offered it, which the existing facilities are inadequate to accommodate. Offers have been received from a number of other cities for the relocation of the industry, and this will be done if local capital does not take sufficient interest in the new stock issue to enable the concern to finance its development.

Reynolds Spring Co. reports that in the quarter ended Sept. 30 it earned from its spring business alone $123,000, after depreciation but before taxes. After allowing for three months' proportion of preferred dividends, the company shows a balance of $188,839, or $1.61 a share on 73,500 shares of common, a rate of $6.44 a year. Earnings on the common for the first six months were at the annual rate of $3 a share.

Yellow Cab Manufacturing Co. reports a profit of $819,626 for the three months ending Sept. 30 after provisions for taxes and employes' profit sharing. Net for the nine months was at a rate of approximately $13.75 on 200,000 shares class B outstanding after the class A dividend. Working hours have been lengthened one hour. Cab factory and general plant capacity have been increased 50 per cent.

Hood Rubber Products Co. reports sales approximating $18,100,000 for the first nine months of 1922, as compared with $17,218,416 for the corresponding period of 1921. Of this, sales of tires were about 25 per cent in value. Bank loans as of Sept. 30 were $2,442,000, compared with $3,585,000 on March 31. It is expected these will be reduced to about $1,000,000 by March 31, 1923.

Hayes Wheel Co. has declared a dividend of 75 cents a share, payable Dec. 15 to stock of record Nov. 30. Heretofore the company has been paying dividends at the rate of 50 cents a share quarterly. The business of the company has been satisfactory and indications point toward net earnings well over $6 a share before Federal taxes.

Goodyear Tire & Rubber Co. of Canada has resumed regular quarterly dividends of 1¾ per cent on the preferred stock and 1½ per cent on the prior preferred stock together with accrued dividends on the latter, cumulative since Jan. 1, 1922. Payment will be made Jan. 10 to stock of record Dec. 31.

Edward G. Budd Manufacturing Co. stockholders will meet Dec. 20 to approve an increase in the capital to $14,498,000. Capitalization now is $8,750,000. The new stock is to be preferred. The concern is a manufacturer of pressed steel bodies and the Budd Wheel Co. is affiliated with it.

Campbell, Wyant & Cannon Foundry Co., Muskegon, has sold to the Continental and Commercial Trust & Savings bank of Chicago, a bond issue, $850,000 of 6½s. The funds will be used to take up present outstanding bonds, also to erect a large addition to the company's plant.

Gray & Davis, Inc., has declared an initial quarterly dividend of $2 per share on the new preferred stock, payable Nov. 1 to stock of record Oct. 27.

THREE NEW SALON EXHIBITORS

NEW YORK, Nov. 1—De Dion Bouton and Voisin of France and the Hispano-Suiza of Spain have been added to the list of exhibitors in the Automobile Salon to be held at the Hotel Commodore, this city, Dec. 3-9, and at the Hotel Drake, in Chicago, Jan. 27 to Feb. 3. This will mark the debut of the Voisin in this country and the return of De Dion Bouton, which has been out of the American market for six years.

John H. Stelling, formerly sales manager of the De Dion Bouton selling branch in New York, has become importer of both the DeDion and the Voisin, while Hispano-Suiza has formed an American connection with the Hispano-Suiza Motors, Inc., of which A. B. Caragol is president and Alfred E. Manning, sales director.

Seaman Body to Duplicate Present Milwaukee Plant

MILWAUKEE, Oct. 30—Issuance of a building permit reveals that the addition for which ground has been broken by the Seaman Body Corp., Milwaukee, will exactly duplicate the original factory erected about two years ago. The new building will be 225 x 425 ft., five stories and basement and the cost, without equipment, is given as $300,000. The original structure cost in excess of $500,000.

The Seaman company, formerly the W. S. Seaman Co., is a pioneer manufacturer of closed bodies and is now producing also open bodies. Charles W. Nash is a large stockholder. The additional facilities are required by the increased demands for bodies by the Nash six works at Kenosha, the Nash four works in Milwaukee, and the LaFayette plant, now being erected adjacent to the Nash four works and scheduled to be completed about Dec. 1 or Jan. 1, when the LaFayette operation will be transferred in its entirety from Indianapolis to Milwaukee.

Deficit of Pierce-Arrow Is Less Than Last Year

BUFFALO, Nov. 1—Pierce-Arrow Motor Car Co. reports an operating income of $11,209 for the three months ending Sept. 30. Interest, taxes and other charges were $351,178, which left a deficit of $339,969 as against a deficit of $2,109,999 in the same period last year.

Deficit for the nine months ending Sept. 30, 1922, amounted to $376,961, while in the same period of last year a deficit of $4,000,051 was reported.

RHODE ADDRESSES S. A. E.

BOSTON, Oct. 27—O. J. Rhode, general manager of the Wire Wheel Corp. of Detroit, was the speaker at the fall meeting of the New England section of the S. A. E., held to-night at the Engineers Club. He gave an account of the development of motor car wheels, tracing their history from the wood to the wire and disc types, and predicted wire and disc wheels would gradually supersede the wood.

His talk was illustrated by lantern slides which showed the process of making both disc and wire wheels. A general discussion followed the address.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Last week rates for call loans ranged between 4 per cent and 6 per cent, as compared with 4½ per cent to 6 per cent in the preceding week. For fixed date maturities little change was noted, and trading continued without special features. Quotations remained the same as in the previous week, 4¾ per cent for 60 days' maturities, 4¾ to 5 per cent for 90 days, 4, 5 and 6 months. The prime commercial paper rate continued to be quoted at 4¼ per cent to 4½ per cent.

The volume of business for the week ending Oct. 26, as indicated by bank clearings in the leading cities of the United States, totaled $7,689,381,000, which was a loss of 13.7 per cent from the preceding week, but a gain of 28.3 per cent over the corresponding week last year.

Revenue freight car loadings for the week ending October 14 were 983,470, a gain of 1.6 per cent over the amount loaded in the preceding week, 8 per cent over the corresponding week of 1921, but 3.4 per cent less than for the corresponding week in 1920, which year marked the peak total in the history of car loadings. The biggest increase shown during the week of October 14 was in coal, 7614 more cars having been loaded.

Soft coal production for the week of Oct. 21 totaled 10,200,000 tons. This was the first time since the week of April 1, just before the strike, that soft coal output has passed the 10,000,000-ton mark.

In sharp contrast to the relatively small total for the month of August, new capital flotations for September were far in excess of any September total in recent years. New issues to the amount of $565,824,897 were brought out in September, as compared with $199,211,136 in August, $381,609,071 in July and $422,093,857 in September, 1921. Two issues which were important factors in swelling the numbers for September were the offerings of new stock of the American Telephone & Telegraph Co. to the amount of $115,000,000 and the Federal Land Bank Farm Bonds to the amount of $75,000,000.

The Federal Reserve statement as of Oct. 25, 1922, showed a decrease of $1,730,000 in gold reserves and $2,279,000 in total reserves. Bills on hand declined to $40,824,000 and total earning assets $79,089,000. Deposits showed a decrease of $114,337,000, and Federal Reserve notes in circulation declined $16,901,000.

BUICK'S BEST MONTH

DETROIT, Nov. 1—October was the best month in the history of the Buick Motor Co., production reaching 17,666. September was the best previous month with 16,482. Shipping records were made during the month as follows: Oct. 12, 775; Oct. 25, 910; Oct. 26, 973; and Oct. 30, 1029.

Dealers State Cars Not Being Stocked

Shows That Big Production Is Being Consumed—Northwest Slightly Behind

(*Continued from page* 901)

country roads and also because of the farmer's tendency to buy transportation for needs as low priced as possible and yet have quality equipment.

St. Louis

ST. LOUIS, Nov. 1—Several dealers have stored open cars within the past few weeks due to a slump in sales recently. Very few have any larger number of closed cars on hand. Most dealers are behind on closed car deliveries, this being especially true on new models recently announced.

Cleveland

CLEVELAND, Nov. 1—Motor car dealers here are not stocking open cars. They are carrying on an extensive campaign for the sale of closed cars and are doing well.

Buffalo

BUFFALO, Nov. 2—Buffalo dealers are stocking cars, including open models, moderately. They are not filling warehouses with them as in former years, but are taking reasonable precautions against being caught short when next year's business opens up. The foregoing applies to dealers handling makes of cars most in demand.

Philadelphia

PHILADELPHIA, Nov. 1 — Inquiry shows that big distributors and dealers are not stocking up on open models. They are sold up and the question is one of deliveries. The tendency is to order more closed models than open ones.

Milwaukee

MILWAUKEE, Nov. 1 — Milwaukee dealers say that there is nothing unusual in the manner of stocking cars nor the quantity on hand. They are proceeding as usual at this season.

Minneapolis

MINNEAPOLIS, Nov. 1—Dealers of the Northwest are stocking cars because they find the prospects are not flush with money to buy. Grain is moving slowly owing to the railroad and boat situation. Elevators are full of grain waiting to move.

DURANT EMPLOYS 26,876

NEW YORK, Oct. 30—Durant activities, that is those concerns directly identified with the big corporation and with companies manufacturing parts for it, now employ 26,876 persons in all their plants, which are spread through 25 cities. Of this total 13,876 are working on materials, 2500 in sales and distribution and 7500 in sales and service. It is believed that this total will be doubled by February, 1923, and that if present schedules are carried out there will be 100,000 by June, 1923.

INDUSTRIAL NOTES

Decker-Mitchell Engineering Co. of Cleveland, which was organized last summer to manufacture special production machinery and tools, has taken over the plant and equipment formerly owned by the Cleveland Precision Tool Co. In addition to its regular line it is turning out hardened and ground parts and screw machine products for the motor car trade. The company is making extensive plans for expansion to take care of increased volume of business in the manufacture of piston pins, hardened and ground bushings, and front axle king pins. It is maintaining a designing and engineering department, for the design of special tools and fixtures for its customers.

American Turn Auto Corp., recently incorporated in Delaware, has moved its plant from Iowa to Bucyrus, where it will continue the manufacture of a device for the turning over of automobiles to enable workmen to get underneath for repairs and overhauling. The distributing company has located at 40 East Gay Street, Columbus, with H. M. Bennett as president and general manager.

Hayes Wheel Co. of Canada, Ltd., is equipping the factory of General Forgings & Stampings, Ltd., at Meriton, which was purchased recently for the production of outside automobile rims. The metal stamping equipment will be transferred to the forging company's plant at Chatham, but the forge plant at Meriton will not be disturbed.

Cadillac Printing Co. has taken over the Verschoor Service for the production of technical catalogs, parts lists, instruction books, etc. R. A. Leavell, for several years connected with the Verschoor Service, remains as manager of the department. C. A. Verschoor, founder of the business, is retaining an interest in the company.

Presto-O-Lite Co., Inc. has announced the removal of its main office from New York to Indianapolis. This action is taken in order to bring sales, service and production into close relation at the most central point of distribution east of the Rocky Mountains.

WILLYS DIVIDEND

TOLEDO, Nov. 1—The Federal Court here will be asked to grant authority to-morrow for distribution of a 40 per cent dividend on the approved claims of creditors of the Willys Corp. Distributions will amount to approximately $6,400,000 and will be made Saturday, according to the present plans. Receivers have in Toledo banks $5,000,000 and have received from the New Jersey district $1,750,000 and from the southern district of New York about $400,000. Out of a total of $18,000,000 of claims, approximately $16,000,000 have been approved to date.

METAL MARKETS

From day to day the markets for pig iron and steel products are shedding more and more of what artificiality still adheres to them as an heirloom of the recent bulge in prices. Pig iron prices are as vulnerable as they were two years ago when, following a short-lived $50 market, decline followed decline until three months later $35 was chalked up and in another three months $25 had become the market's average. In the present movement pig iron prices did not soar to the absurd levels of two years ago and the decline will be proportionately less incisive. Moreover, the coal and transportation difficulties furnished a more substantial basis for the recent flurry than was the case two years ago.

At the same time, the fact remains that in a rising pig iron market there is always lacking that element of restraint which makes for a greater measure of stability in the steel market. When those on the selling side of market, in a period when they have things practically their own way, permit values to climb to abnormal heights, they have no cause for complaint when the market turns against them and buyers fail to give it any support until a condition bordering on demoralization has set in. The declines so far registered fail to attract pig iron consumers who are waiting for much lower levels before they will commit themselves for more than immediate requirements. In the steel market premiums on rush deliveries have vanished and consumers, no matter how urgent their wants may be, experience no difficulty in finding producers ready to accommodate them.

Of some interest to automotive steel consumers just now is the hoary conundrum of whether the egg came before the hen or vice versa, only that the problem which confronts them is whether the sheet bar market makes the sheet market or the sheet market that for sheet bars. Representative tonnages of sheets bars have recently been sold to sheet rollers. In some of these sales prices lower than $40 a ton prevailed. Some say that the considerably easier tone of the sheet market which has been in evidence for about a fortnight was directly responsible for the recession in sheet bar prices. Others contend that the reason for the more moderate price views of rollers is to be sought in the turn in the sheet bar market in the latters' favor during the last fortnight. Undoubtedly considerable of the heavy tonnage of sheet bars recently taken on by rollers will go into sheets booked at lower prices than those in vogue at the culmination of the recent upward movement.

After all the why of the easier conditions in the sheet bar and sheet markets matters little. The all important fact is that they are easier. It may be said that the $3 average differential per ton in the quotations of the chief interest and those of the independents has become nominal, so far as first quarter 1923 business is concerned.

Pig Iron. — Demand from automotive foundries is more or less of retail proportions and chiefly for malleable. Representative buying is in abeyance until prices have become more settled.

Aluminum.—Market conditions are entirely unaltered. Sheets continue in light supply. Odd lots of imported metal are absorbed at prices very close to those of the domestic producer.

Copper.—The market continues weak and domestic consumers show no interest at all.

Calendar

SHOWS

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8 - 13 — New York, Second National Automobile Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Nov. 3 - 11 — London (Olympia), Automobile Show.

Nov. 9 - 19 — Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show, British Cycle Motors, The Tower, Warwick Road, Coventry.

Dec. 15 - Jan. 2 — Paris, Aeronautical Salon, Grand Palace, Chambre Syndicale des Industries Aeronautiques, 9 Rue Anatole de la Forge.

Jan. 13-24 — Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

May - July, 1923 — Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

CONVENTIONS

Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

Nov. 14 - 15 — Chicago, Semi-Annual Convention, Factory Service Managers, National Automobile Chamber of Commerce, La Salle Hotel.

Jan. 15-19—Chicago, Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show.

Jan. 29 - 31 — Chicago, Annual Meeting, Automobile Electric Association, Congress Hotel.

S. A. E. MEETINGS

Metropolitan Section

Nov. 16 — Speaker, A. L. McNurty, Consulting Engineer, Connecticut State Motor Vehicle Commission; Subject, Regulations Governing the Use of Rural Highways.

Dec. 14 — Speaker, Charles P. Grimes, Research Engineer, H. H. Franklin Manufacturing Co.; Subject, Air Cooling in Automotive Engines.

March 15—Speaker, William P. Kennedy, President, Kennedy Engineering Corp.; Subject, Trolley Buses and Flexible Vehicles for Street Railway Service.

April 19—Speaker, Edw. E. La Schum, General Superintendent, Motor Vehicle Equipment, American Railway Express Co.; Subject, Engineering Features of Fleet Operation.

May 17—Speaker, F. P. Gilligan, Secretary, Henry Souther Engineering Co., Subject, Metallic Materials for Automotive Work.

Other Meetings

Jan. 9 - 12 — New York, Annual Meeting.

Jan. 31 — Chicago Meeting and Dinner of the Society at the Congress Hotel.

Shuler Axle Reorganized with Ample Cash Sources

LOUISVILLE, Oct. 30—The reorganization of the Shuler Axle Co. has been completed. The refinancing has been accomplished, it is announced, and ample cash resources are said to be available to insure the development of the company.

The personnel of the company has been rounded out by the appointment of W. E. Dugan as vice-president and general manager, and the re-appointment of F. A. Shuler as director of engineering and manufacturing. Previous to accepting the appointment as a Shuler executive, Dugan was manager of the Cincinnati axle plant of the Standard Parts Co. During his 18 years' experience in the industry, he has served also as factory manager for the U. S. Motor Truck Co. and for the Selden Motor Vehicle Co.

The Shuler factory is rapidly being placed in full production on a complete line of front axles for motor coaches, trucks, tractors and trailers. A feature of the lines is the Shuler wheel brakes, a mechanism permitting simultaneous braking on all four wheels. Patents on this device were granted during the past summer.

Osaka, Japan, Decides to Start Bus Service

LOS ANGELES, Nov. 1—Information received by motor truck manufacturers here from Osaka, Japan, carries details of the decision of the municipal authorities of that city to inaugurate a system of bus transportation, commencing with twenty buses and later expanding to possibly fifty. The announcement is considered especially significant in view of the remarkable progress being made in swinging Japan away from antiquated methods of transportation.

The bodies of the Osaka city buses will be of the single-deck type, seating 16 passengers, with a permanent roof. Some form of collapsible side-curtains with celluloid windows will probably be used instead of the usual rigid frame construction with glass windows. The chassis will be some standard 1½-2 ton type, mounted on pneumatic tires and with full electric equipment.

The inadequacy of the present railway system in Osaka, as in other cities in Japan, has led the municipal assembly to seek some means of relieving the traffic congestion which is growing worse from year to year. Normally 650,000 persons a day are carried on the present railway lines, and when there is any particular attraction in the city, the number of passengers carried often exceeds 1,000,000.

Present plans call for the inauguration of the service on April 1, 1923.

Commercial Vehicles Show Improvement in Columbus

COLUMBUS, Nov. 1—There has been a marked improvement in the demand for trucks and commercial vehicles of all kinds in Columbus during the past few weeks. Dealers in trucks are united in saying that there is a considerable improvement in business conditions generally and that inquiries for all types of trucks are much more numerous. Another feature is the fact that those making the inquiries are generally bonafide prospects and that sales are more frequent than they were formerly.

While business is running largely to the lighter style of vehicles such as delivery types, still there is a good increase in the demand for the heavy trucks. This is apparent with the dealers of the three- and five-ton varieties. Haulage companies are now increasing their equipment while wholesale grocers, commission men and building supply people are also buying heavy trucks. The tone of the trade is good and dealers anticipate a sustained demand during the early part of the winter, at least.

Hill Wins 100 Mile Race on Speedway at Berkeley

BERKELEY, CAL., Oct. 30—Bennett Hill and his Miller-motored racer won the 100 mile race here Sunday in 52 min., 38.4 sec., an average of 114½ m.p.h. Frank Elliott was second, a quarter of a mile behind the winner. Jimmy Murphy won third from Harry Hartz by an eyelash.

Hill took the lead at the start and was never headed, driving through without a pit stop and coming in on ragged tires rather than risk losing the race to Elliott by stopping to change them.

This was the last race of the season on this track, the next event on the coast schedule being the Thanksgiving Day races at Los Angeles. To-day's races were preceded by motorcycle sprint races.

The results of the motorcycle races follow:—10 mile, won by Ralph Hepburn; Jim Davis, second, Ray Weishaar, third; time, 5 min., 42 sec. Twenty miles, won by Ray Weishaar; T. Terry, second; A. R. Sarkesian, third; time, 11 min., 48 sec.

AUTO-LITE EXPANDING

FOSTORIA, OHIO, Nov. 1—Addition to the local plant of the Electric Auto-Lite Co. is under way. A large three-story brick building, formerly used by the Allen Motor Co., is being rebuilt on the interior. The second floor of this building will be used for the offices. The heavier machinery of the company will be installed on the first floor. At least four departments will be added when the building is ready.

ANOTHER GASOLINE CUT

CHICAGO, Oct. 31—Another cent was taken from the price of gasoline to-day by the Standard Oil Co. of Indiana. The service station price in Chicago is now 20 cents a gallon, and the tank wagon price is 18 cents.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

VOL. XLVII NEW YORK—THURSDAY, NOVEMBER 9, 1922 No. 19

Trend Toward Smaller Models Feature of British Show

Noticeable increase in number of models and in four-cylinder engines of less than 120 cu. in. displacement. One maker has twelve chassis types and fifty-five optional body models. Low attendance on first two days. Little actual business reported.

By M. W. Bourdon

LONDON, Nov. 3 (By cable).

THE outstanding feature of the Sixteenth Annual London Motor Car Show, which was opened to the public yesterday, is the record number of new models with four-cylinder engines under 120 cu. in. displacement, with four-passenger bodies, and a selling price between £250 and £400. These represent a continued endeavor to secure lower operating costs through the reduction of engine size together with higher engine efficiency. While the general trend, as last year, continues towards smaller engines, there also exists a tendency to increase the engine dimensions of four-passenger light cars.

Other features observable include the following:

1. A number of makers hitherto specializing on large cars who are introducing smaller models.
2. A marked increase in the number of overhead valve engines, all those of British manufacture having push rod valve actuation.
3. A number of new small six-cylinder models of 80 to 200 cu. in. piston displacement.
4. The reluctance shown by British makers to adopt front wheel brakes; although Austin has them on a miniature "7" described in AUTOMOTIVE INDUSTRIES earlier this year and Sunbeam offers them on its six "24" at an extra charge of £125, no other maker shows them or will fit them.

New British designs generally bear evidence that more consideration has been given to production costs without, however, lowering the standard of body work, of finish or quality of the accessories. In response to a buyers' demand for better weather protection, framed, detachable side panels for open cars are now almost universally supplied. Some of these side panels have elaborate framing and attachments. On one car the panels are made of glass while on all others they are of celluloid.

IN the majority of cases these side panels must add appreciably to the manufacturing costs. Many are usable when the top is folded, the rear panels then forming a V fronted shield for the rear passengers. Most makers are standardizing folding top sedans and some the fixed type of sedan. Even for light cars these closed bodies are offered at prices which usually range more than £100 above those of the open type, but the latter still form about 95 per cent of the total output. One fixed top sedan for light cars has a shell body, steel tube framing, all seats detachable, a central sliding door with frameless drop windows and no double paneling. This design has good possibilities as a light weight low-priced job.



Sloping front sedan on a 40-50 hp. Napier exhibited by a body builder at Olympia



Arrol Johnston sedan with V-front screen; has rear door on right hand side and sliding and tip-up front seats

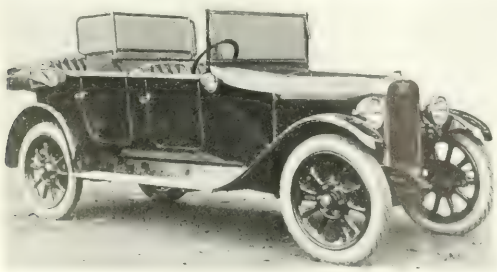
The extensions to Olympia not being completed, the show is again divided between that building and the White City, a single admission fee being charged and free transportation furnished. Accessories, tires and cars of all sizes and nationalities are exhibited at both sections of the show.

THE public again gives preference to Olympia, however, placing exhibitors at the White City under a disadvantage. Thirty of these latter exhibitors, including Dodge, Hupp and Paige, issued a combined appeal asking the press to emphasize the equal importance of their section of the show.

Besides forty-three British makes there are six French, five American (Case, King, Moon, Durant and Packard), four Italian and one Belgian makes on exhibit at the White City. The more fortunate American makes to whom the ballot gave space at Olympia include Buick, Chevrolet, Oakland, Cadillac, Chandler, Cleveland, Gardner, Essex, Hudson and Overland. The show is thoroughly international, except for the fact that the ban on late enemy productions is continued and that there are no representatives of the Dutch and Swiss industries.

Increase in Number of Exhibitors

A total of 159 different makes of cars are being shown, which is an increase of four over last year. This list comprises ninety-six British, twenty-four French, eighteen American, eight Italian and three Belgian



Austin Twelve with standard four-passenger body and normal screen equipment

names. Including the accessory exhibits there is a total of 555 stands, as compared with 520 at last year's show. On 288 stands, including fifty-one of body builders, there are exhibited 758 cars, an increase of seventy-eight over last year's show. This increase has been made possible more by the reduction in the average size of car than by any increase in the floor space. The total includes 109 bare chassis, the majority of them highly finished.

On Friday and on Saturday morning the attendance was materially below that of the opening days last year. No official figures are as yet available, but it is estimated that the reduction in attendance was from 30 to 40 per cent, which is ascribed in part to the imminence of the parliamentary elections. There was no overcrowding until the arrival of the usual Saturday afternoon sightseers, who entered at the reduced admission fee of 1 shilling. Exhibitors, with few exceptions, report the business done so far to be disappointing.

The most popular type of car for 1923 will be a four-cylinder four-passenger model of 90-120 cu. in. piston displacement, selling at between £300 and £400. The corresponding six-cylinder cars are mostly new models and are not attracting much attention, buyers willing to pay the price usually asked for these models, usually preferring the bigger fours. There is a fair demand for two-passenger fours at from £200 to £250. It is still too early to fully judge the 1923 prospects, the only certainty being that there will be unprecedented competition in nearly every field.

The president of the Society of Motor Manufacturers and Trades at the inaugural function was guardedly optimistic, but deplored the difficulty in connection with export business while the present British motor taxation system continued. He asserted that this system, which penalizes large bore, moderate speed engines, encourages a home demand for car types that are not popular overseas. The result is that output is restricted, which necessitates comparatively high prices.

Prices generally show a considerable reduction, although the drop is less on a percentage basis than at the 1921 show. The largest proportional price reductions since last year is shown by the American cars, averaging 20 per cent; the Continental reductions average 12 per cent, as compared with 23 per cent last year, and British reductions 15 per cent as compared with 17 per cent last year. The largest British reductions are on light cars and average 20 per cent.

Price Reductions General

Morris, who now has the largest output of any British maker, and is planning a production of 15,000 cars for next year, caused a stir just before the show by announcing a second cut within six weeks, the two cuts combined amounting to 24 per cent. He now offers a four-passenger "twelve" of 102 in. wheelbase at £255, a figure which is unapproached by any other British make of similar specifications. The largest actual reduction since the last show is on the Napier six, from £2,100 to £1,750, while the biggest single cut occurred on the Vauxhall "twenty-three," from £1,150 to £895. The Rolls-Royce "fifty" chassis at £1,850, the Austin "twenty", five-passenger model, at £695, and the two

Daimlers are the only British cars that are not reduced in price. The Cubitt "sixteen," of 170 cu. in. piston displacement, again stands alone on a price basis among full sized British five-passenger cars, having reduced 24 per cent. It now sells at £360. This compares with the Essex at £490, Maxwell at £360 and Dodge at £350, which latter cars carry a 30 per cent import duty. Cubitt's nearest British competitor sells at £475, but this type is not so popular as the smaller fours of even the same or a greater price. Only four British makers, including Napier and Lanchester, are now specializing on the luxury type. Rolls-Royce is not showing the new "twenty," fearing that the stand would be monopolized by curiosity seekers who would crowd off legitimate prospects for both the "fifty" and "twenty."

More Chassis Types Offered

British makers with few exceptions are increasing the number of their chassis models and body types, often in an endeavor to broaden their appeal in every direction. Daimlers are a conspicuous example. They are introducing two small sizes, one of 87 cu. in. capacity and selling at £550 for the chassis, the other of 132 cu. in. capacity and selling at £625, both with four speed gearsets amidships, following the practice of the three larger existing six-cylinder models. In addition they are making the 87 cu. in. six with a three-speed unit power plant at £450 for the chassis, and also a new four of the same dimensions as the 132 cu. in. six at £325 for the chassis, and a two-cylinder air-cooled "ten" at £230 for the complete car with two-passenger body. All except the last-mentioned models have Knight engines. On some models two chassis lengths are being offered. This results in a total of twelve types with fifty-five optional bodies.

Wolseley furnishes another prominent example of this tendency, adding a four-cylinder fourteen to a range already comprising five distinct chassis from a two-cylinder "seven" to a six-cylinder "twenty-four," with optional chassis dimensions in several cases. The new "fourteen" with side valves is a lower priced edition of the existing overhead camshaft model, and sells at £525 as compared with £660, both being four-passenger cars. Many other instances of the same policy could be mentioned, some firms adding both larger and smaller models. The tendency observable immediately after the war to concentrate on one model has been completely abandoned and the other extreme adopted. Many additional models have parts interchangeable with existing types. Sometimes the gearset, axles and steering gears are identical with those of earlier models, whereas the multiple model policy previous to the war usually inferred differences throughout the chassis.

The show is remarkably free from unorthodox designs. The new Lancia is here but there is nothing unusually deserving mention among British productions. The following percentages apply to individual models of all nationalities exhibited. Disregarding two-cylinder models, which show no increase in number or popularity, fours constitute 75 per cent, sixes 19 per cent, eights 5 per cent and twelves 1 per cent of the total, all of these figures being practically the same as last year.

Detachable heads are found on 65 per cent of the models, a gain of 7 per cent. While the use of side valves decreased from 64 to 57 per cent, overhead valves with pushrods increased from 17 to 24 per cent, and overhead camshafts dropped from 12 to 10 per cent. Models with sleeve valve engines increased from 7 to 9 per cent. Pressure lubrication has fallen from 61 to 49 per cent, while the splash-pressure system increased from 16 to 31 per cent, and the simple splash system dropped from 23 to 20 per cent.



Popular type of "sport" body on Alvis Twelve. All aluminum panels, pointed tail curtains, single dickey seat. Engine has thermostatic control for thermosyphon water circulation

Magneto ignition shows a slight decline, from 87 to 84 per cent. Gravity fuel feed increased from 35 to 44 per cent, vacuum feed dropped from 58 to 44 per cent, and pressure fuel feed advanced from 7 to 12 per cent. Aluminum pistons are now used on 48 per cent of the models as compared with 34 per cent last year. Pump circulation is found on 54 per cent of the cars, a drop of 4 per cent. Water temperature control increased from 5 to 9 per cent.

Cone clutches decreased from 46 to 44 per cent, single plate increased from 31 to 34 per cent, while the multiplate type in both the dry and oil operated variety re-



Screen equipment of new Ruston Hornsby car



Upholstered pocket behind driving seat is provided on Sunbeam cars for the detachable framed side panels for use with the folding top



Front view of Sunbeam 24 six with which front brakes are optional at extra cost of £125. Note round section of front axles outside springs to resist braking torque

tained practically the same standing, viz., 14 and 8 per cent. Four speed gear boxes increased from 51 to 55 per cent. Open propeller shafts remain the same at 47 per cent, spiral bevels increased from 67 to 83 per cent, while straight bevels dropped from 20 to 6 per cent, and the worm from 13 to 11 per cent. The practice of placing all brakes on the rear wheels increased from 51 to 60 per cent, while the practice of mounting the brakes on the wheels and the transmission has fallen from 39 to 20 per cent and four-wheel brakes gained from 10 to 14 per cent. Carrying brakes on both the front and rear wheels and also on the transmission appeared for the first time, being represented on 4 per cent of the models, while on 2 per cent there were brakes on the front wheels and on the transmission. Cantilever springs dropped from 24 to 20 per cent and half-elliptic from 59 to 55 per cent, while quarter-elliptics increased from 12 to 19 per cent and three-quarter-elliptics from 5 to 6 per cent. The number of new models of all nationalities exhibited was eighty-five, but of these about 50 per cent are not yet in production.

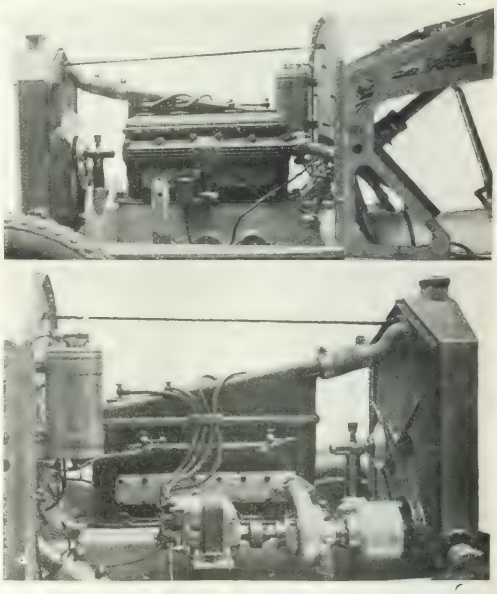
Considering British cars only, there is little change with respect to practice as regards cylinder numbers, the sixes having increased from 13 to 15 per cent and the fours dropped from 77 to 75 per cent, as compared with last year. Overhead valves show an increase of 24 to 33 per cent, including three models having overhead inlet valves only. Of the engines with overhead valves 74 per cent employ long tappet rods, as compared with 56 per cent last year and 43 the year previously. Helical gear drive for the camshaft in the crankcase increased from 22 to 28 per cent, some makers having experienced trouble with chains, which was generally due either to the use of too small a size or to incorrect application. Of the sixes 48 per cent have block cast cylinders as compared with 10 per cent last year, this being largely accounted for by the increase in small sixes.

Air-Cooling in Development Stage

Air cooling has not made its appearance on British fours and sixes, but developments in this direction are expected before the 1923 show opens. Oil cooling is now used by two "twos" and one "four," although the latter is not exhibited. Pump water circulation decreased from 49 to 42 per cent. Cooling control, which was used on three cars only last year, is now seen on thirteen, including two 100 cu. in. "fours," with thermo-syphon circulation. Cellular radiators constitute 75 per cent of the total. Solid white metal casings increased from 30 to 64 per cent, nickeled brass, represented on 32 per cent, lost proportionately, while an aluminum shell is used on one make only. Three cars have a separate radiator shell. Pressure lubrication dropped from 54 to 44 per cent, splash showing an increase of from 21 to 34 per cent, while the full pressure system is used on four cars only. Aluminum pistons increased from 33 to 41 per cent, magneto ignition decreased from 94 to 88 per cent, while battery ignition increased from 6 to 12 per cent. However, several makers are using a magneto after first announcing battery ignition for new models, fearing the prejudice of dealers, who find that a magneto never prevents a sale but a battery does occasionally.

Straight Side Tires Gain in Favor

Vaporization is given more attention but the various systems are quite orthodox. Cone clutches still predominate, but the single plate type increased from 33 to 36 per cent. Unit power plants increased from 27 to 48 per cent. Four speed gearsets increased from 42 to 46 per cent, despite the number of new small cars. Worm drive gained 1 per cent, and spiral bevel drive now stands at 76 per cent. Half-elliptic front and rear springs stand at 43 per cent, the same as in 1921. Quarter-elliptic springs at both ends increased from 20 to 25 per cent, cantilever rear springs dropped from 22 to 15 per cent. Disk wheels dropped from 29 to 27 per cent, pressed steel, hollow spoked wheels increased from 48 to 56 per cent, and wire wheels retained their position with 15 per cent, while the wood wheel is now almost defunct. Straight side tires are beginning to gain favor, being now standard equipment on 6 per cent of British



Two views of Burt & McCollum single sleeve valve engine of British car with Entz magnetic transmission system. Latter is also used on another British production, the Ensign, with an overhead camshaft six-cylinder engine. Engine illustrated is 3⅛ x 5½ in. and four-passenger car sells at £950



New Wolseley Fourteen four-passenger car, chassis of which, excepting engine, follows lines of 15-hp. model. Complete car sells at £525

cars, as compared with 1 per cent last year. The new adherents of this type of tire include such extremes as the Rolls-Royce on the one hand and the Singer, one of the popular British light cars, on the other.

Internal brakes on the rear wheels only increased from 67 to 77 per cent, the remainder of the models having the brakes divided between the wheels and the transmission. Front-wheel brakes are practically non-existent on British cars. Five cars only have external rear brakes. Brake linkage by cables has made still further gains in popularity, the brakes being usually equalized by the cable passing through a transverse shaft which carries curved and grooved end levers. The use of aluminum for axle housing has perceptibly increased. When the aluminum extends beyond the central casing, steel tube liners are almost invariably used, though there are two semi-floating all aluminum axles, one being a double banjo pattern. Double banjo pressed steel axles are fitted on 16 per cent of the British cars.

A classification of 54 new British models gives the following percentages: Four-cylinders, under 60 cu. in. displacement, 2; 60-70 cu. in., 10; 70-90 cu. in., 7; 90-100 cu. in., 6; 100-120 cu. in., 13; 120-150 cu. in., 2; 150-200 cu. in., 2; over 200 cu. in., 3. Six cylinders, 80-90 cu. in., 1; 90-100 cu. in., 2; 100-150 cu. in., 3; 150-200 cu. in., 3. Features of these fifty-four new cars are as follows: Side valves, 25; overhead or push rods, 24; sleeve valve, 5; aluminum pistons, 24; pressure lubrication, 22; gear drive for camshaft, 28; magneto, 44; cone clutch, 33; four speeds, 24 (nine of the latter under 100 cu. in displacement).

Grease gun chassis lubrication and leather spring covers are now items of standard equipment on 25 per cent of all British cars. Rear trunk carriers are found on 15 per cent of all four passenger models and rear folding windshields on six makes. The provision for storing frame side panels on open cars usually comprises a compartment behind the back upholstery hinged at the bottom of the front or rear seat. Other plans include a pocket behind the front seat panel, large door pockets and a drawer under the rear seat. The body types on several makes of light cars with from 60 to 70 cu. in. piston displacement are miniatures of the close coupled four-passenger type, the rear seat having restricted leg room and only accommodating two children or one adult sitting slantwise.

Morris Adds Two New Models

Morris is the only maker of assembled cars worthy of mention, and even his power plants are of his own design, though made at the Hotchkiss English plant at Coventry, which works exclusively for him. Morris is adding two new models, one with a larger four-cylinder engine but otherwise identical with an existing chassis, the respective piston displacements being 94 and 112 cu. in. The other is a six-cylinder model of 141 cu. in. with the same cylinder dimensions as the small four viz., 69 x 102 mm., and the same gearset. All models have three speeds and five-plate clutches with cork inserts. Only the six is furnished in a folding top sedan model, at £575. The new four sells at £380 with a four-passenger body. With optional finish and equipment the small four sells at between £255 and £355.

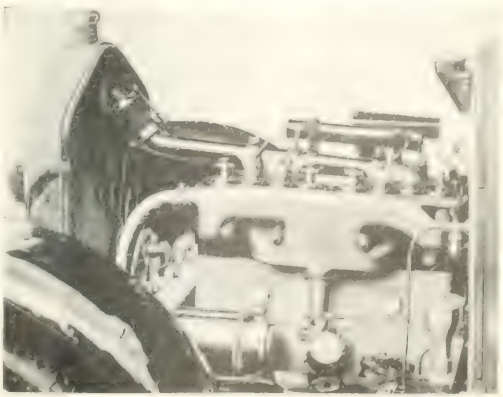
Humbers have adopted new overhead inlet valve engines for their 106 and 170 cu. in. displacement fours and also for the new 60 cu. in. four, claiming running and production advantages as compared with all overhead valves. The new small four is a high grade job and with the close-coupled body sells at £275. The four-passenger 106 cu. in. sells at £525. The five-passenger 170 cu. in., termed a "sixteen" and claimed to develop 50 hp., sells at £750. The Austin four-cylinder "Twelve" of 100 cu. in. piston displacement appears at this show for the first time and sells at £450. It is a four-passenger model and is equipped with a four-speed gearset. This and the Austin "twenty" are now equipped with two spare wheels and tires.

The Standard company exhibits a 56 x 110 mm. eight-cylinder V engine which is so designed that it is interchangeable with a 117 cu. in. displacement four-cylinder engine in the normal "twelve" chassis. Vauxhall has adopted the overhead pushrod engine for a "four-30" design similar to the new "twenty-three" recently described in AUTOMOTIVE INDUSTRIES.

Two British cars are now fitted with the Entz transmission. One has an 80 x 130 mm. four-cylinder single sleeve valve engine and sells at £750 for the chassis, while the other has an overhead camshaft, 102 x 140 mm. engine, which has formerly been used by the same concern (Ensign) with an ordinary transmission. The price is now £1500 for the chassis.

Wolseley

Operating in one of the largest of British automobile plants, the Wolseley Co. has added still further to its range of chassis and body types, increasing the former from five to six. Actually, however, from a production standpoint, the chassis types exceed six in number, for with variations in number of gears, wheelbase and track, and "sporting" models of three sizes, there are eleven chassis from which potential buyers may make a selection; and for these eleven chassis there are 36 different

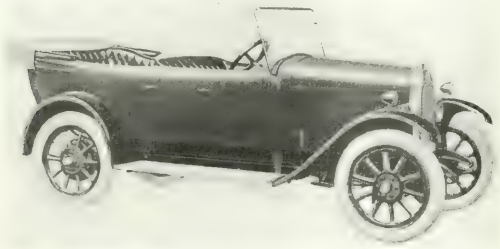


Left side of engine of new Wolseley Fourteen, which has pair-cast cylinders and a bore and stroke of 3⅛ x 5⅛ in.; note integral and exhaust manifolds with front outlet pipe to muffler

bodies available, with 41 different list prices according to optional equipment selected.

The six leading models are the 7-hp., two-cylinder; 10-hp., 14-hp. and 15-hp. fours, and the 20-hp and 24-hp. sixes. Of these the new one is the 14-hp., which has an integral L-head engine with pair-cast cylinders. Its dimensions are $3\frac{1}{8}$ x $5\frac{1}{8}$ in., in which it is identical with the 15-hp., but the latter has block cylinders and an overhead camshaft. The cylinders are the counterpart of those of the 20-hp. Six, and so also are many other engine details.

This new model has been introduced to cope with a demand for what is being termed a "family" car; it has



New 12-14 hp. Crossley four-passenger which is designed to sell at popular price on British standards, viz., £475

larger engine and chassis dimensions than the biggest of the overgrown light cars, but a somewhat lower efficiency and maximum speed than the latter; it is a more "sedate" type, able to maintain its original standard of efficiency with less attention than the high-speed high-efficiency models of similar size, and selling at a lower price with a roomy and comfortable four-passenger body. Thus we have the 15-hp. Wolseley, with its high-efficiency engine, selling at £660, while the 14-hp. is £525; behind the clutch the two chassis are identical and the price difference is due to the simpler engine design and the less elaborate equipment and finish of chassis and body.

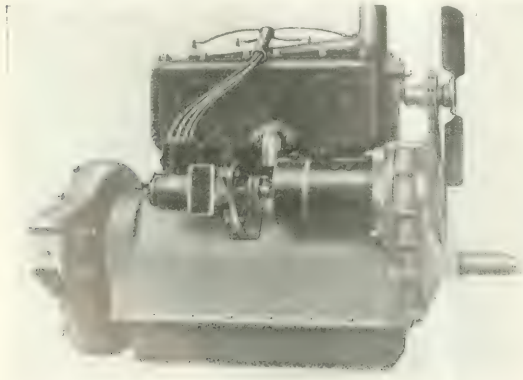
Some details of the specifications are as follows: The crankshaft has three white metal bearings, the camshaft three of bronze. Aluminum pistons are used, with straight sides and three compression rings, the lower of which serves also as a scraper, having its groove beveled off with a series of holes drilled through to the piston interior. The piston pin is fixed in the rod and floats in bronze bushes in the piston bosses. Lubrication is by splash throughout, with oil circulation by a gear type pump at the side of the camshaft with a filter incorporated. Three separate silent chains are used for the distribution, one each for the camshaft, generator and the water pump and magneto driven in tandem. The valves are inclined at a slight angle from the vertical and operate in renewable cast iron guides. The inlet and exhaust manifolds are integral, with a wide contact between them immediately over the vertical pipe from the carbureter flange. The exhaust pipe to the muffler is led away to the front. Fuel feed to the Wolseley carbureter is by gravity, the tank filling spout being under the hood.

The clutch differs from that of all other Wolseleys, except the smallest, in being of the inverted, fabric faced cone variety, with two roller races for the pilot; the driven member is of pressed steel and the driving unit of cast iron and bolted to the rear face of the flywheel. The three-speed gearset with side control is separately mounted on the main frame, while the propeller shaft is of the semi-enclosed type, a short coupling shaft from the gearset, with a fabric joint at the front and a sliding pot joint behind, connecting to the propeller shaft proper in its torque tube. Final drive is by bottom worm of 5.2 to 1 ratio.

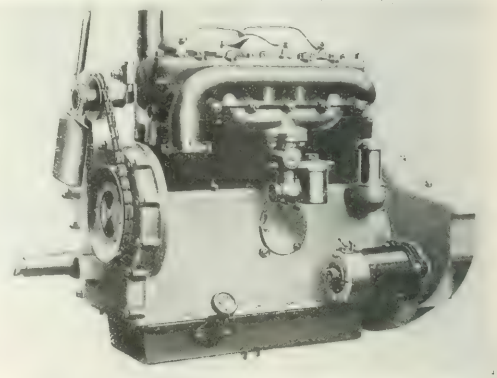
Brakes are all within the rear wheel drums, and consist of four segmental shoes in the same plane in each drum, two operated by pedal and two by lever. Quarter elliptic springs are used back and front, the front ones having a short "safety" leaf. Timken roller bearings are fitted throughout the transmission, except for the gearset pilot, which is a plain bronze bushing. Pressed-steel hollow-spoked wheels are standard, as are 32 x 4 in. Dunlop tires with clincher edges.

Wolseley Prices Compared

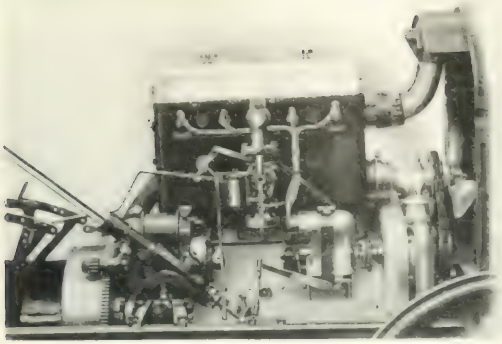
The standard body is a three-door, four-passenger, open type with fabric top and detachable side panels, provision for storing the latter out of use being in the form of a compartment disclosed by pulling forward the top of the back seat upholstery. The wheelbase is 118 in., the track 52 in., and the ground clearance 8 in. The chassis alone weighs 1750 lb. and the complete car 2800 lb. For the chassis without body-work, but including the electric



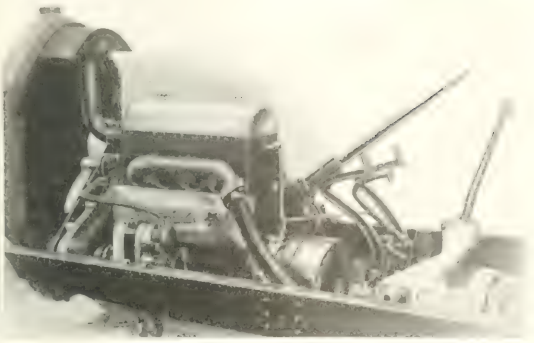
Right side of new 12-14 hp. Crossley engine showing barrel type crankcase with rear end cover integral with clutch housing and bearer arms. Magneto is of new M-L type with separate skew gear driven distributor.



Left side of new 12-14 hp. Crossley engine which has bore and stroke of 80 x 120 mm.



Right side of new 15.9 hp. Humber engine which has overhead inlet valves and side exhaust



Powerplant of new 11.6 hp. Humber engine which, like all models of this make, now has overhead inlets and side exhaust valves

equipment, £450 is charged. As showing where the extra price of the 15-hp. overhead camshaft model comes in, it is of interest to note that the chassis only of the latter is £500; thus in the body and equipment there is £85 of the extra £135 for the complete car and £50 for the difference in the two engines.

Following is a comparison of prices of the Wolseley models, with standard body-work and equipment, with the 1922 figures in parentheses: 7-hp. two-cylinder, 82 x 92 mm., two-passenger, £255 (£310); 10-hp. four-cylinder, 65 x 95 mm., two-passenger, £380 (£475); 15-hp. four-cylinder, 80 x 130 mm., four-passenger, £660 (£975); 20-hp. six-cylinder, 80 x 130 mm., five-passenger, £995 (£1,200); 24-hp. six-cylinder, 90 x 140 mm., five-passenger, £1,145 (£1,350).

Crossley

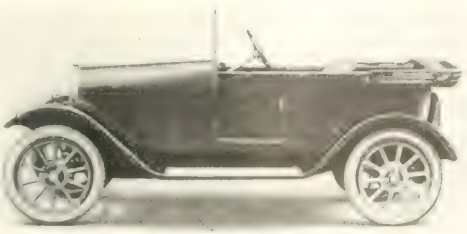
Another prominent British firm, Crossley Motors, Ltd., has adopted the same policy as Wolseley in putting forward as an additional model a chassis of moderate power and efficiency to sell at a low price on British standards. This new Crossley, termed 12-14 hp., has a bore and stroke of $3\frac{1}{8}$ x $4\frac{3}{4}$ in., with block cast L-head cylinders and a detachable head. The three-bearing crankshaft is carried in a barrel-type crankcase. The rear opening of this crankcase is closed by an aluminum unit forming the flywheel bell housing, to which the bell-housing extension of the gearset is bolted. A steel pressing forms the engine oil sump, running the full length of the crankcase.

Aluminum pistons are used, with narrowed waists and three compression rings, the bottom one serving as a scraper; the piston pins float in the piston bosses and in the bushed small ends of the connecting rod. Distribution is by a triangulated silent chain driving the camshaft on the left and the generator and magneto in tandem on the right. Battery ignition was specified for this model when it was first announced, but within a week a further announcement changed this to magneto ignition. Doubtless representations from dealers against the former had some influence in this matter.

The valves are of 3 per cent nickel steel, water circulation is by thermo-syphon, and lubrication by splash with leads to catch pits over the main bearings, a plunger type of pump being used, located in the sump. The inlet and exhaust manifold are separate from the cylinder block but cast as a unit, the exhaust delivery to the muffler pipe being at the front end.

The dry, single plate clutch with fabric friction surfaces has a ball bearing pilot and is entirely enclosed, though a small rectangular opening with a cover-plate affords an inspection orifice. Central control is provided for the three-speed gearset, which has ball bearings for the mainshaft but plain bushings for the layshaft and pilot bearing. At the rear end of the mainshaft is mounted the drum for an internal expanding brake, this being operated by the hand lever; connection from the latter to the brake camshaft consists of a short lever extension on the main lever boss which lifts a lever extending at right angles from the camshaft, contact between the two being by means of a set screw with lock nut, which also form the means of brake adjustment.

From the gearset the transmission is by an open tubular propeller shaft with a fabric joint at each end and spiral bevel gearing with a ratio of 4 to 1. The axle is of the semi-floating type with ball bearings throughout. Internal wheel brakes operated by pedal, half elliptic springs front and rear—offset in relation to the axles—pressed-



New Humber Eight with single shell body for two adults and two or three children. Sold at £275 with four-cylinder engine, 56 x 100 mm.

steel hollow-spoked wheels, 30 x $3\frac{1}{2}$ in. Dunlop cord tires with clincher edges, and worm and full worm wheel steering, are other items of the design.

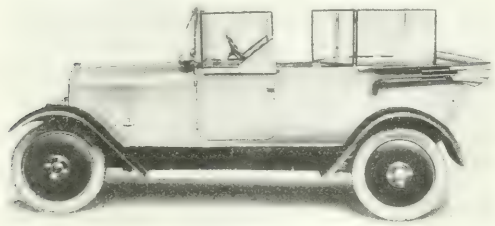
The standard body is an open four-passenger and it is to be noted that the bonnet is prolonged rearwardly and the cowl correspondingly shortened, so that the gravity feed fuel tank lies exposed within the engine space when the bonnet is raised. The complete car is priced at £50 less than the 14 hp. Wolseley, viz., £475. Its wheelbase is 108 in., track 54 in., ground clearance 9 in., and weight just over 2000 lb. with body. This car is supplemental to the 25-30 hp. Crossley (four 4 x $5\frac{1}{2}$ in. cylinders, £975) and the 19.6 hp. model (four $3\frac{1}{2}$ x $5\frac{7}{8}$ in. cylinders, £795);

the latter is a post-war model first seen at the 1920 Show and is now to be supplemented by a "sports" rendering, termed 20-70 hp., with a guaranteed speed of 70 m.p.h. and sold at £80 above the touring car price.

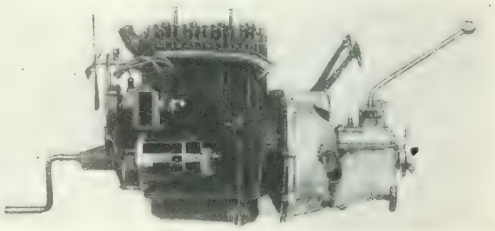
Humber

The products of the Humber Co., one of the oldest motor manufacturing concerns in England, have been in ascendancy since the war, after a period of pre-war depression which was only beginning to lift in 1914 and which arose from various causes concerned with management and design. During the past two years Humber cars have been confined to two models, the 11.4 hp. four-cylinder (68 x 120 mm.) and the 15.9 hp. four-cylinder (80 x 140 mm.); both have had side valve engines and have commanded a ready sale despite their high prices alongside those of their respective competitors. The plant is among the dozen largest in the country, with an output capacity of 100 cars per week.

For 1923 an entirely new model is to be made and this, as well as the other two, will have a new type of engine. The latter in each case has block cast cylinders with detachable head, overhead inlet valves and side exhausts. There has been a good deal of discussion as to the wisdom



Standard body of new Singer Ten with framed celluloid side panels as used to form V-fronted screen for rear passengers



Powerplant of new Singer Ten which has barrel type crankcase cast as a unit with cylinder block. Bore and stroke are 63 x 88 mm.

of the policy represented by this design, especially as the all-overhead valve engine is becoming so increasingly popular and accepted without demur by the vast majority of potential buyers. The engine type is, however, the result of experiments extending from 1919 until now and it is the firm contention of Humbers that, although the splitting-up of valve position is not necessarily the best practice under all conditions, their own application of the principle gives manufacturing and other advantages which make it preferable to both L-head and all-overhead valve engines.

Humber Engine Modifications

In the first place, the overhead inlet valve and the side exhaust enable larger diameter valves to be used (55 mm. in the case of the 80 mm. bore engine) without appreciably increasing the cylinder head area. Next, the details of the design encourage the machining of all the exposed surfaces, with advantages which are obvious. As compared with the old ones of the same dimensions, these engines show a very appreciable increase in maximum power, and the peak of the power curve is carried to a much higher speed. In the case of the 11 hp. engine the increase in maximum power is 25 per cent (24 to 32 b.-hp.) and in the larger type about the same, the peak of the power curve of the latter (52 b.-hp.) being at 2800 r.p.m. and of the former at 3000 r.p.m.

Reverting to the design of the combustion chamber, this is in the form of a short cylinder with flat top and a side pocket of horseshoe shape, the flat sides of the latter being slightly prolonged. The underside of the cylinder head is an absolutely flat surface, being milled all over above the cylinder bores. The top of the cylinder block is also flat with the exception of the four exhaust valve pockets, which are milled out to equalize them and are thus of identical size and shape.

To minimize valve clatter, the pushrods of the overhead inlets are made in the form of straight, plain-ended rods, each working in two renewable guides, one in the head and the other in the block. With the same object in view, the valve spring pressure is divided between the valve and the rod, there being a spring on the valve as usual and another of the same size at the foot of the pushrod, each one being considerably lighter than the exhaust valve spring.

The overhead rockers are individually pivoted on pins projecting from four standards, the lower ends of which are hexagonal and form four of the nuts for the cylinder head studs. The rockers are of channel section, with the channel facing upward and drilled for conveying oil to the pivot bearings, the lubricant being fed by drips from an overhead pipe.

The upper surface of the head is flat, but slopes slightly toward the pushrod side; thus excess oil fed to the rockers runs to that side and gets back to the crankcase through helical grooves cut in the pushrod bushings, lubricating these on the way. Pushrod adjustment is made at the heads of the cam followers, the latter being exposed with those of the exhaust valves by removing cover plates as usual from the side of the cylinder block. Mushroom-ended cam followers are used.

A novel feature lies in the piston design. This, as in all Humber cars of recent years, is of the straight-sided, split-skirt type in aluminum with an internal expanding ring in the skirt; the novelty is in the crown, which has a flat surface sloping to the extent of a few degrees at right angles to the crankshaft center line. It is claimed for this design that piston slap is entirely eliminated because the explosion pressure, applying to the sloping surface, counteracts the natural tendency of the piston to tip from one side to the other at the end of the compression stroke, or the beginning of the firing stroke—a tendency due, of course, to the change in angularity of the connecting rod.

Another innovation is that on all models a muffler is fitted to the carbureter air intake; this is rendered necessary, it is said, because of the extreme quietude of the new engines. This additional device consists of a bell-mouthed attachment projecting from which is a series of pins supporting three metal rings and a flat disk, each of which is separated from the units on either side of it to the extent of 1/16 in. or so. Thus entering air is split up by being obliged to pass between the units mentioned.

Magneto ignition is continued on the two larger engines while the battery system appears on the new Eight. The

11 hp. has had skew gears for the distribution substituted for silent chains, though one of the latter is made to serve for the combined generator and starting motor, the latter being piloted into the rear face of the distribution casing on the right, and eccentrically mounted to provide chain adjustment.

The two smaller models have the cylinder block cast as a unit with the upper half of the crankcase and both are of unit powerplant construction, though differing in the manner in which this principle is carried out. They have thermo syphon circulation, whereas the 15.9 hp. has a water accelerator on the rear end of the fan shaft.

Good Example of Light Car

The new 8 hp. model is an excellently designed example of the still smaller four-cylinder engined light car for two adult passengers which is now offered by several British makers for the first time. Hitherto, the smallest light car engine of this type has been of about 67 cu. in. capacity, whereas the Humber Eight typifies a smaller class, i. e., under 60 cu. in., its cylinder dimensions being 56 x 100 mm. But realizing that even with an engine of these dimensions users will not be satisfied to carry two passengers and no more, the makers have adopted a type of body which is found on several English cars of this size for next year. This is variously known as the "single shell" and the "light family" type. It is constructed with a full-width comfortably upholstered seat in front, behind which is another full width seat but with a narrow cushion and restricted legroom, intended for two or perhaps three children; an adult could be accommodated, but not at all comfortably, sitting askew. The points of advantage of this design, as compared with the dickey seat alternative, are that all occupants are within the main shell of the body and are equally well protected whether the folding top and detachable side panels are in use or not. Further, the restricted dimension of the rear seat and the fact that no separate entrance is provided to it discourages its use by two adults—for it is the maker's idea to prevent the overloading which almost invariably occurs when a dickey seat is provided.

There is nothing unorthodox about the chassis design and transmission, except the frame, which is reminiscent of Marmon practice, the side members having pressed steel running boards welded to them; they are unusually deep between the springs and of inverted L sections, merging into a channel section toward the ends with the channel outward. The springs are quarter elliptic at the front and half elliptic at the rear. The brake pedal applies a contracting band on a drum behind the three-speed gearset, while hand-applied contracting band brakes are used on the wheel drums. A point of note is that, although the unit gearset has right-hand side control, the "gate" usual with this arrangement is here omitted.

At 3000 r.p.m. this engine develops approximately 20 b.hp. and at this engine speed with the 28 x 3 in. wheels and 4.9 to 1 spiral bevel ratio a decidedly high road speed —approximately 42 m.p.h.—is attainable on level roads with two adults aboard.

One other point of this new chassis can be mentioned. The front swivel axle bushes are lubricated with oil stored alongside them within a chamber formed by drilling a vertical hole in a long boss integral with the forging, while the joints of the tie-rod are supplied with oil stored in the rod itself, the latter being hollow and having a lubricator for the introduction of oil.

With the bodywork specified the 8 hp. Humber sells at £275. The 11.4 hp. four-passenger is £525 (1922 price £620) and the 15.9 hp. five-passenger with rear cowl and screen £750 (£850 for 1922). An addition to the range of body types for the large chassis is an all-enclosed landaulet, having a V front double panel screen and instrument board, the latter items being standard on all bodies except that of the 8 hp. chassis.

Singer

The Singer Co., Coventry, has varied neither the fundamental features of its design nor the engine dimensions since 1912, when it came out with the first four-cylinder 67 cu. in. light car. Neither has it departed from the two-passenger body with a small dickey. The 10 hp. Singer two-seaters have experienced a demand second to none in this field, and have held the firm in a strong financial position for many years past.

But an entirely revised design has now been adopted. In place of pair-cast L-head cylinders, and a three-speed gearset as a unit with the rear axle, an overhead valve engine with block cast cylinders and pushrod operation has appeared, and a gearset as a unit with the engine. While the engine dimensions remain the same (63 x 88 mm.) the chassis layout has been varied so as to accommodate a small four-passenger body, the wheelbase remaining the same (96 in.) though the track has been increased from 46 to 48 in.



12-25 *hp. Phoenix four-passenger car with front glasses in position with folded top*

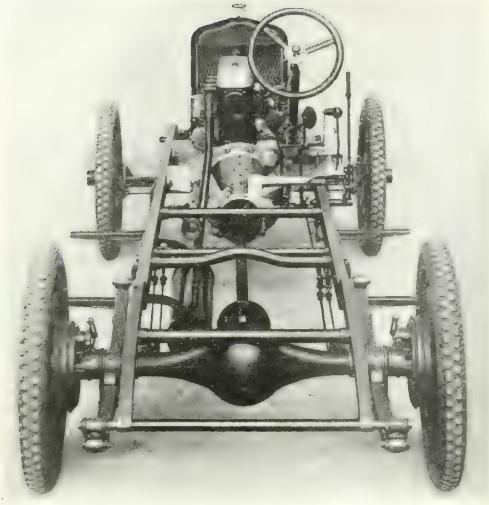


Phoenix luggage grid and wheel carrier shown in two positions, in both of which the wheel is readily accessible

Singer Shows Unusual Features

An unusual feature of the engine design is the use of a cast-iron unit comprising the cylinder block and the entire barrel type crankcase, the latter having a large opening at the rear end through which the two-bearing crankshaft is assembled. The crankcase has a pressed steel oil sump, and its rear end is formed with a large flange to meet the bell housing extension of the gearset.

The induction manifold is also cast as a half-projecting unit with the cylinder block, but the exhaust manifold is separately cast with four branches to the valve ports. Engine support is afforded by two tubular cross members, the front extension of the distribution cover sus-



Rear view of 12-25 hp. Phoenix chassis. Has pushrod operated valves and a bore and stroke of 69 x 120 mm.

pending from the center of the cross tube there located, while the rear tube passes through the clutch pit. The application of this arrangement is simplified by the fact that the side members of the frame have their channels facing outward, this in turn being permitted without spoiling the front appearances by reason of the use of quarter elliptic springs which, incidentally, are bolted up directly to the underside of the channel members and run parallel with the latter. An open propeller shaft with fabric joints, a tubular torque member, spiral bevel final drive (ratio 4.1 to 1), all brakes within the rear wheel drums, epicyclic steering gear and disk wheels with 26 x 43 in. straight-side tires (the only British light car having the latter) are other design features. The peak of the engine power curve is just over 3000 r.p.m., at which speed 20.75 b.hp. is developed.

The standard four-passenger body has only one door, on the left at the front, entrance to the rear seats being secured by lifting up the left front seat, which is hinged to the floor and has a hinged back rest. This hinging seat is of neat design, having an exposed bottom framing of cast aluminum with an integral footrest for the rear passengers.

The folding top is supplemented by something out of the ordinary in the way of transparent detachable side panels; the latter are of larger area than usual and consist of three sections at each side, the front one being a single unit and the others united by a hinge; this last feature enables the two rear panels to be used even when the top is folded, for the front halves can then be brought across to meet at the center of the car and so form a V fronted screen for the rear passenger.

At the last Olympia Show Singers exhibited a small Six with L-head block cast 65 x 100 mm. cylinders. This model is, however, only now going into production. There is nothing much out of the ordinary in the layout, though it varies from the smaller model at many points; for example, it has its three-speed gearset as a unit with the torque tube.

The Singer Ten is also to be sold under the name Coventry Premier, the makers having bought out the interests in the latter name, which previously has been associated with a two-cylinder three-wheeled light car. The 1923 Coventry Premier is, however, identical with the Singer Ten except that it has battery ignition in place of a magneto and is minus the side panels of the folding top and one or two other items of equipment. Prices compare as follows: Coventry Premier, £250; Singer Ten, £295 (last year £395 with two-seated body); Singer six-cylinder four-passenger, £550.

Phoenix

An old-established firm with an excellent reputation for small cars, the Phoenix Co. introduced an 18 hp. ($3\frac{3}{8}$ x 5-5/16 in.) overhead camshaft model at the 1920 Show. Although it was again exhibited last year it has not yet gone into production, but is held up until better times come along for cars of that size. Now the range has been supplemented by a smaller overhead valve pushrod operated model termed 12-15 hp. with $2\frac{3}{4}$ x $4\frac{3}{4}$ in. cylinders. There is nothing peculiarly striking in the chassis, but the all-weather feature is out of the ordinary.

The standard four-passenger body has a folding top with an all-metal framing and covered with black material lined with grey. When erected the top fits snugly to the top rail of the double panel screen. To the top edge of each of the four doors of the body a rectangular metal-framed plate-glass window is hinged; normally these windows are folded down against the inside of the doors, where they are protected and kept out of sight by a light metal frame, suitably upholstered and padded, which has a spring hinge on the lower part of the door. To provide an enclosed car, the top is erected and then the windows are hinged upward—the top edge of each protecting frame first being pulled toward the inside of the car to free the window.

To secure the windows in a vertical position over the rear doors and to allow them to open with the latter, the framing of the top has attached to it at each side a bracket carrying a spring plunger, and this engages with corresponding brackets at the top of the window framing. The brackets are positioned so as to be located in a direct vertical line above the door hinges, making in effect one continuous hinge from the bottom of the door to the top corner of the window, so that door and window can open together without twisting any part. The windows over the front doors are similarly provided for, though in this case the upper brackets are attached to the windscreen pillars, thus permitting these windows to be used as side wing screens when the top is folded.

Improvement in Window Adjustment

Any or all of the windows can be used when the top is erected, and all can be brought into use in less than two minutes, without disturbing the passengers and even without stopping the car. This arrangement is unquestionably a great improvement on anything of the kind introduced until now, for there is not the call for special drawers or loose upholstery to store away detachable side panels, and the fact that plate glass can be used safely instead of celluloid is in itself a point in favor of the scheme. Compared with many of the other systems for providing side panels that open with the doors of open cars, there is seemingly little if any difference in production cost to be considered, though obviously there are certain bodywork features which must be adopted if the system is to be used. There is, however, one point against this plan—that quite a big portion of the top extends around its sides, as far forward as the back of the rear door. Compared with other arrangements, where usually there is a transparent panel at each side of the rear seat, the interior is not so light when the top is erected.

Why Is an Automobile Finance Company?

Distinct need for such organizations. Sound banking principles needed throughout operation. Dealers need assistance in handling credits. Manufacturers sell C. O. D., but have responsibility to assist retail representatives. Extensive credit education needed.

WHY are automobile financing companies?

That's a question a good many people in the automotive industry are asking themselves for various reasons. The inquiry is based in some cases upon the premise that they are unsound in principle. Any such assertion is incorrect, however.

Organization and development of finance companies have been perfectly logical. Theoretically, banks should finance all the legitimate needs of every reputable business and industry. This theory doesn't work out in practice and that is the real answer to the question, "Why are automobile financing companies?"

If the banks had been able to extend to motor vehicle dealers all the credit to which they were entitled, there would have been no excuse for the finance company. Given an automobile dealer and a hardware dealer of equal merchandising ability and an equal annual profit, one is as good a credit risk as the other, but the banks can't see it that way. They are thoroughly familiar with the hardware dealer's methods, which have been standardized by long years of practice, but they don't like the system in vogue in the automotive industry, under which the dealer gets his goods on a C. O. D. basis and sells large units on a time basis, usually 30 per cent down and the remainder in a series of twelve equal monthly instalments.

The banker will admit readily enough that the motor car dealer may be just as good a risk as the hardware man, but he will contend that so much bookkeeping and collection machinery is necessary to handle the automobile paper that it cuts too deeply into the profit. This may be true, although a large number of banks have built up a substantial business in the prime mercantile paper resulting from automobile sales, wholesale and retail, and are making a good profit out of it.

Driving a banker into giving you a line of credit is not a pleasant diversion for a hot summer's day, however. When the automotive industry began to reach large proportions it became apparent that something had to be done about credit. Then it was that the automobile finance company came into being. The pioneers in the field were concerns which had been financing time sales of pianos and other things. They had the machinery and they adapted it to the needs of a new industry. The adaptation wasn't perfect but it brought substantial profits. In the earlier years the profits were so large that many exclusive automobile financing companies were organized. Some of them operated on a national basis and some of them were local in their scope. The local company of late has been getting much more of the business than it did formerly.

THERE may not be enough efficiently managed finance companies in the field to take care of automotive business. The banks will handle only a certain amount under given conditions. Dealers must have adequate credit facilities or sales will not reach maximum possibilities.

Future conditions may indicate the desirability of the larger and stronger automotive manufacturing companies forming finance companies of their own. Several smaller manufacturers might band together for the same purpose.

This article discusses the whys and wherefores of the automotive finance corporation and points out ways to remedy the difficulties which exist to-day in many cases.

Theoretically, the paper which is good enough for a finance company to buy should be good enough for a bank. A very large percentage of automobile paper, both wholesale and retail, comes in this class, but the banks assert they don't want to be bothered with the details of credit risk investigation and collection. They frankly admit that they would rather loan their money to the finance company at a lower interest rate and let the finance company, which has the machinery, do the work of investigation and collection.

In the last analysis it is the banks which really are financing the business through their loans to finance companies. If the finance company is unable to borrow money at the bank it can't function. That is the reason why a good many of the so-called local companies give the motor vehicle dealer good service in periods when money is "easy," but have nothing to loan the dealer in times of depression when money is "tight." In other words, some of these companies, but by no means all of them, are unable to assist the dealer when he most needs their help.

Scattered here and there throughout the country are motor vehicle dealers who are strong enough financially to get all the credit they need at their own banks, but they constitute a small minority of the whole. Many more dealers are able to meet some of their credit needs through their own banks. If there are any dealers who

have no bank credit, they ought not to be selling automotive merchandise.

Financing the sale of motor vehicles, at wholesale and retail, is one of the big problems of the industry. So long as manufacturers insist upon selling their products on a C. O. D. basis their dealers will require longer lines of credit than business men of the same ability who sell other merchandise of equal value but who are given 30 or 60 days in which to meet their bills, thus having an opportunity to turn over a good share of the goods they sell before they have to pay for them.

Inasmuch as it is this factory custom which has made it necessary for dealers to obtain a larger volume of credit than is necessary for dealers in any other line, the factories have an obligation to their sales organization to help solve this problem.

As the situation stands to-day, dealers for most of the companies in the field have to fight their credit battles unaided. They stand or fall by their own efforts.

Part of the trouble is the fault of the dealers, part is the fault of the finance companies and part the fault of the factories. Generally speaking, neither is trying deliberately to "trim" the other. Many dealers have not realized their obligation as merchandisers and many finance companies have not sensed their duties as bankers.

Finance companies, logically, should be operated on exactly the same principles as banks, except that they require specialized machinery. They should be regulated by State banking departments. They should not go into the insurance field or any other field with which a bank should not meddle. They should study their credit risks just as carefully as a bank. They should give sound co-operation and advice to their clients. They should strive to make their clients better business men. Their own honesty and squareness should be above reproach and they should refuse credit absolutely to any dealer suspected of shady practices. On the whole, finance companies probably have been victimized more often than they have made victims.

Success Depends on Sound Practice

The men who operate finance companies should be thoroughly familiar with banking obligations and banking practices. They should be perfectly frank and fair in their dealings with their clients and they should insist upon reciprocity in this respect. Their success or failure, in the long run will rest upon the care with which they scrutinize credit risks. Any practice which is fundamentally wrong will cause trouble sooner or later.

When a finance company is asked by a dealer for accommodation to permit him to stock cars on his floor, it should assure itself that the operation will be a good credit risk. If the answer is in the affirmative, the loan is justified. If there is any question about it, the loan should be refused.

When a finance company is asked to purchase the paper arising from the sale of motor vehicles at retail, it should ask itself two questions:

1. Will the dealer honor his endorsements?
2. Will the purchaser pay his notes?

If either answer is negative, the paper should not be bought.

If the risks are sound and if the losses of a finance company on defaulted payments are small, it will be able to offer a lower rate than it would if it had to set up a large reserve for losses.

All business if founded on mutual confidence and the dealer has two obligations in respect to credit. One is to himself and the other is to the bank or finance company which extends him credit. In his merchandising operations, if he is fair to himself, he usually will be fair to the institution from which he has borrowed.

There is nothing intrinsically wrong with the sale of motor vehicles on credit. In fact it is a perfectly sound proposition. Many of the abuses which have arisen have resulted from the eagerness of the dealer to increase his sales. It should be accepted as an axiom that no person who cannot afford a motor vehicle should be permitted to buy one on time.

If every dealer made a careful and intelligent investigation of the credit standing of every prospective purchaser on an installment basis and assured himself that he never sold anyone who could not afford to buy, most of the evils which have arisen in the retail automobile financing field would disappear.

Reducing Credit Risk

An equally important forward step would be taken if banks and finance companies would refuse to extend credit for wholesale purchases to any dealer who was not himself a good credit risk. There would be few dealers who would not be good risks if they conducted their own credit operations on sound lines.

No company which expects to build on a permanent basis, can afford to have in its sales organizations any man who is not a good credit risk or accepts credit risks which are not good. No company can afford to have its products sold on time to persons who cannot afford to buy them.

It cannot be denied that there are many evils in connection with automobile financing. It is equally true that the manufacturers of motor vehicles owe a distinct obligation to their dealers and themselves to help eliminate these evils.

This can be done primarily through a process of education. The average dealer takes very seriously all the suggestions made by his factory. Every company in the field could well afford to conduct a sort of training school in merchandising and financing for its dealers. This could be done by traveling teachers who would help individual dealers solve their problems, supplemented by periodical "classes" held at the factory or at some central point at which all the dealers or the men from some large territorial division could be given brief but intensive courses. Obviously, this instruction should be thoroughly sound.

Education and Cooperation Needed

At the same time, manufacturing companies should begin educating the finance companies to their obligations as bankers. This work should be undertaken in a spirit of co-operation based upon the fact that the finance company is a very sound and very necessary institution.

Such a procedure would enable manufacturers to weed out not only inefficient dealers but inefficient or unfair finance companies. Finance companies which are not willing to institute reforms where reforms are needed should be forced out of the field. The same is true of dealers who do not play fair with the people from whom they borrow money.

If it were demonstrated eventually that there were not enough sound and efficiently managed finance companies in the field to supply all the credit needed, then the larger and stronger automotive manufacturing companies could form finance companies of their own. It might be possible, also, for several of the smaller companies to band together and form a company which would be able to finance all their dealers. If such com-

panies were formed, however, they should be operated as distinct entities engaged exclusively in the banking business.

Observations on finance companies up to this point have been confined to those which do not do business on a "no recourse" basis. "No recourse" means that dealers do not indorse their paper. The company demands a certain percentage of the total price as a down payment, has the vehicle insured against fire, theft and collision, in some cases, then takes a lien on it and trusts to luck. If the purchaser does not make good on its notes, the finance company replevins the vehicle at the earliest possible moment and then gets its money back by selling it to someone else.

In theory, at least, this practice is unsound for it combines within one company the functions of banking and merchandising. The same is true of companies which engage in the insurance business in a similar way.

Fundamentally, if the motor vehicle dealer is merely to sell cars or trucks and not accept his own credit responsibilities, he is merely an order taker and is entitled only to an order taker's commission.

A Radical Departure in Suspension Springs

IN the design of springs for automobile chassis the aim is to keep the stresses due to the load and to shocks as nearly as possible uniform throughout the mass of the spring material, as this results in the best cushioning action with a given amount of such material. This is ordinarily accomplished by using leaves of graduated length, assembling the spring out of a number of such leaves. To prevent the leaves from separating during the rebound they are given a nip, the short leaves being nipped more than the long ones, so that they are under comparatively high initial stress. This nipping process involves certain difficulties and often is the cause of excessive local stresses.

An entirely new design of spring in which uniform distribution of stress is obtained in a novel manner has been introduced by W. D. Kelly and is illustrated by the drawings herewith. It is a laminated leaf spring, but all of the leaves are of full length and they are not nipped. Under static load the leaves are substantially straight. In order to take account of the decreasing bending moment from the center of the spring outward, the leaves are given the form of a frustrated rhomboid. A slight modification from the rhomboid form is necessitated by the shear stresses which near the ends of the leaves become more important than the bending stresses. All leaves are arched to the same curve, which is an arc of a circle.

In an ordinary leaf spring, owing to the differential nipping, when the spring as a whole is in the neutral position some of the leaves are under stress in one direction and the others in the opposite direction. All of the leaves of the Kelly spring have the same neutral point or position. In case the vertical acceleration should carry the chassis above the neutral point of the spring, excessive reverse bending is prevented by the combined action of all the leaves of the spring.



Details of Kelly suspension spring showing design of master leaf and supporting leaf

To reduce the friction between the leaves, the inventor has made provisions to keep them separated from one another over practically their whole length. Spacers 1/32 in. thick are placed between leaves over the axle, and the ends of the leaves are upset to increase the thickness 1/32 in. at these points. This spacing of the leaves, however, is not an essential feature of the new springing system, the inventor evidently realizing that many manufacturers consider a fair degree of friction between leaves as highly desirable. One of the claims made for this spring is that the danger of leaf breakage has been greatly lessened. Two causes of uneven distribution of stress, namely, nipping and rusting together of leaves, are eliminated. Although the center bolt hole—another cause of leaf breakage—has been retained, the leaves are made considerably wider at the center than those of the ordinary spring, hence an adequate factor of safety is provided at this point, too. No rebound clips are used. The spring eyes and their bolts are replaced by what are termed journal segments, which have a liberal bearing surface and are well provided for in the matter of lubrication.

Design of Spring Leaves

The master leaf is so shaped that it fits into a recess of the journal segment and takes the horizontal component of the road resistance, acting as a radius rod as well as cushioning member during deflection. The leaves of the spring are referred to as the master leaf, the supporting leaves and the bottom leaf, the latter differing from the rest in that it has no oil hole through it and its ends are beveled to allow more clearance as it slides forward when the spring is deflected.

The journal segment bears against the bushing and is provided with an oil hole and an oil groove, distributing the oil to its own wearing surface and to the spring leaves below it. The bushing is locked in place by a screw which enters it from bottom of bracket casting.

The key segment locks the spring and journal segment in place. The assembly is free to rotate about the center line of the bushing and the supporting and bottom leaves are free to slide as the spring deflects. The oil path is shown by dotted lines in the cut-away sections of the drawing.

THE Swedish body building industry is very small, the entire annual output never having exceeded 150 bodies, most of which are made of wood, and while some fine special bodies were turned out during the war, the average output does not compare favorably with American and other foreign makes in price, quality or appearance, says a report from Assistant Trade Commissioner H. Sorensen, Copenhagen.

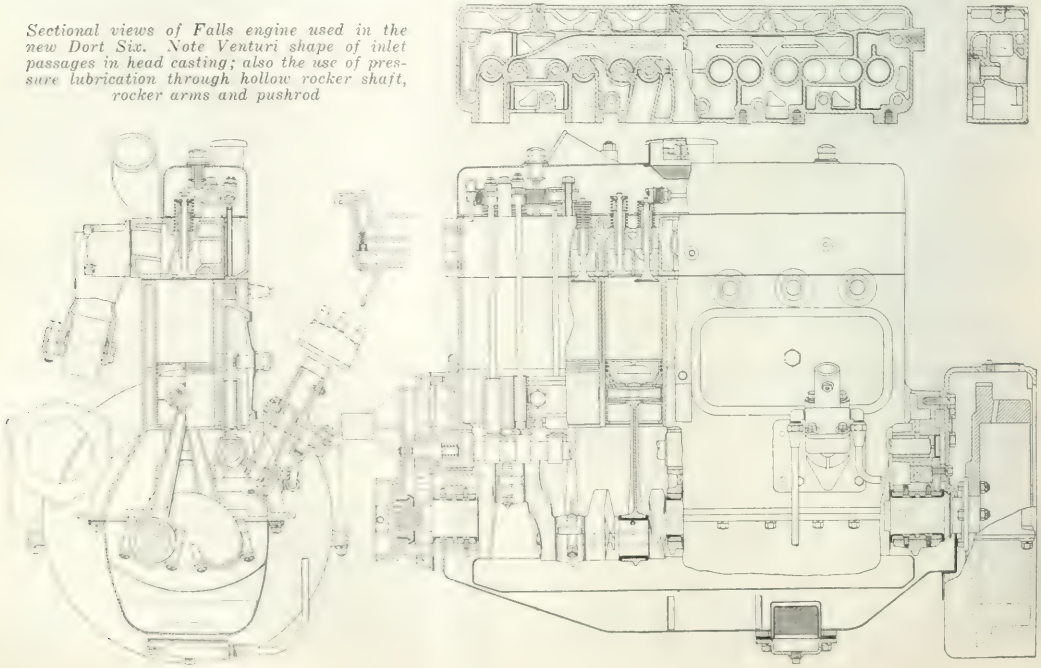
Dort Announces Its First Six-Cylinder Product

New car is similar to the four except in external appearance. Has 115 in. wheelbase. Model T-8000 Falls engine incorporates a stiffer crankshaft and other changes suggested by Dort engineers. Silcrome valves and pressure lubrication employed.

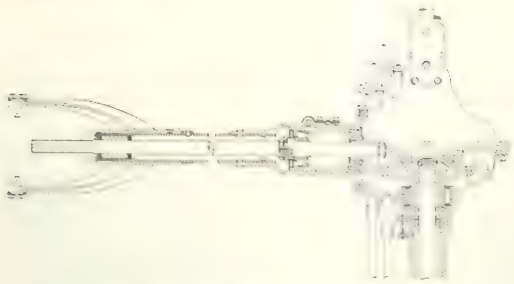
By J. Edward Schipper

THE Dort Motor Car Co., which has previously manufactured only four-cylinder cars, has added a six to its line. The new six, while following fundamentally the lines of the previous Dort cars, differs in many respects in exterior appearance. Mechanically, the six is similar to the four, employing a great many standardized units similar in both cars, but, of course, differing as to engine and in the parts requiring heavier construction, due to the increased stresses of the more powerful engine. The wheelbase is also longer, being 115 in. in the six-cylinder model as compared with 108 in the four.

The engine is the Falls model T-8000, which is familiar to the industry, but which has been modified, however, by design features incorporated by Etienne Planche, chief engineer of the Dort Co. The modifications include a redesigned intake manifold with a venturi effect due to a taper in the diameter and easier interior curves for the purpose of securing superior distribution and carburetion throughout the entire range, especially at low speeds. The crankshaft also has been increased in diameter to help minimize periodic vibrations within the speed range of the engine. The engine is a high-speed design turning over 3000 r.p.m. at 60 miles per hr.



Sectional views of Falls engine used in the new Dort Six. Note Venturi shape of inlet passages in head casting; also the use of pressure lubrication through hollow rocker shaft, rocker arms and pushrod



Flint axle used on new Dort chassis. Hyatt bearings are now employed at differential and at forward end of propeller shaft

car speed. It is an overhead valve type $3\frac{1}{8}$-in. bore by $4\frac{1}{4}$-in. stroke, or 195.06 cu. in. piston displacement. The combustion chamber volume is 21.82 per cent of the total volume, giving an actual compression pressure of 74 lb. per sq. in. at 300 r.p.m.

The crankshaft in the Dort adaptation of the Falls engine is mounted on three bearings, the dimensions being from front to rear as follows: 2.10 in. by 2 5/32 in.; 2 in. by $2\frac{1}{8}$ in.; 3 in. by 2 3/32 in. The lower rod bearings are 1.997 in. in diameter and 1.626 in. in length. These are steel backed, babbitt lined bearings, the babbitts being bonded to tin and the tin bonded to the steel.

Probably the outstanding features of this particular engine is the fact that it has a built-in pressure feed oiling system, which feeds the overhead valve mechanism. Oil is led under pressure through the rocker shaft, then through drilled passages through the rocker arm to the top of the push rods. The top of the push rod ends in a cup in which the ball end of the rocker arm operates. Oil flowing under pressure from the rocker arm shaft through the drilled rocker arm comes out through a hole in the ball and into this cup. This keeps the cup and ball continually lubricated and provides a liberal film to cushion the shock. A lead passes down through the push rod to the tappet so that the cam contact is also lubricated. Another feature of the valve action is the employment of the new silicon-chrome alloy called silcrome, a product of the Steel Products Co. The engine installation on the Dort car is thermo-syphon cooled, through a Fedders radiator.

The engine auxiliaries include a Carter carbureter, 1 in. size, American Bosch starting, lighting and ignition in combination with a U. S. L. 6-volt, 90 amp. hr. storage battery. The clutch is a multiple-disk Detlaff. This is a dry type with six disks. The gearset is the same unit used in the four and manufactured by the Dort company itself. The drive is taken from this through a Mechanics Machine Company's universal joint to a three-quarter floating Flint axle. The drive is taken through the rear springs and the torque is taken through the third member of the rear axle by means of a yoke at the front end of the tube which incloses the propeller shaft. This is the same construction and same axle used in the four-cylinder model.

Some notable features of construction which have been adopted recently in this axle are the mounting of the differential between two Hyatt roller bearings in order to secure the advantage of the long line support in these two points and also the mounting of the long series Hyatt roller bearings at the front end of the propeller shaft for alignment of this unit. The rear axle ratio on all body models is 4.66 to 1. The wheels are all 31 by 4 in. equipped with cord tires. Steering is by Gemmer gear.

Six bodies are provided. These are a five-passenger touring car at $990; three-passenger roadster, $990; five passenger Yale sedan, $1195; three-passenger Yale coupe, $1145; five-passenger Harvard sedan, $1495; three-passenger Harvard coupe, $1365, all of which are in addition to the four-cylinder models, which will be continued unchanged except for a new shaped hood and radiator.

Wire Wheel for Straight Side Tires

A WIRE wheel for clincher tires which is claimed to be considerably lighter at the rim than the ordinary wheel with demountable or detachable rim has been brought out by the Dayton Wire Wheel Co. It is of the demountable type, as may be seen from the sectional view shown herewith. A feature of the design is that the center of the rim is dropped, the whole rim being made in a single piece.

B. G. Parsons, chief engineer of the Dayton Wire Wheel Corp., informs us that he has been using a set of these wheels in the 28 x 4 in. size for some time and that they were also used in the Indianapolis 500 mile race on the two Fronty-Ford entries. As regards tire changes, they are said to be quite simple, as the same conditions exist as in the plain clincher tire. The general construction of the wheel may be seen from the drawing.



Sectional view of Dayton wire wheel

THE Automotive Division of the Department of Commerce reports that in keeping with incoming reports that motor sales have been very good in Spain, that country imported 239 passenger cars and 62 trucks from the United States during June, as compared with 141 passenger cars and 3 trucks during the previous month.

Curtiss-Army Racer—Fastest Vehicle Ever Operated

Winning machines in Pulitzer race have exceedingly small sectional area and a wing section said to have lowest resistance of any known. Gross weight 1950 lb. Span 19 ft. Engine develops 140 b.m.e.p. at 2200 r.p.m. Radiators a feature.

By Herbert Chase

RECORDS in speed making invariably attract considerable notice, and the recent performance of the Curtiss-Army racers in the recent Pulitzer race is no exception to this rule. When it is realized that the resistance to the passage of any vehicle through the air increases as the square of the speed, and that the power required to propel it, so far as wind resistance is concerned, increases as the cube of the speed, it is evident that areas causing resistance must be reduced to the lowest possible figure if maximum speed from a given assembly is to be attained. Precisely this consideration was given primary attention in designing the plane which won the race. There were in the race planes carrying much higher powered engines but apparently none with so high a ratio of power to resistance.

The Curtiss school of design has adhered to the practice of using the thinnest feasible wing section and then fairing non-lifting surfaces to the best possible degree, rather than following plan of making all exposed surfaces lifting surfaces by employing a deep wing section within which all non-lifting surfaces are concealed.

From the front view of the machine here described it will be seen that the fuselage has a section only just large enough to inclose the engine and pilot, while the non-lifting surfaces are not only small but are faired with great care. All fittings are inclosed. There is but one I-shaped strut between wings at each side, only two struts are used for the landing gear instead of four, while the number of wires used is a minimum.

Of greatest importance, however, from the standpoint of low resistance is the use of wing-type radiators. Various experiments with this type of radiator have been made in other quarters, but it has remained for the Curtiss Co. to perfect a design which successfully withstands conditions as severe as those encountered in the recent race. In this case the radiators are said to offer no more resistance than a bare wing. They consequently eliminate what has heretofore been one of the largest elements in creating drag.

Wing-Type Radiators

The radiating surface is formed by a corrugated sheet of brass which is soldered to a plane sheet at the edges of the corrugations. This leaves passages of triangular section measuring about ⅛ in. on a side through which the water flows from front to back of the wing. Radiator sections are made up in strips 9 in. wide and of a length equal to that of the curved surface of the wing. In this case the wing is covered both top and bottom and the upper and lower sections are joined in headers which form the leading and trailing edge of the wing. Water leaving the engine enters the header in the leading edge and after



Comparative photograph of the Curtiss-Navy and Curtiss-Army Racers which won the Pulitzer race last year and this year, respectively. Both are fitted with Curtiss engines of the same displacement and basic design, yet this year's machine made nearly 30 mi. faster speed due to its lower resistance to passage through the air. The chief changes are a slightly shorter span, use of wing instead of Lamblin radiators, single strut instead of V-strut landing gear, I instead of N-struts, fewer wires and smaller projected area of body. The views well illustrate a year's advance in fast plane construction



Front view of the Curtiss-Army Racer which won the recent Pulitzer race, making an average speed of 206 m.p.h. The same machine later established an official world record of 224.05 m.p.h. for one kilometer. Note the exceptionally small frontal area, and the location of the wing radiators, which cover both sides of both wings between the two struts

passing through the upper and lower sections is drawn out through the header in the trailing edge. The radiator thus forms an envelope which in this case completely incloses that portion of the wings between the two struts. The radiator does not replace the normal wing covering, however, but is placed over this covering and is held in place by bronze bolts which pass through the upper and lower sections as well as through the wing covering. The fact that the radiator is not designed to act as a structural element may well have much to do with the success attained with this design. The arrangement employed is clearly shown in the photograph.

The body of the machine is formed from two-ply spruce 3 32 in. thick. Fittings are made from duralumin, a fact which accounts in part for the light body, the weight of which is said to be only 127 lb. The projected area of the body is 25 per cent less than that of the Curtiss-Navy racer which won the Pulitzer race last year, although it is fitted with a very similar engine.

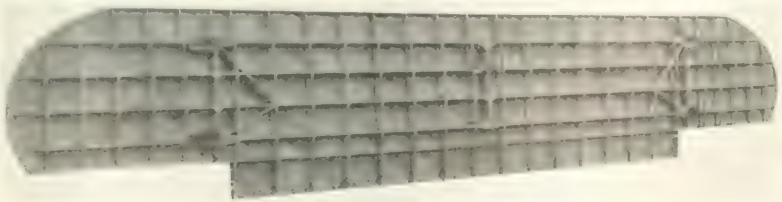
Multispar wings covered with two-ply veneer are employed. These are a typical Curtiss type of construction, the nature of which is well illustrated in the accompanying cut of the upper wing panel. There are five spruce spars, four of which run the entire length of the wing. The deepest of these measures about 3½ in. The ribs are spaced about 8 in. apart, are cut away for lightness and are glued with corner blocks to the spars. The framework thus formed is covered with veneer strips screwed and nailed in place, and the latter is covered with a batiste which gives a good surface to hold the waterproof finish. This structure weighs 1.2 lb. per sq. ft. and is said to have a factor of safety of over 10. The fittings are recessed within the wing, the opening being covered with fabric.

The wing section used is known as Curtiss No. 27 and was developed from data obtained in the wind tunnel at the Garden City plant.

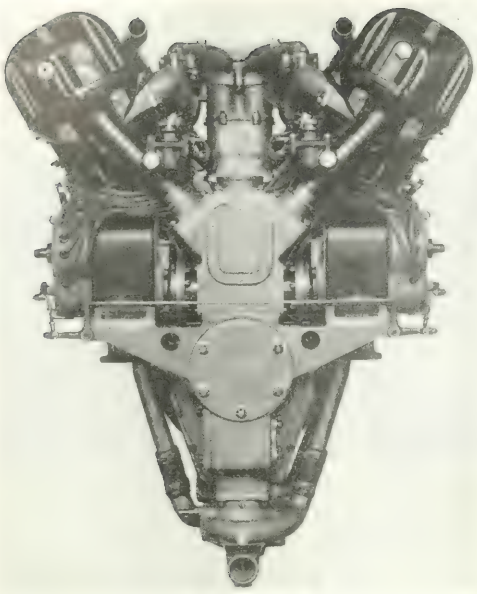
The fin and stabilizer surfaces are also of plywood construction without external braces, while the control surfaces, ailerons, elevators and rudder are of duralumin and steel with linen covering. They weigh 0.7 lb. per sq. ft. of area. All controls are actuated by internal cables and tubes.

The chassis, with a single strut at each side, is braced by streamline wire and is said to have the strength and rigidity of a conventional V-strut arrangement while its resistance has been reduced two-thirds as compared with earlier types. The wheels are provided with cupped disks which cover the wheels and hub and a linen covering is applied over the wheel and tire in order to give it a minimum parasite resistance.

It is interesting to compare the machine above described with the Curtiss-Navy racer which won last year's Pulitzer race, making an average speed of 176.7 m.p.h. The two machines are equipped with an engine of the same size and are of the same general design, yet the later machine maintained a speed nearly 30 m.p.h. faster in this year's race. This is evidently due to the "cleaner" design and consequent lower resistance of the later plane—a feature which is at once apparent from a study of the photographs of the two machines here reproduced to facilitate comparison. They well illustrate the advance made in the past year in the design of fast planes. The major specifi-



Upper wing panel of Curtiss-Army Racer. Note the five spars and covering of two-ply spruce veneer. The ailerons are pivoted on tubes carried within the wing



Rear view of the Curtiss Model D-12 engine used in the Army Racer. The separate gearcase which carries nearly all the gearing as well as the magnetos and water pump is clearly shown.

cations of the two machines are given in the appended table.

The engine used is known as the Curtiss Model D-12. The basic design is the same as that of the Model CD-12 used last year, but has undergone extensive alterations in a number of important particulars which have resulted in decreasing the weight by 35 lb. and increasing the output by 10 to 15 hp. Power torque and fuel consumption curves of the engine with 5.3 to 1 compression ratio are given in the accompanying cut. The engine used in the recent race, however, had a 5.7 compression ratio and develops 460 b.-hp. at 2300, the speed at which it ran in the race. The fuel used in this case was 50 per cent benzol and 50 per cent aviation gasoline.

The engine has twelve cylinders with 4.5 in. bore. The stroke is 6 in. and the piston displacement 1145 cu. in. The aluminum blocks into which the steel cylinder liners are inserted give a rigid construction which it is difficult to obtain in an engine with separate cylinders. The angle of the V is 60 deg. There are two overhead camshafts for each cylinder block. One of these is driven directly by bevel gearing from crankshaft and the second shaft is driven by the first through a pair of spur gears.

Steel Cylinder Liners Employed

The steel sleeves are closed at the top and are screwed into the aluminum head casting. A stud, forged integrally with the steel liner, projects through the aluminum cylinder head. When the nut is drawn up close contact between liner and cylinder head is assured. The steel barrel of the cylinder is in direct contact with the jacket water. The sleeves fit snugly into the water jacket at the lower end and are provided with a flange under which a composition gasket makes a tight water joint.

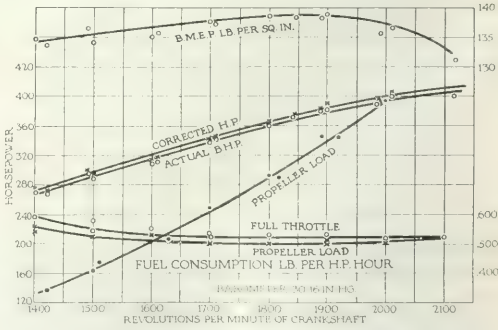
There are two inlet and two exhaust valves per cylinder. They are of tulip shape, are all interchangeable, and seat directly in the steel head of the liner. The size of the valves has been decreased by 0.04 in. to permit of their removal from the cylinder without removing the guide. The camshafts are mounted on the top of the cylinder heads on six aluminum brackets in which the shafts bear directly. The brackets are dowelled to the head and are made interchangeable so that no alignment, reaming or hand scraping is done in the manufacture. The bevel gears which drive the exhaust camshafts are internally splined with stub teeth cut on a Fellows gear shaper. This internally splined or toothed hub fits over the extended hub of the spur gear mounted on the exhaust camshaft. Because of the fact of the number of teeth on the spur gear differs from the number of teeth in the bevel gear a very fine adjustment is obtainable in timing by shifting the gear in relation to the shaft.

Each cam operates two valves through the medium of a T-shaped tappet yoke the stem of which reciprocates in a bushed hole in the cylinder head. By this type of construction all side thrust on the valve stems is eliminated.

At the rear end of the engine is fitted a gearcase which carries practically all the gearing used for operating the camshafts, magnetos, pumps and gun synchronizers. This gearcase has been redesigned to provide better accessibility and to make provision for mounting the Air Service gear type gasoline pump and generator drive. At present all gears are assembled to the shafts by using the stub-tooth spline construction referred to above. The tachometer drive is now taken off the left camshaft. All gears have stub-teeth. The magnetos are driven by a combination flexible disk and Oldham coupling. Two flanges used in this drive are provided with bolt holes so spaced about the same bolt circle as to enable a very close angular adjustment.

Seven Bearing Type Crankshaft

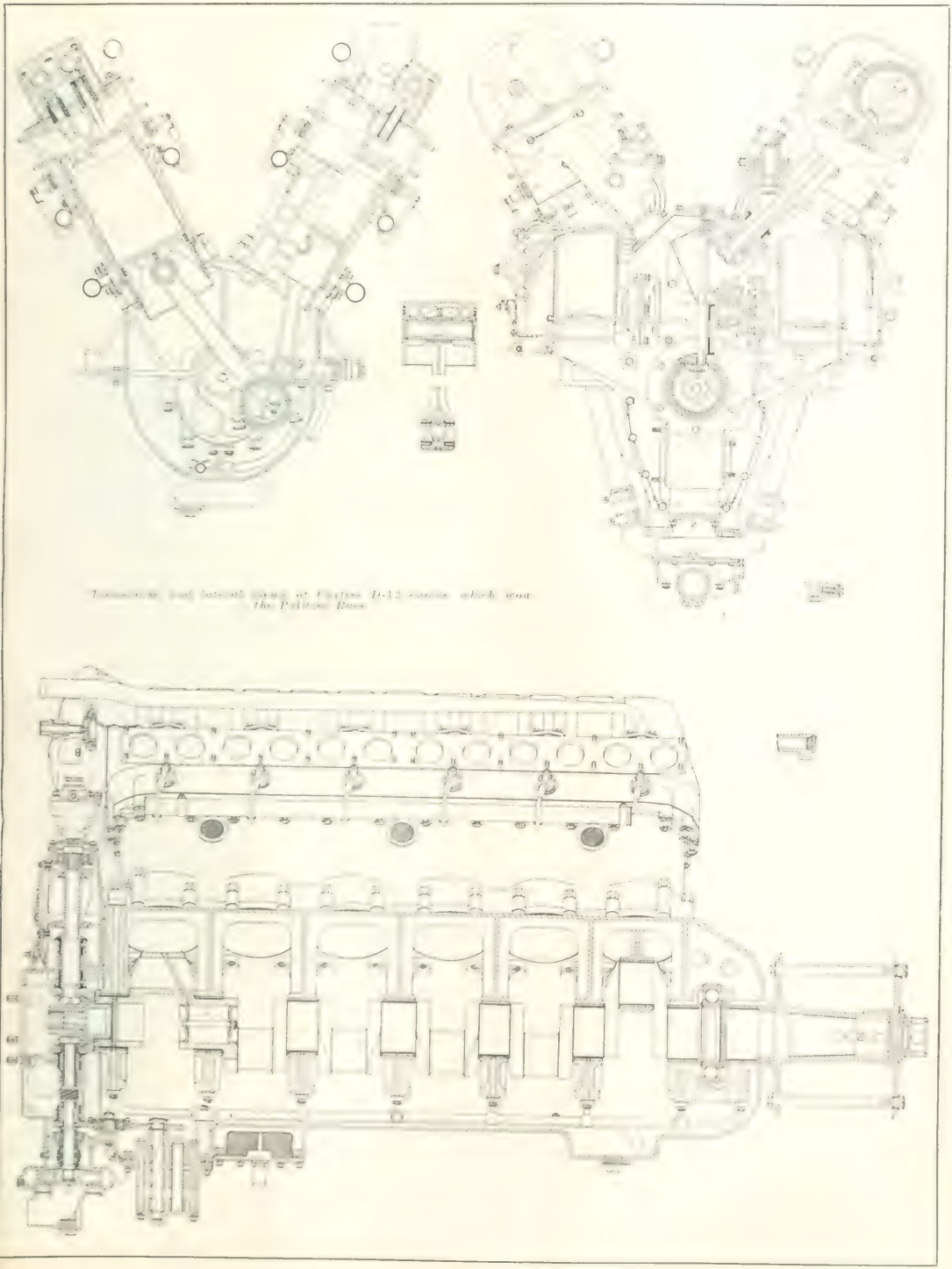
The crankshaft is Wyman-Gordon low chrome nickel steel forging and is of the conventional seven-bearing type which has been used heretofore. The lengths of the main



Power, fuel consumption, b.m.e.p. and propeller load curves of the Curtiss Model D-12 engine with 5.3 to 1 compression ratio

bearings have been altered so that only two sizes are now used. The center bearing is $1^3/_4$ in. long while the other bearings are all $1^1/_2$ in. The main bearings are 3 in. in diameter and the crankpins $2^1/_2$ in. as formerly. The crank cheeks are now $^1/_4$ in. wider than formerly but are elliptical in end view instead of rectangular. By these changes the shaft has been made stiffer although lighter than formerly. The practice of dividing the main bearing into two sections and placing the ball thrust between them is continued.

The upper half of the crankcase has been slightly short-



Transverse and longitudinal views of Curtiss D-12 motor which won the Pulitzer Race

Table of Dimensions and Areas of Curtiss Planes Which Won Pulitzer Races in 1921 and 1922

	Curtiss-Navy Racer (1921)	Curtiss-Army Racer (1922)
Span (overall)	22 ft. 8 in.	19 ft. 0 in.
Length	21 ft. ½ in.	18 ft. 11 in.
Height	8 ft. 11 in.	7 ft. 10 in.
Length, upper panel	22 ft. 8 in.	19 ft.
Length, each lower panel	10 ft. 2¼ in.	8 ft. 10 in.
Chord (all wings)	48 in.	46 in.
Angle of incidence	0 deg.	0 deg.
Gap	48 in.	46½ in.
Stagger	15 in.	7½ in.
Dihedral (lower only)	2 deg.	0 deg.
Sweepback	None	None
Tread of wheels	60 in.	58½ in.
Upper wing panel	88.0 sq. ft.[1]	68.4 sq. ft.[2]
Lower wing panels with ailerons	80.0 sq. ft.	62.74 sq. ft.
Total wing area	168.0 sq. ft.	138.0 sq. ft.[3]
Ailerons	17.6 sq. ft.	9.25 sq. ft.
Horizontal stabilizer (2)	12.6 sq. ft.	11.2 sq. ft.
Elevator (2)	9.2 sq. ft.	6.9 sq. ft.
Tail fin (1)	4.8 sq. ft.	4.9 sq. ft.
Rudder (1)	4.8 sq. ft.	4.9 sq. ft.

[1] Had no ailerons. [2] Including ailerons. [3] Including stubs and landing gear fairing.

ened by removing the propeller end electric starter bosses but is otherwise practically unchanged. Duralumin forgings are now used instead of aluminum castings for the main bearing caps. The bearings are of bronze with babbitt linings held in place by countersunk screws. These bearings are bored to size in a boring mill and are not line reamed or scraped since the makers believe that this practice gives the best alignment securable. It also materially facilitates production.

The aluminum pistons have a ribbed head and the rings have been lowered to provide a wider top land and to make the rings all 3 32 in. wide. The piston pin floats both in the rod and in the bosses. It is held in place by snap rings of piano wire. The connecting rod assembly is unchanged. They are of articulated type, the short rod being forked over a boss on the master rod.

Three Separate Oil Pumps

The lower half of the crankcase has been entirely redesigned to eliminate the oil tank formerly built into it. At the same time the oil pump has been redesigned. There are now three separate oil pumps instead of three suction and two pressure pumps formerly used. The oil pumps are driven by spur gears from the lower vertical shaft. The middle gear of the train is mounted on an eccentric stud attached to the lower case, the arrangement being such that an easy adjustment for proper mesh can be made without special care being used to maintain exact center distances in machining.

One of the oil pumps draws oil from the front end of the crankcase and the other from the rear end, while the third delivers oil under pressure to all bearings on the crankshaft, camshafts, and to the plane bearings in the gearcase. All other bearings are fed by splash or by oil which runs back from the camshaft compartments. The average oil consumption is said not to exceed 0.015 lb. per b.-hp.-hr.

The water pump design is changed to provide a ball bearing in place of the plain bearing formerly used and a splined instead of a square shaft. The water pump is driven off the lower end of a vertical shaft at the rear of the engine and is provided with easily adjusted glands to prevent oil and water leakage. An Alemite connection is arranged to force grease into the water gland since it has been found that it is easy to prevent leakage when the packing is kept soft with grease.

The water pump has a double shrouded type of impeller, the same as that used formerly except that the capacity has been slightly increased. The pump delivers water through manifolds to the lower end of each cylinder block. After passing through the cylinder jacket the water issues through manifolds attached to the cylinder heads.

Redesigned Propeller Hub

The propeller hub has been redesigned so as to use standard size Liberty bolts and bolt circle. The loose flange of the hub is a duralumin forging.

The engine is fitted with two Zenith U. S. 54 carbureters rebuilt to use throttles with shafts parallel with crankshaft and to provide a special mixture control. The two carbureters are interconnected with a cast aluminum air duct which draws air through a sheet aluminum air stack from outside the body of the plane. Two twelve-cylinder single-spark type Splitdorf magnetos, Model SS-12, are used for ignition. There are two plugs per cylinder, one on each side. One magneto fires the plugs on the intake side and the other those on the exhaust side.

The gasoline system consists of a Curtiss three-cylinder gasoline pump which feeds fuel directly to the carbureter. The fuel is fed through a relief valve to maintain constant pressure, an overflow being provided to take care of excess capacity. The pump is arranged to give positive priming and is oiled under pressure to prevent the leakage of fuel past its pistons.

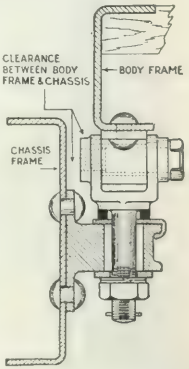
The engine weight is given as 715 lb. with propeller hub and water, or 671 lb. empty and without accessories.

New Body Anchoring System

TO prevent frame distortion from "racking" the bodywork and thus setting up creaks which develop later into rattles and cracked beading and panels, the Daimler Co., Coventry, England, utilize a system of anchoring the body to the chassis frame which permits of movement between the two.

The body is built up on a light pressed steel frame of channel section which is secured to the chassis at two points at the rear and at the front rests upon blocks of rubber attached to the chassis. The rear anchorages form hinges which enable the body to be lifted up at the front until it assumes an angle of approximately 45 deg., a feature obviously facilitating the inspection and adjustment of the transmission, etc.

The accompanying drawing shows one of the anchorages and indicates the amount of clearance allowed between the chassis frame and adjacent parts attached to the body frame. The bracket rivetted to the chassis has, it will be seen, a hole with considerable clearance for the vertical stem of the hinge fork, this being provided to permit of inadvertent variations from standard dimensions in the two frames.



Rear anchorage of Daimler bodies; section showing channel steel frame on which body is built up independently of the chassis frame.

Making Fin and Tube Type Radiator Cores

Tubes are drawn, inserted in and soldered to fins punched from sheet brass. Single sections are then assembled into one-piece cores. Single operator makes 9,000 ft. of tubing per day.

By Herbert Chase

ALTHOUGH fin and tube type radiators have been used for cooling automobile engines ever since the earliest types of cars were constructed, there have been many recent advances in the method of manufacturing radiator cores of this type. There are numerous different methods now followed in making these cores, and each manufacturer has a more or less characteristic type.

The type marketed by the Bush Mfg. Co. consists of a series of vertical sections containing from three to six rather flat vertical tubes arranged in a plane at right angles to the front of the radiator. The tubes are spaced on centers about 1 in. apart, and are forced through fins of sheet brass spaced from four to eight per inch of height. The fins are made from 0.005 in. ribbon, the edges of which are folded over so as not to present a knife edge at the front and rear of the radiator. The fins are pierced to fit closely over the tubes and the front edge of the fin is, in some cases, slotted at two points to provide recesses into which are fitted vertical strips which join the fins at the front edge. These strips give the front a square cellular appearance and serve also to strengthen the core.

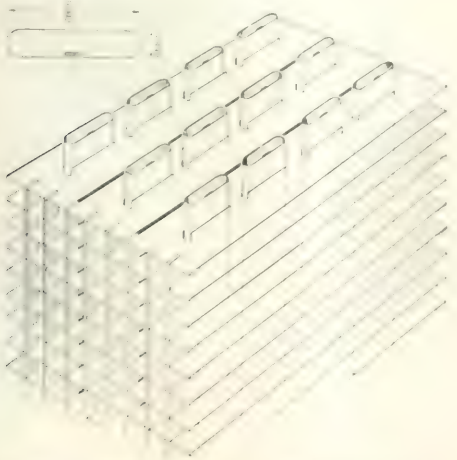


Fig. 1—Sketch of a portion of the Bush fin and tube core, showing section of the tube with double-locked seam

The separate vertical sections are 1 in. wide and are made of such length as to form a core of the desired height. The single sections are placed side by side in assembly to form a core of a width to fit the particular shell employed.

Each single section is dipped in solder before the final assembly so that the fins are securely soldered to the tubes, while all portions of the section including the inside and outside of the tube, as well as both sides of the fins, are coated with solder. After assembly of the sections to form the complete core, the latter is dipped in solder front and back in order to make it a single unit.

Manufacturing Operations

The first step in the manufacture is the formation of the tube, which has the section shown in Fig. 1. It will be noted that the seam is of the double-locked joint type. The tube is formed from brass ribbon 0.009 in. thick and 1 27/32 in. wide. This ribbon is pulled through a forming die on a conventional type of draw bench as shown in Fig. 2. The tube is formed with the lock joint in a single operation. It is made in sections 10 or more feet in length and is afterwards sawed off by a high-speed rotary saw to the desired length for the particular core.

The lubricant used in the drawing die is whale oil soap in water. A single experienced operator can make, on a single draw bench, from 500 to 600 lb. of tubing per 9-hr. day. Since the tube weighs 0.0575 lb. per ft. this is quivalent to about 9000 to 10,000 ft. of tubing per day.

The second operation is to saw off the tubes to the desired length. The tubes are then burred on each end and are then transferred to the tube pushing machine described below.

The brass ribbon used for the fins is 0.005 in. thick and of whatever width is necessary to form a core of the desired depth. The first operation on the ribbon is to draw it through a die which simply folds over the edges. The ribbon is fed off a spool, through the die and on to a second spool or pulley, which is driven by power. The spool of ribbon with folded edges is then transferred to a high speed punch in which the holes for the tubes are pierced and the ribbon cut off in 1-in. lengths, which form the individual fins. The metal in the holes is not cut away but is bent up to form a good surface for soldering to the tube. As each fin is cut off it is automatically placed in a loading jig in which the fins are spaced from four to eight per inch, according to the amount of cooling surface desired in the particular core.

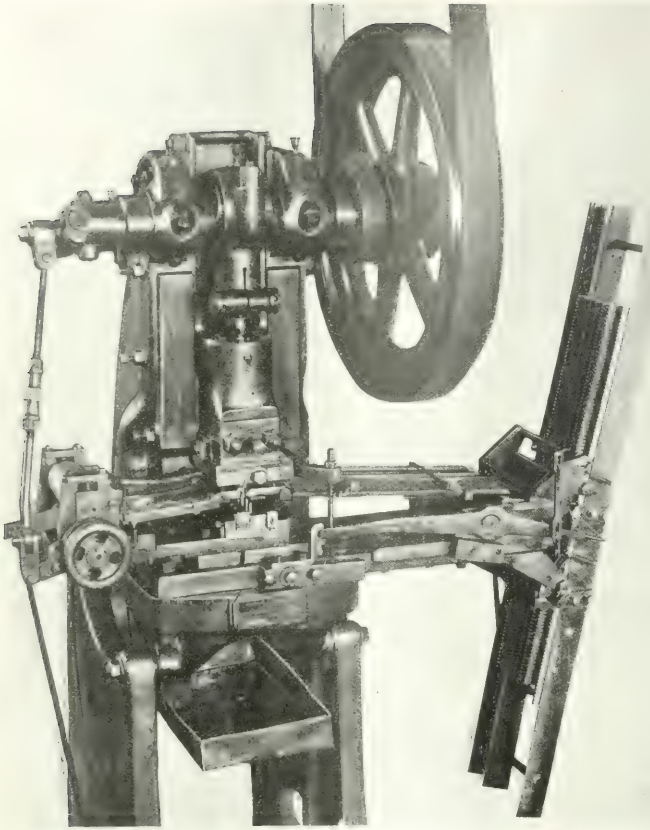


Fig. 3—The punch here shown pierces the holes in the fins, cuts the slots in their front edge, cuts the fins off to length and inserts them in the loading jig shown at the right

This automatic punching machine is capable of loading from thirty-six to forty jigs per hour. The machine is shown in Fig. 3. The unloaded jig is placed in position on a frame at one side of the machine and is automatically fed upward as the fins are loaded in it. When filled to the desired height it is removed by hand and placed in the tube pushing machine shown in Fig. 4. At the same time another empty jig is placed in the frame. During the time the second jig is being loaded the first jig in the tube pushing machine holds the fins while the tubes are put in place by the same operator who cares for the punch.

It will be noted that the tube pushing machine has a bench to which the loading jig is fastened. Under this bench is a hand crank carrying a ratchet wheel and a pinion. The latter meshes with a horizontal rack which slides in a track under the bench. A head attached to one end of the rack, as seen in the photograph, bears against the outer ends of the tubes, which are placed in position by the operator. Into the ends of the two outer tubes in the row are fitted tapered brass pilots, the function of which is to align the fins as the tubes are forced through. Motion of the crank in a clockwise direction moves the rack and forces the tubes through the fins, after which the section, with fins in place, is removed by hand and is ready to be sent to the dipping room, while the jig is returned to the loading machine.

A single operator handles the punch and the tube pushing machine. He pushes one set of tubes through the fins in one jig while the other jig is being loaded in the punch. An operator can thus make from 36 to 40 sections per hour, depending upon the length of the sections.

These sections are dipped separately, first in a soldering flux, then in a bath of solder which tins them all over, including the interior of tube, thus soldering the fins to the tube as well as soldering the tube joint. This dipping is done by hand while the bath of solder is maintained at a correct temperature by adjustment of the gas flame.

Following the dipping operation the single sections are assembled in a frame on a table and separating strips of copper about 3/16 in. wide are inserted between sections. In some cases also, strips are placed in the slots in the front edge of the fin, which are cut at the same time the fins are pierced in the punching machine, referred to above. These strips are intended to give the front an appearance similar to that of a square cellular type core. When the strips have been inserted in the front the core is locked in a frame and turned over after which the strips between the single sections are inserted in the back face. When these strips are in place the core is placed on a surface plate where it is trued up. The front face is then dipped in flux and in a bath of solder, thus firmly securing the strips in place and locking the core together. The backface of the core is then dipped also.

Following the final dipping operation the core is transferred to a bench where the front face is filed off by hand to give a perfectly level front surface. The core then undergoes a hand straightening operation performed by hand by an operator who uses a multiple-pointed punch, which fits into the front cells and straightens them into parallel rows. This operation is for the sake of appearance only.

Fitting Header Plates

The next process in the manufacture is to punch out header plates from 20-gage bronze. This is done in a power punch through which the bronze ribbon of the desired width is fed. The punch simply pierces holes through which the ends of the tubes in the respective single sections project.

The next operation is to apply the header plates to the core and hand solder them in place. If any trimming is required on the core, as, for example, to cut off corners to conform to a particular shape of shell, this is done by hand before fitting the header plate.

In many cases cast radiator shells are machined and fitted in the Bush plant, or are formed from sheet metal, reinforced by the necessary castings, and assembled to the core. The completed radiator is then tested under

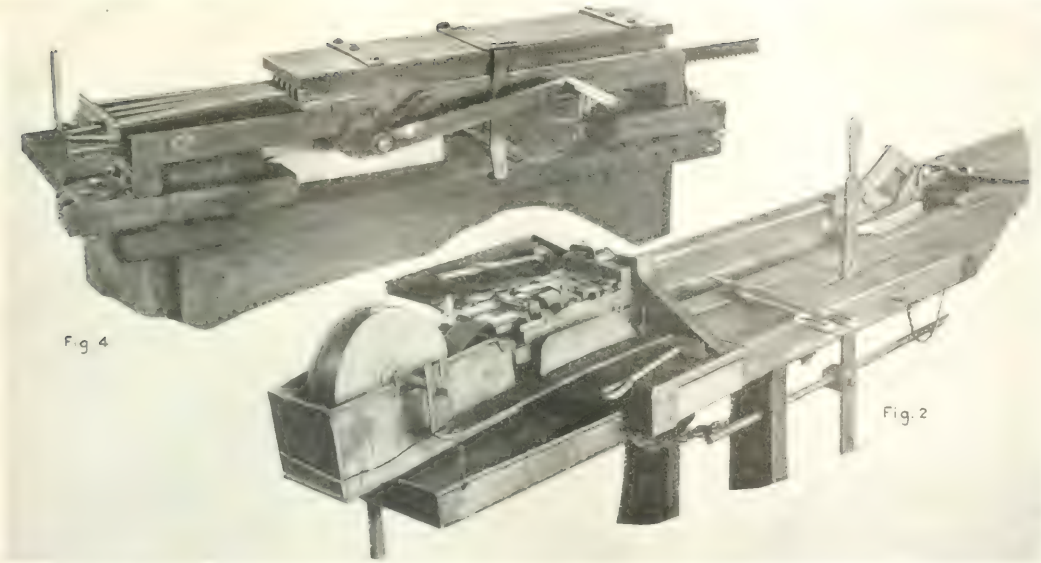


Fig. 2—Drawing the brass tube through a forming die. The brass ribbon used is 0.009 in. thick. The tube is formed in a single operation. Fig. 4—Pushing the tubes through the fins as they are held in the loading jig. This is a hand operation. A single operator performs this operation and cares for the punch shown in Fig. 3. While he is pushing the tubes through fins held in one jig, another jig is being loaded in the punch

water by applying an air pressure of 12 lb. or more as desired. If any leaks are found these are carefully repaired by hand before the core is passed. In case of cores which are shipped without the shell a temporary box is soldered top and bottom to admit of the pressure testing operation, after which the box is removed.

Protection Against Cementation by a Brush-Applied Coating

MESSRS. Galibourg and Ballay describe in the Revue de Metallurgie a new process for protecting certain portions of pieces against carbon penetration in the cementing process. They use two parts by weight of copper dust and one part of emery dust together with sufficient solution of commercial sodium silicate to make a heavy paint. The coating obtained with this mixture is very adherent before it is heated, but readily drops off after cementation and quenching. The best plan is to prepare the mixture of copper dust and emery dust in advance and add the necessary amount of potassium silicate solution at the time the paint is wanted.

The paint should be prepared only a short time before it is to be applied. At first the silicate is added little by little, so as to obtain a thick paste, which is then brought to the necessary fluidity to obtain a smooth coating by means of the brush. If the mixture thickens while it is being applied it is thinned down by adding silicate solution.

Experience has shown that the coating will protect efficiently only parts that have been thoroughly cleansed of grease and of silicates. Cleansing in hot potash is entirely insufficient, as mineral oils show little tendency toward emulsification. The most efficient method of grease removal seems to be to pass the pieces to be treated through a furnace at about 930 deg., carefully avoiding raising to a red heat, as this would produce scale. Numerous tests made under these conditions and covering thousands of pieces are said to have always given excellent results.

It requires a coating of from 0.020 to 0.030 in. thickness to protect against cementation to a depth of 0.040 in. If the coating is correctly applied its drying requires about 15 minutes. At the end of that time the pieces may be handled without risk. In any case the pieces may be put in the cementing boxes an hour after having been given the protective coating.

In cases where it is necessary to economize time or where, on account of the form of the parts to be protected, rapid drying is necessary (protection of projecting angles) the coating may be applied to the piece after it has been heated to from 160 to 190 deg.

Taking account only of the cost of the materials and making the test on a piece comprising equal areas to be cemented and to be protected, the two portions of the surface also being identical in form, the advantage remains with copper applied electrolytically. But if account is taken of the fact that painting with silicate permits of passing through four times as many pieces, by doing away with the attachment of the pieces before they are placed in the bath and the cost of installation and maintenance of the plating establishment, the advantage is largely in favor of painting with silicate.

It is quite evident that the choice of one or the other of these processes should depend upon the proportion of the surfaces to be cemented and to be protected.

Keen Competition Forces Jobbers to Restrict Lines

New trend gains strength in automotive equipment field. Salesmen must have popular lines on which to specialize. Some manufacturers also working in same direction. New sales methods.

By Neal G. Adair
Editor, Motor World

A JOBBER received a letter from a manufacturer of timers for Fords, asking why he was not selling more of the manufacturer's products. The jobber replied that he was not trying to sell them. Thereupon the manufacturer wrote an indignant letter cutting the jobber off his list.

The manufacturer was justified in cutting the jobber off. His mistake was in getting indignant. If the manufacturer had taken the trouble to investigate he would have learned that he should have taken the jobber off his wholesale list six months earlier. At that time the jobber decided to discontinue carrying a dozen lines of timers in favor of selling three lines, one high priced, one medium and one low. The indignant manufacturer's timer happened not to be one of the three.

This incident illustrates a trend in merchandising which is gaining strength every day in the automotive equipment field. Intensive competition is forcing jobbers to restrict their lines. Scattered gunfire from such a skirmishing line as a catalog containing seven or eight thousand items won't win to-day's battle on the dealer and garage front. The jobber must have a battery of Big Berthas and he is finding it in lines of leaders—a dozen or two dozen fast selling items with which his salesmen can batter down competition and then mop up with the secondary ammunition of general merchandise.

NECESSITY for operating along sound economic lines is bringing a distinct change in methods of merchandising automotive equipment. It is no longer possible to get satisfactory results with scattered sales effort. Concentration is needed and the necessity is recognized.

* * *

In this article Neal G. Adair, editor of Motor World, points out the trend of merchandising in this field. He gives incidents by way of comparing the effectiveness of different sales methods and tells some of the problems that the automotive equipment manufacturer is up against.

THE jobber's Big Berthas must be goods that his salesman can make a noise about, which imposes two requirements, first, that the goods must be highly salable, and, second, that the salesman must know the goods. The second requirement is largely responsible for the restriction of lines. A salesman cannot make much of an impression walking into a dealer's establishment and trying to sell him one of a dozen lines of timers or horns or even spark plugs. He cannot talk convincingly about any of them. He cannot tell the dealer why any one is a good piece of merchandise or, what is more important, how the dealer can go at the job of selling it. If he has one or, at the most, two or three lines of each class of merchandise he can learn the construction features and selling points of all of them fairly well. He can open his conversation with the dealer by talking about items which he knows well, obtain an order or group of orders from his line of leaders and then, when he has maneuvered the dealer into a buying mood, work up a reasonable volume of pick-up orders from the pages of his catalog making up his second line of attack.

Not all jobbers by any means have reached or even approached this stage of semi-specialization but the number who are working along these lines is gaining every day. This trend among jobbers is meeting co-operation in some manufacturing circles, resistance in others.

THE jobber who is cutting his timer line, for instance, down to three would like to have fewer competing jobbers handling the same timers. He feels that if he is going to concentrate his timer sales activities on three lines the manufacturers of those lines should co-operate by broadening his market, and they can do this only by cutting down the competition against his work as a distributor. He would like to see, perhaps, two or three of the twenty odd jobbers in his territory handling these timers, another group of jobbers, another group of timers, and so on, eliminating a condition under which perhaps fifteen to twenty jobber salesmen in a single week approach the same group of dealers with the same list of timers. Some manufacturers are falling in with this line of thought. In fact, some are urging it upon jobbers, with the result that in quite a number of lines manufacturers are gradually but materially cutting down their jobber representation in given territories.

On the face of it the two movements—jobbers restricting their lines and manufacturers cutting down mul-

tiplicity of jobber representation—should assist in the much-needed process of reducing distribution costs.

Another instance, rather, a pair of them, will serve to illustrate the workings of the present day trend in the equipment field.

A JOBBER who had been carrying several lines of brake lining threw out all but one six months ago. In the half year period he has sold twice as much brake lining as in any similar time in the history of his business. It didn't just happen, of course. He pushed the sale of the one brake lining, as he could not promote three or four lines. His salesmen were able to study up on the one line, talk about it as the best line and turn convincing sales arguments into sales.

The other instance is of a manufacturer, one of the most aggressive in the equipment field, whose factory makes a replacement unit. In a wide territory he cut his jobber representation from five to two. Over a year's period accurate check was kept on all the company's products going into that field, and the two jobbers gave him more distribution than the five ever had. When it is noted that these two jobbers had cut their lines of this class of product from six or seven to two or three the full import of what had taken place is seen. The manufacturer did not eliminate competition on his line in the territory. Rather, he intensified it by making it more worth the while of his wholesale representatives to push his goods. Nor did the jobbers give the manufacturer a monopoly of their services. They simply fitted themselves for better merchandising of the class of merchandise in question by restricting the number of lines.

ANOTHER manufacturer told a group of jobbers recently that he hoped within two or three years to reduce the number of jobbers on his books from 500 or thereabouts to a little more than 200. He gave it as his opinion that a manufacturer with a salable line of merchandise can cut his jobber list in half, using discretion, without losing sales volume.

Apparently, judging from the hundreds of names on the wholesale lists of some manufacturers, there are still sales managers who think that representation spells distribution. More and more of them, however, are learning their mistake. They are discovering that shipping a jobber a bill of goods doesn't sell them, and that a jobber who places only small and occasional orders is not a good customer, for two reasons. The first is that he is not giving the manufacturer distribution of his product in the territory and the second and more important reason is that he is not getting a frequent turnover of merchandise and so is not a good credit risk for the manufacturer.

NEW manufacturers coming into the equipment field cannot always get representation by the strongest jobbers, nor can they get individual jobbers to push their lines as vigorously as they will push tried and proven merchandise. They are forced to an extent to seek distribution through numerical strength of representation. But it is significant that some of the older and apparently more successful manufacturers are supporting and in some cases leading the movement among the jobbers to intensify selling by lopping off some of the outer fringes of competition. Just as the jobber can work more efficiently selling a restricted line of merchandise, so can the manufacturer get better results, particularly through his field organization, working with smaller groups of jobbers.

The automotive equipment business necessarily is younger than the automobile industry from which it gets its living, and it still has many straggling features. The trend toward centralization of selling effort may be regarded as one of the reforms developing with age. This movement, aside from lightening burdens and tending to assure profits of manufacturers and wholesalers, may gradually influence lower retail prices through the process of reduced distributing costs. It is not difficult to understand why an article which cost the manufacturer $1.85 must take $10 out of the consumer's pocket after one has seen twenty jobber salesmen, in a day, calling on a garageman on the outskirts of one of our eastern cities and, added to that spectacle, has visualized the vast army of manufacturers' salesmen and missionary men working continually on the many thousands of wholesalers and retailers in the equipment field.

BUT the young and struggling industry is getting steadier on its feet. Through its several associations and its group meetings of manufacturers and jobbers it is learning more about the laws of supply and demand. The manufacturers' inclination toward limitation of jobbers, together with the jobbers' leaning toward curtailment of lines, seems to be a move in the direction of operation along more soundly economic lines. Add to this the additional tendency of jobbers to restrict territory and so cultivate it more intelligently and we find much that the manufacturer, veteran or novice, needs to keep closely under his eye in the automotive equipment field.

American Car Exports to South Africa Show Increase

PASSENGER car imports into the Union of South Africa for the first half of 1922 were very good, considering the general economic conditions that have prevailed since the first of the year. Whereas in the whole year 1921 only 802 American passenger cars were imported, 854 were imported in the first six months of 1922, and 421 of them in May and June.

Imports of Canadian cars in the first six months of this year were 959 compared with 1010 in all of last year. Combining the two, we find that 94.03 per cent of the entire imports were of American origin, as compared with 87 per cent in 1921.

The United Kingdom was the second largest exporter to this market, the six months total being 59 machines of a value of £27,279. The total number of passenger cars from all sources imported in January-June, 1922, was 1928, valued at $373,047.

France is the only other country that has any particular share in the present trade of South Africa. Thirty cars were imported up to July 1 as compared with 34 last year. As before, practically all are Renaults. Germany sent in only 14 cars.

IF the American motorcycle exporter would compete successfully in the Great Britain field, he must confine himself largely to models of 2.75 and 2.50 hp. at popular prices, rather than those whch have been shipped over during the past three or four years of 3½ hp. The current demand for motorcycles is for the lighter models. Side car machines of 4.5 and 5 hp. models, at prices from £75 to £100, are reported as the best sellers, according to advices to the automotive division of the U. S. Department of Commerce.

American Exports of Cars, Trucks, Tires and Aircraft

COUNTRIES	GASOLINE PASSENGER CARS						GASOLINE TRUCKS						PARTS
	Up to $800		$800 to $2000		$2000 and over		Up to 1 ton incl.		Over 1 to 2½-tons		Over 2½ tons		
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	Value
Europe													
Austria													$600
Azores and Madeira Islands													448
Belgium	438	$112,035	19	$22,156	2	$4,014	371	$110,322	1	$826			31,478
Bulgaria													80
Czechoslovakia													103
Denmark									1	1,320	1	2,224	167,468
Esthonia	39	21,854	13	14,629									
Finland									1	3,209			403
France	11	6,745	9	10,535	5	13,841			1	1,186	1	1,983	102,408
Germany			1	1,000									796
Gibraltar			1	1,658									105
Greece	4	2,809	1	1,918									8,502
Hungary	1	440											
Iceland and Faroe Islands													400
Italy			1	1,512									2,025
Malta, Gozo and Cyprus Islands	6	2,150							1	2,460			190
Netherlands	17	9,706	18	20,640	1	3,577							6,331
Norway	70	28,526	8	8,536			15	3,515					11,167
Poland and Danzig			6	7,500									10
Portugal			8	8,749									1,709
Roumania					1	3,870			2	3,766			2,192
Russia in Europe	60	35,160					40	18,400					6,043
Spain	216	72,215	128	149,699	25	71,175	2	2,064					436,246
Sweden	50	36,950	42	44,851									25,815
Switzerland	12	5,698	12	11,539	2	6,021							6,010
Turkey in Europe	1	586	2	1,840									2,635
Ukraine													414
England	514	276,229	94	104,478	3	11,150	53	41,925	77	62,099			430,685
Scotland			1	1,500									150
Ireland	2	775	2	1,943									6,821
Yugoslavia, Albania, etc.													1,121
North and South America													45
Bermuda													12
British Honduras	425	238,355	433	448,800	49	165,120	39	28,648	87	81,855	28	77,346	769,950
Canada	2	686	1	1,360									1,486
Costa Rica			2	2,335					1	1,214			910
Guatemala	3	1,241	1	917					3	3,472			2,081
Honduras													125
Nicaragua													4,719
Panama	10	5,288	4	4,128									1,196
Salvador													76,012
Mexico	530	224,275	142	154,751	26	62,163	110	47,516	13	19,067	10	25,434	32
Miquelon and St. Pierre Islands													1,261
Newfoundland and Labrador			2	2,603									2,049
Barbados							1	404					11,587
Jamaica	39	22,002	5	4,719			18	7,906	6	6,592			6,887
Trinidad and Tobago	14	6,656									2	4,381	2,710
Other British West Indies	9	3,220	2	1,986			2	504					30,643
Cuba	103	41,026	9	12,125	18	49,191	31	11,001	6	6,257			13,873
Dominican Republic	10	3,999	9	12,261	2	5,384	2	808	1	1,697			1,275
Dutch West Indies	1	358											902
French West Indies	2	829											3,010
Haiti	4	2,964	1	900									
United States													780
Virgin Islands of U. S.													85,682
Argentina	32	23,812	96	101,053	7	17,105							886
Bolivia											3	12,684	80,050
Brazil	135	51,108	34	40,071	9	24,642							6,912
Chile			1	1,950									6,201
Colombia	10	5,172	8	8,761	1	2,989					1	2,078	585
Ecuador													1,175
British Guiana			1	880									700
Dutch Guiana							1	325					87
Paraguay													6,080
Peru					2	16,025	20	8,080					11,140
Uruguay	80	22,563	13	15,678	4	11,413	40	9,435					4,861
Venezuela	16	6,234	8	10,560	5	10,484	2	808					
Asia													125
Aden													520
Ceylon	8	4,540	2	2,955									8,944
China	54	34,764	19	18,479									
Chosen	2	956	7	8,106									14,950
British India	80	53,003	8	8,508	2	4,008	5	4,032	5	5,061			4,505
Straits Settlements			6	5,451									9,690
Java and Madura	30	22,500	21	21,468									1,431
Other Dutch East Indies													54
French Indo China													326
Hejaz, Arabia and Mesopotamia	5	3,888											88
Far Eastern Republic													427
Hongkong	1	750	3	2,525					5	11,838	2	5,369	46,853
Japan	2	1,300	15	15,778									16,820
Palestine and Syria	73	28,353	11	13,872									215
Persia									2	2,112			15,541
Philippine Islands	50	25,559	10	13,291	4	10,765							178
Greece in Asia	10	3,929											
Turkey in Asia	6	2,318									1	1,800	1,174
Siam													
Oceania													91,409
Australia	405	257,265	300	324,879	14	31,314	18	16,226	147	100,311	6	11,453	27,655
New Zealand	100	60,341	102	84,193	2	5,985			10	19,678	10	23,036	418
Other British Oceania													147
French Oceania	2	1,100											1,170
Other Oceania													188
Africa													10,764
Belgian Congo	6	1,958					12	9,000	1	1,224			16,710
British West Africa	10	5,580	16	17,068							1	1,143	768
British South Africa	70	50,997	56	56,606	2	4,442							8,259
British East Africa	11	5,346	1	970									
Canary Islands	6	2,840	9	11,176			4	1,616					
Algeria and Tunis	14	5,354					6	2,185					4,321
Other French Africa	7	2,904											1,065
Egypt	41	16,397	1	1,000			4	1,616					3
Liberia							1	500					4,119
Morocco	24	11,184	1	1,500									126
Portuguese East Africa	3	2,308					30	13,137					267
Other Portuguese Africa	34	14,427											1,482
Spanish Africa	5	3,750											
Fayal Islands													
Total	3,931	$1,302,395	2,026	$1,849,226	186	$544,678	827	$339,973	369	$335,235	66	$168,931	$2,678,941

Canadian Exports for August, 1922

ELECTRIC PASSENGER CARS AND TRUCKS		TIRES						PASSENGER CARS		MOTOR TRUCKS		PARTS	COUNTRIES
		Casings		Inner		Solid							
No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	Value	
													Europe
		8	$153										Austria
													Azores and Madeira Islands
		574	7,805	756	$1,175			22	$16,509			$543	Belgium
													Bulgaria
													Czechoslovakia
		2,406	33,283	2,438	5,864	212	$6,035	3	3,790			78	Denmark
								1	1,346				Esthonia
		241	4,941	134	342	25	608						Finland
		1,191	24,937	93	375	3	68						France
		28	446	3	19								Germany
													Gibraltar
		767	9,573	595	967								Greece
													Hungary
		91	1,445	82	161	8	168						Iceland and Faroe Islands
		681	9,064	1,100	4,292			2	2,044				Italy
		202	2,904	137	249			3	2,224				Malta, Gozo and Cyprus Islands
		734	11,659	887	2,097	30	685	47	34,825			194	Netherlands
		1,821	35,760	1,093	2,411	16	707					356	Norway
													Poland and Danzig
		287	3,678	20	38			6	8,172			13	Portugal
		285	5,572	49	111								Roumania
													Russia in Europe
		1,996	30,155	1,062	2,279	515	16,898	28	23,113				Spain
		1,967	28,845	2,351	5,498	12	355	16	7,516			226	Sweden
		150	1,621	100	100							87	Switzerland
		273	2,876	77	123			1	1,362				Turkey in Europe
													Ukraine
		26,382	299,159	25,043	38,713	999	19,767	923	623,388			49,815	England
		325	1,339	40	54								Scotland
		361	4,325	85	163								Ireland
		639	9,855	560	1,208								Yugoslavia, Albania, etc.
													North and South America
		2	18	8	51					1			Bermuda
2	$2,900	2,871	39,936	3,133	4,876	153	6,408						British Honduras
		57	1,145	32	64								Canada
		71	1,692	67	155								Costa Rica
		76	2,284	70	266	38	1,461						Guatemala
		23	428	56	123								Honduras
		401	5,983	246	430	14	350						Nicaragua
		18	273	24	54	8	240						Panama
		12,806	130,888	16,009	27,380	187	5,453	16	19,875				Salvador
													Mexico
													Miquelon and St. Pierre Islands
		99	2,079	125	248	6	111	1	982	1	$510	535	Newfoundland and Labrador
		56	640	15	27								Barbados
		627	8,817	1,164	1,908	81	2,301						Jamaica
		187	2,462	181	393	2	84						Trinidad and Tobago
		81	1,022	37	77	2	50	7	5,656			465	Other British West Indies
		6,030	79,681	9,991	16,067	580	16,944					100	Cuba
		1,359	17,187	1,633	2,818	153	4,058						Dominican Republic
		70	762	77	128	2	32						Dutch West Indies
		146	1,409	156	264	3	79	9	6,601				French West Indies
		207	2,272	305	513								Haiti
								15	6,020			3,918	United States
		22	282	18	38								Virgin Islands of U. S.
		4,625	42,006	7,680	12,287	134	1,980	27	20,853			470	Argentina
		72	1,439	47	105	6	184						Bolivia
		3,796	50,677	941	1,391	219	4,794	26	17,097				Brazil
		674	9,632	382	995	13	364					59	Chile
		347	7,094	435	1,002	3	84						Colombia
		151	2,898	164	346								Ecuador
		94	876	159	242			3	2,192				British Guiana
		339	3,403	436	856			3	1,254				Dutch Guiana
													Paraguay
		362	7,169	246	449	18	353						Peru
		1,001	13,790	270	429			8	5,488			273	Uruguay
		238	4,201	398	824			8	3,718			88	Venezuela
													Asia
		1	9	26	50			5	2,290			1,070	Aden
		194	3,074	37	75			59	25,924			40	Ceylon
		298	6,034	353	794	64	1,703	10	8,557			442	China
		338	1,668	602	1,729								Chosen
		747	9,404	643	1,585	143	3,086	208	96,447	12	5,208	15,330	British India
		712	9,118	876	1,676	104	2,212					1,964	Straits Settlements
		852	11,596	445	901	336	11,070						Java and Madura
		176	2,094	166	409	32	860	39	16,446			635	Other Dutch East Indies
		80	1,198	60	180								French Indo China
		146	1,981	254	743								Hejaz, Arabia and Mesopotamia
													Far Eastern Republic
		17	205	17	18								Hongkong
		1,111	16,919	56	84	48	1,066	15	12,914				Japan
		959	11,740	949	1,878	30	791						Palestine and Syria
													Persia
		5,349	63,391	4,822	9,872	103	2,613						Philippine Islands
													Greece in Asia
													Turkey in Asia
								3	1,260			615	Siam
2	4,356	5,157	55,402	548	995	186	6,154	811	309,406	120	52,080	31,663	Oceania
		4,166	50,584	2,370	4,137	201	6,313	289	146,890			19,773	Australia
		32	459	30	60								New Zealand
		11	182	6	17	2	64					462	Other British Oceania
		31	294	33	58	2	44						French Oceania
													Other Oceania
													Africa
		321	6,481	336	815	10	300					2,461	Belgian Congo
		3,304	37,357	2,448	3,548	4	93	80	50,138			310	British West Africa
		410	4,889	276	556			1	1,605			1,562	British South Africa
		610	7,625	331	543	54	1,071	1	1,447				British East Africa
		303	4,165	125	234								Canary Islands
													Algeria and Tunis
		321	2,017	396	677			10	4,480				Other French Africa
		4	45	3	6								Egypt
		4	104	4	9								Liberia
													Morocco
		92	1,102	12	12								Portuguese East Africa
		115	1,570	39	88	140	2,955						Other Portuguese Africa
													Spanish Africa
								1	441			35	Fiji Islands
4	$7,456	101,835	$1,292,926	97,469	$172,834	4,901	$131,019	2,710	$1,582,280	133	$57,798	$133,582	



Rail Car Field Demands Specialized Activity

Service Truck executive favors anti-friction bearing in rail cars. Market limited, but demand exists for right product.

Editor, AUTOMOTIVE INDUSTRIES:

We regret that we consider it necessary to go on record as being entirely out of sympathy with the article entitled "Why Railroads Don't Buy More Rail Cars," written by Donald A. Hampson.

Mr. Hampson starts this paper with some very good statements regarding the necessity for combining railroad and motor truck practice in gasoline cars for railroad service.

Thereafter, however, he strays into two very serious errors: one of them in assuming that no attempt has been made to combine railroad and automotive experience, and in the other case in allowing his paper to degenerate into an argument in favor of plain brass bearings, which the railroad men themselves will admit are the cause of the greater part of their operating delays in freight trains, etc.

As set out by Mr. Hampson, it is indeed very important that the manufacturer of motor coaches should combine railroad and automotive experience. The engineer must choose carefully the good features of railroad practice, as well as motor truck and automotive practice, which are adaptable to his particular problem. For instance, the use of eight wheels under a car is not the result of any accident, but is based on real necessity arising from the operating conditions. The use of four-wheel pivotal trucks and of swing motion bolsters can be traced to a real need on the part of the railroad. It therefore seems obvious that any combination of automotive and railroad practice which seeks to offer a real solution of the problem in question should not overlook these particular essentials.

Plain vs. Anti-Friction Bearings

As regards the merits of plain and anti-friction bearing, I have no doubt that satisfactory automotive equipment can be built on either of these types of bearings. With the light weight per wheel which is encountered in gasoline motor coaches, however, the roller bearing packed in grease can be used with much less attention and much less trouble than any other bearing, including the plain, old-fashioned brass. Furthermore, it has been shown that all speeds below about 30 miles per hour, the resistance due to plain bearings is considerably in excess of that on anti-friction bearings. It therefore seems obvious that in gasoline propelled equipment, where the normal operating speed is usually around 30 miles an hour, anti-friction bearings would have a considerable advantage from the standpoint of acceleration and economy.

Finally we must point out that Mr. Hampson's title that the railroads are not buying motor coaches is false. Our experience indicates that if they are offered something that will really fit their needs, they will not hesitate to buy, and in good quantity, too. In closing, we want to point out one further thing. The field for cars of this type is relatively limited. The production for a year will be small as compared to motor truck or automotive practice. This is not a field, therefore, which should appeal to the large quantity producer, but will be made the field for specializing by the companies devoted exclusively to this work.

CHARLES GUERNSEY,
General Manager, Railroad Division, Service Motor Truck Co.

Editor, AUTOMOTIVE INDUSTRIES:

The article entitled "Why Railroads Don't Buy More Rail Cars," by Donald A. Hampson, published in your issue of September 21, 1922, has been read with much interest. His summary of the present strategical situation as between the automotive industry and the railroads is in general accurate. Perhaps he is inclined to criticise a little too severely the conservatism of the railroad engineers, in view of the remarkable record for efficiency and safe operation, which stands as a tribute to their policy.

Undoubtedly, the solution of the problem of adapting the rail car to the real needs of the railroads lies in a compromise. Experience has conclusively shown that the broad field of application is covered neither by the heavy motor coach of the early days, nor the standard motor truck chassis fitted with flanged wheels and a bus body. The former fails from an economic point of view, the latter from an engineering point of view.

Our experience with both the railroads and the rail car builders, leads us, however, to differ with Mr. Hampson in the detail of his suggested compromise. His proposed pedestal mount is perhaps justified according to the psychology of salesmanship, but the problem is fundamentally and ultimately an engineering one. In this latter respect the pedestal mount is far from being a panacea for all those ills which the light types of rail car have developed in service.

In order to justify the retrogression to the plain type of axle bearings, Mr. Hampson refers superficially to antiquated comparative tests between plain and anti-friction journal bearings. He further draws his parallel with an "overloaded freight car," completely ignoring the vast disparity in the character of the service. Surely the railroads are not seeking to duplicate the proverbial rough riding qualities of a freight car in their most modern passenger equipment. The shock and vibration in operation is one of the most severe indictments against the present light rail car.

It is now definitely known that there is a very appre-

ciable saving in power, resulting from the use of anti-friction axle bearings in rail vehicles. These conclusions are based on exhaustive tests conducted by the Swedish State Railways over a period of eight years. The incongruous results of early tests have been definitely traced to inherent defects in the primitive types of mounting employed; which through their enforced constraint on the axles introduced indefinite and incontrollable variables aside from the friction of the bearings themselves. The demonstration of this fact leads to conclusions in complete harmony with the experience derived in the application of anti-friction bearings in all other mechanical fields. There is no logical reason for assuming that a ball or roller bearing has desirable anti-friction qualities, when applied to a transmission, which it loses completely when properly installed in a correctly designed journal.

In regard to the durability of anti-friction bearings, under the very serious conditions of metallic impact, and unsprung wheel and axle loads, we have only to refer to the results obtained in tests on the actual steam equipment, in fast passenger service. The fact is not generally known that the Swedish State Railways now have a large part of their standard equipment fitted with anti-friction journal bearings. Tests are also in progress in the United States with this same type of roller bearing, installed on standard steel passenger equipment in express service. The results of these tests to date show conclusively that the life of such bearings is many times greater than the average of 35,000 miles, which is typical of plain bearings in equivalent service. The progressive railroads of both Europe and this country have shown a remarkable interest in the results of these tests and have found in them the answer to both the question of power saving and that of superior durability.

Since the anti-friction bearing has established its field and possibilities in regular steam train service, why ignore its multiple benefits in less severe service of rail car operations? Such a policy is poor salesmanship and worse engineering.

In conclusion we do agree with Mr. Hampson as to the simplification resulting from application of the pedestal type of mounting. Such a design, providing the latest railroad development of self-aligning roller bearings, applied to a live axle having lateral freedom, is an excellent solution of the journal problem. The further advance in assuring ease and comfort of riding must provide, in some way, a greater degree for transverse flexibility of the spring suspension. This is one of the notable differences in the character of the service exacted from rail vehicles over those employed on highways.

H. E. BRUNNER,
Chief Engineer,
S K F Industries, Inc.

Steering Gear Troubles Analyzed

Easy handling possible with proper steering gear construction.
Prominent engineers give reasons for present difficulties.

Editor, AUTOMOTIVE INDUSTRIES:

The items indicated in your recent article as having an effect on the question of steering are all of importance. With regard to castor action, we have found that increasing the ease of steering has made it increasingly important to reduce the castor effect almost to a minimum, in order to prevent front wheel wobble. With proper attention to the details of construction, both in manufacture and assembly, there is no reason why the largest truck should not be handled with perfect ease.

B. B. BACHMAN, Chief Engineer, The Autocar Company.

Editor, AUTOMOTIVE INDUSTRIES:

We have had few difficulties with steering gears, but do not think this would be the case if we put the steering gears into our cars as we receive them. We have to rebuild quite a number of them. In other words, we think the steering gear manufacturers are to a certain extent afflicted with one of the ailments from which we all suffer; that is, poor workmanship.

We believe, however, that the worm and sector steering is certainly the easiest.

With a large steering wheel, with the axle pitched to the proper degree sufficient leverage on the steering arm and with a worm and sector gear, steering should be very easy, and at the same time sufficiently fast to turn corners at a comparatively high speed.

We all know the objection to most of the worm and sector gears is the poor arrangement or rather lack of facilities to a great extent for taking up the wear even with eccentric bushings, which is a very poor proposition, and there is bound to be lost motion on the sector and also wear on both the worm and the sector.

W. G. WALL, Chief Engineer, National Motor Car & Vehicle Corp.

Editor, AUTOMOTIVE INDUSTRIES:

It has been our experience that all parts of the steering linkage must be free and in good alignment, that the axle must have the proper angle and the toe-in of the wheels must be right to give easy steering. The big factor, however, is the properly designed and manufactured steering gear.

We pay a good deal of attention to these points and we have an inspection test on our steering gears determining the pounds pull necessary to operate the gear.

We also lap the ball ends of the reach rods, as we have found that there is too much friction on a turned ball seat.

Lubrication has a great deal to do with easy steering. The king pin must be properly lubricated as well as all other connections. To cover this point on our king pin we use oil and the design is such that this oil cannot escape, therefore, does not have to have attention very often. The Empress Bowen system is used on the other connections.

C. E. JEFFERS, Chief Engineer, Nordyke & Marmon Co.

Editor, AUTOMOTIVE INDUSTRIES:

The statements made by steering gear manufacturers are undoubtedly true in some cases. I found that the toe-in as specified by nearly all manufacturers has practically no effect on the stiffness of the steering.

Outside of rough workmanship of steering gears, I find most of the causes of stiff steering on new cars is due to stiff assembly of the front axle. Car manufacturers have a tendency to assemble the front axle rather snug so as to give the axle longer life and prevent rattles and loose bearings after a few thousand miles. This particularly refers to axles with plain bearings in the knuckle pins and tie-rods. However, such axles will loosen up after a few hundred miles due to the road shocks, and after which the steering will be found usually quite easy.

I have also found that sometimes the steering gear mounting on the frame as well as the steering connections are quite flexible, which allows too much spring in the whole steering mechanism and makes the steering gear seem hard. This is specially noticeable when the steering gear is mounted away from the frame or where the steering gear is mounted on a part of the frame not braced against twisting of the channel.

I believe though that the greatest blame of hard steering rests with the public. The public will insist on riding with soft tires, which increases the stiffness of the steering very much and will not lubricate the front axle and steering mechanism as instructed. I have found very often that by lubricating the front axle only, it will bring a stiff steering car back to normal, although the steering gear was blamed for the fault.

VICTOR JAUTSCH, Chief Engineer, Earl Motors.

Editor, AUTOMOTIVE INDUSTRIES:

In our experience steering difficulty is caused almost entirely by improper alignment.

On the other hand, steering gear manufacturers have had considerable difficulty in eliminating rattles from their steering gears, and as a result they use various types of anti-rattling packings, which packings are invariably adjusted too tight. This difficulty could be eliminated if the steering gear manufacturer would agree to run his steering gears in so as to reduce the friction in the packings.

It is the practice of some steering gear makers to weigh the torque at the rim of the steering wheel, but the maximum torque they have fixed upon is entirely too high to produce an easy steering car. The hardened worm and segment or worm and worm wheel type of steering gear will practically lock under loads that would be produced in steering a car in sand or with partially deflated tires. In other words, the load which this type of gear of present design will carry without producing excessive friction in itself is very limited.

Excessive friction, due to misalignment of front axle part, could be eliminated by the car assembler by testing the alignment when the axle is carrying its full load. This could be accomplished by placing the front wheels on ball bearing plates or suspending the car from the rims of the front wheels, and fixing upon a maximum torque to turn from full right to full left.

The adaption of a ball steering knuckle tie-rod would go far toward improving the steering. The steering gear maker's contention that the alignment of the parts connected with the steering is not what it should be is to some extent correct.

G. E. FRANQUIST, Chief Engineer, James Cunningham Son & Co.

Editor, AUTOMOTIVE INDUSTRIES:

In the issue of AUTOMOTIVE INDUSTRIES of Sept. 14 I noticed an article relative to the front wheel "shimmy."

I have found that if the plugs that adjust the spring tension of the ball joints on the drag link are tightened it will in every case eliminate the "shimmy." At least I have never found a case that I could not cure by this method.

H. R. YOUNG,
Young & Patterson Co.

Editor, AUTOMOTIVE INDUSTRIES:

Referring to your article in the Sept. 14 issue, "What Makes 'Em Shimmy?" this has been somewhat of a puzzle to me during the past eight years. I have observed that cars equipped with rib tread cord tires are the worst offenders. The same car equipped with fabric tires driven at the same speed over the same pavement behaved very respectably. The remedy which I have applied is to set the knuckle pivots to an angle of 2 deg. 30 min., take up all play in the drag link, rebush the knuckles if they were worn and balance the wheels. I do not know whether this corrects the cause but it will correct the effect. Wobble occurs at speeds ranging from 8 to 15 m.p.h. Changing the course, increasing or decreasing the speed, will stop it. Cord tires are much more resilient than fabric. This fact, and the fact that wobble occurs at a certain speed, is a strong indication that vibration is the basic cause.

G. H. ALLYN.

Radiators and Cooling Problems

Engineers discuss many problems which arise in connection with this subject. Results of laboratory tests outlined.

Editor, AUTOMOTIVE INDUSTRIES:

With reference to the articles by A. L. Clayden which appeared recently in AUTOMOTIVE INDUSTRIES, on radiators and cooling systems, I would like to discuss a few points. I believe that such discussion and particularly a free and frank interchange of information is very desirable and must prove helpful to all concerned.

Mr. Clayden is to be congratulated for calling attention at the outset to the lack of quantitative data. It is to be regretted, however, that within a page after such a remark he gives an incomplete, qualitative curve bearing on the title of his whole article of Aug. 17, namely effect of water flow. The curve is incomplete and misleading because it does not show that beyond a water flow of 2 to 3 gallons per minute per inch depth of core, 1 ft. wide there is nothing gained by increasing the water flow. This was clearly demonstrated as a result of the creditable work done in Washington on aircraft radiators. See *Tech. Paper Bureau of Standards,* No. 211, p. 312. Further the curve given by Clayden is qualitative and rather useless because he does not state the units of the ordinates.

Mr. Clayden favors forced or pump circulation system but I fear that he will not convince any one of the correctness of his views when he states that "it is a very hard thing to argue but the writer himself is convinced

that the cost of a reasonably satisfactory convection or thermo-syphon system is actually higher than that of a simple pump system . . . ." Personally I would have been very interested to see some comparative cost figures. It seems to me that the choice of a thermo-siphon system depends on the relative cost of the two systems and their relative advantages and disadvantages. As to the latter point I may call attention to the fact that the advantages of the thermo-siphon system are its simplicity—there is no pump, no pump bushing, no leaks, etc. Its disadvantages are that it is more sensitive than a pump system to low water level and it is more liable to freeze in winter.

Mr. Clayden seems to think that the so called critical velocity of water flow affects the rate of heat transfer and is responsible for the different water flow-heat transfer characteristics of different radiators. I am rather inclined to question the existence of a critical velocity—as the term is understood by hydraulic engineers. It seems to me that with pump circulation, at all ordinary ranges the water flow is turbulent; however, it has been found that heat transfer does vary with water velocity. See Bulletin 40. Engineering Exp. Station, University of Illinois.

Effect of Direct and Indirect Surface

In case of automobile radiators the effect of the relative amounts of direct and indirect surface has a great influence on the heat transfer; consider a flat plate radiator having 1 sq. ft. of radiating surface and 1 sq. ft. of copper, i.e. no indirect radiating surface. Suppose that the air is absorbing 100 heat units and that this is its capacity. Then if the water flow is increased, the heat dissipation will not increase because the air is working at capacity; if the water velocity is reduced the heat dissipation will be reduced, because the air can absorb 100 heat units but the water flow is not rapid enough to supply this amount, and tests show that the relation between water flow and heat transfer from water to metal is parabolic. Now, take the same amount of material but redesign the radiator so that its frontal area remains the same, and one-half of the material is used for direct radiating surface and the balance for indirect. Further assume that the efficiency of the indirect radiating surface is 70 per cent of that of the direct; the total effective radiating surface then is $(0.5+0.5\times0.70/2)=1.2$ sq. ft. Assuming that the heat transfer to the air per unit radiating surface remains the same, then the second radiator will reach its maximum heat dissipation at such a higher water velocity, at which the heat transfer from water to metal is 120 heat units. Beyond this point increase in water flow will not increase the heat dissipation, because the air at that particular velocity and mass flow cannot absorb any more heat; below this velocity the heat dissipation will drop because the water is not supplying the metal with sufficient heat units. If the design of the second radiator is such that the heat transfer per unit surface, which depends on the size of the cells, their shape and the general air flow changes, then the reader can easily work out for himself the result.

Air-Flow vs. Heat Transfer

Referring to the article of Sept. 7 I must correct the author for his statement that "there is no very direct relationship between air-flow velocity and heat transfer." Heat transfer varies as the nth power of the air mass-flow. This was independently derived by the writer and also the Bureau of Standards. See above reference, p. 372, etc. The exponent n varies between 1 and 0.4 depending on the ratio of direct to indirect, etc. This law is not entirely new with either the Bureau of Standards or myself and its application to present day radiators and new designs is very useful. The French in the Eiffel Laboratory Tests adopted the relation: heat transfer $=(A+BV)$, where A and B are constants and V is the air velocity.

The curves given at top of page 464 are useless and misleading. They are useless because they do not give sufficient information in regard to the physical characteristics of the radiators and as before, the heat transfer is given in some mysterious unknown ratio. They are misleading because those who have not specialized and familiarized themselves with radiator characteristics, must conclude that an all direct radiator is superior, as far as cooling capacity is concerned, to a core having part indirect surface. This is not necessarily so; in general, an all direct radiator makes a better showing at high air velocities and a core having a large percentage of indirect, makes a better showing at low air velocities. At some intermediate air velocity the heat transfer curves cross each other and it all depends on the radiator core at what velocity they cross, or whether they cross each other or not.

There are a great many other points which I could discuss, but the above taken more or less at random must suffice. The average designer and engineer will do well to study the problem and get familiar with the fundamentals of the cooling system and the characteristics of the component parts, namely the radiator core, the fan, the pump and the effect of the piping. As to details these can be left to the ones who specialize in the manufacture of radiators, and who could supply the designing engineer with any detail information he may need.

N. S. DIAMANT.

Effects of Jacket Temperature on Economy

Editor, AUTOMOTIVE INDUSTRIES:

In your editorial "Cooling Ideals," of Sept. 28, you say: "A fairly long course of experiment with steam systems under pressure ought to give conclusive data as to the effect of definite degrees of heat above 212 deg. Fahr. Of course such data are not obtainable by simply adapting steam cooling to an engine designed for water cooling."

I do not see just why you do not believe data upon the effect of higher temperatures with steam cooling may not be obtained with engines designed for water cooling. The only limitation will be the ability of the water jackets to withstand the pressures associated with the higher temperatures. Of course, some types of engines with flimsy sheet metal plates, held on with small screws, to close large foundry core openings will not stand any considerable pressure, but there are many engines now in use with but small areas of flat, unsupported jacket walls, that are entirely safe with water pressures up to, say, 30 lbs., corresponding to about 275 deg. Fahr., which should be high enough to draw definite conclusions as to the desirability of going to still higher temperatures.

It is an entirely mistaken idea that the engine design must be modified in some way to secure proper results with cooling by the boiling and condensing cycle. This is due, perhaps, to the belief that there must be a large jacket space provided for the accumulation of steam to avoid risk of overheating. It does not seem to be understood that where, as with the Rushmore system, the water is kept in circulation by a positive acting pump, there is no chance for the formation of large pockets of bubbles of dry steam. As a matter of observed fact, the higher the steam pressure the smaller are the bubbles of

contained steam and the more violent is the circulation; otherwise the modern high power locomotive would not be possible.

I have run a number of tests at my laboratory on a General Electric gasoline engine with four 7 x 9 in. cylinders, direct connected to a 25 kw. generator at 560 r.p.m. Under constant full load, on runs of two hours each, the fuel consumption per kilowatt hour was practically the same with the jacket water at 275 deg. as it was with the water at 160 deg. Fahr. From repeated tests, of two hours duration each, under half load, or 12½ kw., the fuel consumption per kw. hr. was about 10 per cent less with the jackets at 275 deg. than with the jackets at 140 deg. Fahr.

As the ratio of water cooled surface to cubic contents is very much less with the big 7 x 9 in. cylinder than it is with the much smaller automobile engine cylinders it would seem that the saving possible with the latter with the higher temperatures should be considerable.

Luther Ayer, factory manager of the International Motor Co., at Plainfield, who has driven his Studebaker car for more than a year with the Rushmore system, states that, under normal winter conditions, he obtains fully 20 per cent greater mileage per gallon of fuel than he could get with the same engine with the usual water cooling system.

Although there might be some further fuel economy from working the jackets at higher temperatures I do not believe it would warrant the added complication of the necessary pressure reducing valve between the engine and the radiator nor the expenditure of power required to feed the water under pressure.

The Rushmore "up-flow" sysem, working at about atmospheric pressure, does not involve the least complication and permits the use of simple, inexpensive little gear pumps which may be of the very cheapest construction and which operate satisfactorily even with clearances so excessive as to make them unfit for any other class of service.

S. W. RUSHMORE.

Effect of Proper Cooling

Editor, AUTOMOTIVE INDUSTRIES:

We have read with interest the articles on cooling systems by A. Ludlow Clayden. We cannot supply any research data, as all these problems on the Rolls-Royce were worked out several years ago in our experimental department at Derby, England.

We can, however, confirm generally the statements of the four papers, especially with regard to the importance of a cylinder block design which discourages steam pockets and hot spots, a radiator of true honeycomb form which allows internal circulation of water, an adequate pump, and a free escape for the air passing through the radiator.

We can confirm also that when these items are attended to the brake horsepower and efficiency of the engine will be maximum with a water temperature of 180 deg. Fahr. to boiling.

M. OLLEY,
Engineer, Rolls-Royce of America, Inc.

Road vs. Laboratory Tests

Editor, AUTOMOTIVE INDUSTRIES:

There is probably no product of applied mechanics which, in practical usage, varies so widely from purely laboratory conditions as the automobile. While much good can come from laboratory experiments and tests, there are certain points which can only be discovered and corrected by intelligent work under the exact conditions governing the real use of the machine as a whole.

In the development of all forms of power, reliability has first been sought. When this was attained, economy was the desired goal. Reliability in the automobile has become pretty well established during the past dozen years and we have entered the era for economy.

Now in making experiments for power and economy in fuel, covering a number of years, all of which were made under true working conditions, I discovered some facts of seeming importance.

Troubles of Feed Systems

Even at this stage of progress, we have fallen heir to two legacies of earlier days which still are largely accepted.

One of these pertain to gravity fuel feed and the other to the offset float chamber. Anyone with a little knowledge of the laws governing the fall and lift of liquids can see that either gravity feed or an offset float may give trouble under certain conditions.

With a very economical carbureting system, I soon found the following difficulties:

With a low head of fuel, the float action became sluggish and a false level was maintained. The shut off was retarded and an excess of fuel admitted. Everyone has noted on opening the shut off valve with a full tank that the float chamber fills immediately while with a depleted supply one must wait for the filling. This is not peculiar but absolutely according to natural law.

On completing a satisfactory vaporizing and metering device, I found one trouble. When racing up a hill, on reaching a steep incline the engine power fell off. This fault was remedied when I centered the float with the nozzle. I then recognized that the offset float has certain disadvantages, when the car is not operating in a horizontal position.

The point I wish to make is that these facts were learned entirely from road tests and they would never have been learned from any ordinary laboratory work. They were learned through the use of a carbureting system which showed nearly double the average mileage economy without being excessively lean, hence these faults were accentuated so they could not fail of ready recognition.

It is most unfortunate that, with the progress of the automobile, there has not been evolved a unit of power similar to the Watt in electric performance, which can be measured readily in actual service. Miles per gallon really mean nothing. Grades are not taken into account. There is no absolute indication of expended power.

Great benefit would be derived if the S.A.E. can discover a means for measuring the power developed under the conditions of actual usage.

The real test of the value of any device is its performance in practical service. A small circle digest the theoretical but the hard headed man looks only for results.

GEORGE M. BROWN.

THE Victorian Railway Department at Melbourne has adopted the rail motor-car to handle passenger traffic on short spur lines, and over other sections where it is uneconomical to provide a service of steam trains.

Automotive Industry Needs To Train More Skilled Mechanics

Accuracy in manufacture and care in inspection suffer greatly through lack of competent workers. Human element important in working to exact tolerances. There is a limit to what may be expected of machines. Bidding for operators is harmful.

By Harry Tipper

ACCURACY in production with our methods of machine operation is still a major production problem. Occasional tests on the outside indicate that the expected accuracy is not secured and that inspection is not as thorough as it should be. The latter really implies the former as well, inspection being necessary because of lack of accuracy. An engineer friend familiar with automotive practice, bought a new car of a good make not long ago and wrote the manufacturer for a tolerance sheet so that he could keep to the tolerances in any replacement or repairs.

Being of a curious turn of mind, he dismantled the car and checked up the dimensions of all the important elements by the sheet. When he got through he wrote the company a letter showing the variations and stating that his first job would be to bring the machine to the dimensions.

Limited errors from absolute accuracy were evidently expected. These were detailed in the sheet of permissable tolerances. But the actual shop operation evidently permitted errors of larger variation.

We have been depending almost entirely upon the machine for the accuracy desired in the product. A comparatively short training period suffices to make a mechanic and frequently the apprenticeship for an inspector is little more. Sensitive measuring instruments are used by these workers to check up their set-up and the result. These instruments themselves require careful handling to produce accurate results in measurement. It is difficult to operate some of them without a fair understanding of the principles upon which their operation is built. The fingers must be reasonably sensitive in operating and the influence of sudden changes in the handling must be understood. These things are not always known by the worker or the inspector, particularly where the plant employs large numbers of men and must take its operators from the average population.

Limit to Machine Accuracy

IN the small shop it is somewhat easier to select a better lot than the average and some of the smaller shops show the advantage of that in their work. The amount of spoiled work is quite considerable in some cases.

There is a strict limit to the accuracy secured in practice, regardless of the character of the mechanical equipment. The human element cannot be eliminated from the operation. It exercises its influence upon the result at all times. Foremen and superintendents are well acquainted with the facts and they know that despite equipment, accuracy requires a definite skill and comes only with sound knowledge and experience.

It is still usual to find an engineer discussing production and particularly production accuracy, as though it were a matter of machinery and system. Data are frequently presented showing methods of inspection and examination, but not very much is said of the actual results secured in the shop or the cost of attaining these results due to the natural inaccuracy of the average skilled machinist in the automomtive manufacturing establishment.

Industrial Training Necessary

MORE work must be done in the development of mechanics than we have done at any time up to the present. Mostly, whenever the industry is running at nearly full tilt and other industries in the metal trades are in fair shape, the automotive manufacturers bid against each other for the available labor, pay the price and get through with the work somehow. This, of course, does not make for increased accuracy in the work, nor does the large turnover help the situation any.

The automotive industry may not need to work to tolerances as close as some of those specified to-day. The point might be discussed effectively when due attention has been paid to the actual results secured in the car from time to time. Nevertheless, the industry does need to embark on a considerable program of developing skilled mechanics—men with a better background of understanding and experience than many of those at present on the job. No other branch of the metal trades industry has so many mechanical operations to go through in the building of its product and no other branch has a need for such numbers of skilled mechanics.

This is a problem for the manufacturer which he must answer in one way or another.

This year manufacturers have been bidding against one another in some of the automotive cities and the other metal trades lines have not been flourishing particularly. When they are all doing well from a production standpoint skilled mechanics will be scarcer than they have been this year. Young men should be brought into this field. They should be encouraged to do so. The best form of encouragement is a sound training in practice and elements of theory. Applied strictly to the work this is the training which makes for more understanding and more accuracy in operation.

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AUTOMOBILE
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Red Tape and Overhead

LOWER production costs in the next few years will come through closer attention to overhead costs and small mechanical refinements. Time has ceased to be the chief consideration in production, although it is still important. Managers are realizing that saving in time of production can offset only a certain amount of increased overhead and subsidiary charges.

Comparatively little attention was given to mechanical production methods at the recent S. A. E. production meeting. The practical men gathered there were talking almost entirely in terms of cutting out red tape, reducing overhead, eliminating waste, and getting a better knowledge of the human element in production.

Quantity production has made possible low prices in the automotive field, but competition is making it necessary to reduce unit costs as well as to increase quantity. Mechanical production methods have already been studied so carefully and improved so greatly that major steps in advance can scarcely be expected from now on. The various factors surrounding production, however, have not been subject to intensive study in the past. The possibility for extensive cost reduction lies in a better understanding of these related factors.

One automotive executive said recently, for instance, "I have learned more about unit production costs and overhead expense in the last twelve months than I had accumulated in the previous twenty years." His experience was not unique.

An Arrogant Automobile Club

WHILE more than 11,000,000 motor vehicles are in operation in the United States, the time has not yet arrived when motorists can safely take the position that they are entitled to a monopoly of city streets and public highways.

One of the most remarkable recent instances of selfish disregard of the public need by owners of automobiles is the stand taken by the Illinois Automobile Club in opposition to the application of John Hertz to the Illinois Commerce Commission for a franchise which would permit him to operate a modern bus system in Chicago.

The club does not want the buses "because they would further congest the boulevards." Discussing this phase of the opposition to Hertz's application, the Chicago *Daily Tribune* says:

> "In other words, persons owning cars feel that they own the streets over which automobiles may run, and would, for their own selfish comfort and convenience bar anyone who does not own or have access to an automobile from use of the boulevards. The poor man, whose only opportunity to enjoy a ride on the city's most attractive streets might lie in the 10-cent bus line is nothing to them. Throw him out. The boulevards are too good for him, such is their attitude."

Is it any wonder, in the light of such cases as this, that state legislatures sometimes are tempted to "swat" the motorist with taxes which, fundamentally, are unfair, or impose onerous regulations to promote safety? The great majority of voters do not yet own motor cars.

It is this attitude of arrogance on the part of so many motorists which is responsible for much of the mania for regulation which is sweeping the country. The average motorist emits a loud wail when something is done to him which he does not consider fair, but it is more than possible that much of this attitude of antagonism would disappear if he would strive always to be courteous and fair to the other fellow.

As a matter of fact, the argument of the Illinois Automobile Club is illogical. Buses always tend to relieve rather than increase traffic congestion.

It should be gratifying to the industry to know that the *Tribune* is earnestly supporting the Hertz application. It says:

> "There is only one condition of importance properly applicable to the granting of the franchises sought. That is the condition that the proposed bus lines should allow no standees in the busses. Every passenger should have a seat. Greater comfort, faster service, and a minimum of inconvenience would be the result. Those who pay would get what they pay for, and none would pay for what they could not get. With that single condition the franchises should be granted. The Chicago Motor Bus Co., with the experience, energy, ability and money of John Hertz and his associates behind it, will then do the rest. The great profit will be to Chicago and its residents."

Send Reckless Motorists to Jail!

By James Dalton

THE ghastly toll of deaths caused by motor vehicles in 1921 should jolt the industry into some concerted action which will help solve sanely its most menacing problem.

A report by the Census Bureau shows that 10,016 persons were killed in 34 States last year. This was an increase of 1065 over 1920.

It reads like the casualty list of a desperately fought battle in the World War rather than a record of the hazard attendant upon life in time of peace.

Nothing is to be gained by trying to place the burden of blame upon pedestrians, as one of the national organizations of motorists already has attempted to do. It may be true that carelessness was responsible for most of the deaths, but that does not relieve the motorist of responsibility.

If the casualty list of street and highway accidents is not reduced it will inevitably result in a labyrinth of regulations which will not only make driving a burden rather than a pleasure but will seriously curtail sales of motor vehicles.

For the automotive industry it is a practical as well as a humanitarian question. Glaring newspaper headines, telling the story of people killed or maimed by cars or trucks, are kindling indignation every day the length and breadth of the country. This indignation cannot fail to be reflected in State legislatures.

Motorists know that burdensome licensing regulations will not cut down these accidents. The man who can pass the most rigid tests to which he might be subjected may be more of a menace at the wheel of a motor car than the merest novice at driving.

Two things are needed to cut down the toll of death. They are:

Sane and simple laws.

RIGID ENFORCEMENT OF THE LAWS.

If the laws which are enacted to make the streets and highways safe are just and sound they should have teeth in them. Fines are not enough. Violations should be felonies rather than misdemeanors.

Persons who violate such laws should be given just as fair a trial as those who are accused of any other crime, but if they are convicted after a fair trial THEY SHOULD BE SENT TO JAIL.

The careless, reckless driver, who is not willing to concede that pedestrians have rights in the streets and who seems to regard public thoroughfares as his individual property, is a menace not only to the other motorists but to the entire automotive industry. He is building up sales resistance every day.

Careful analysis of the data in the possession of the Census Bureau might show that "jaywalking" was responsible for more deaths than anything else, but it wouldn't answer the question. The fact remains that animosity on the part of pedestrians toward motor vehicles is becoming stronger.

A majority of the people of the country are not motorists. Legislators usually are influenced by the majority unless right is undeniably on the side of the minority. It may be true, as one of the national associations of motorists says, that "the automobile always has been a subject of class legislation * * * and is subject to more regulations than any other means of conveyance," but the fault is largely that of the motorists themselves.

The average motorist seems to be governed by two kinds of psychology. There is the one which makes him curse the reckless or inconsiderate driver when he himself is a pedestrian, and the other in which he is engulfed when he himself is driving and which causes him to regard any pedestrian crossing a street or highway as a pest who is intruding where he has no right.

The average person who does not own or drive a car has only one psychology. Under the thrall of it he regards every motor vehicle as a juggernaut bent upon his destruction. In all too many cases he is entirely justified in this view.

Recriminations against unfair and burdensome regulations will not get the motorist anywhere. His attitude must be one of live and let live.

We repeat that if he is unwilling to submit to sound laws fairly framed to promote the safety of the public, he should be sent to jail. After a few days there he may still think the regulations unfair but he will obey them with scrupulous care.

The time has come for the automotive industry, as a matter of self preservation, if nothing else, to wake up and take the lead in accomplishing something tangible. Concerted action in this direction will not bring it into conflict with the Sherman law. It would not be a combination to restrain trade but to curb death.

Big Output Hinges on Body Supply

Closed Car Orders Exceed Production

Dealers Not Taking Open Models for Stocking Against Spring Demand

DETROIT, Nov. 4—Maintaining production marks at points approximating those of the earlier months of the year is largely a matter of material supply, closed bodies being the principal obstacle to continued heavy operations. Demand for open models is limited to special sections of the country and to export markets. Some factories report the demand for closed bodies now to be in excess of 75 per cent of output.

Several factories which have been among the leaders during the year are now operating on low schedules because of the failure of the closed body supply. Orders on many of their closed models are piled two months ahead, and the plants are operating at 30 to 50 per cent of former production figures. One of these factories with orders far ahead showed an operating deficit in the last two months.

For the most part dealers are declining to take open models for stocking against spring demand and are clamoring for all the closed models they can get. There is a general demand for closed cars from cities in every part of the country. Price uncertainty has caused dealers to fight shy against accepting any models except those for which they have a ready market. If there is to be any stocking, it will be light and will not take place in any volume until the spring season is at hand.

Business in Special Models

A large part of the present open body business is in special models with sport trimmings, the usual open types not making special appeal except in those cars which recently have been remodeled or repriced. New sport models will be brought out by a number of factories in the near future to meet the demand now existing for cars of this type.

Ford Motor Co. will build at the rate of more than 5000 cars daily. Sales are running in excess of production, and the company is extending its output as rapidly as it can. Chevrolet is now on a basis of about 1200 daily and will increase this to 2000 as rapidly as it can execute its new factory and production plans.

Buick is operating at close to 800 cars daily, this total including its Flint, Detroit and the McLaughlin Buick plant in Canada. Studebaker continues at its maximum of about 450 daily in all plants. Dodge Brothers is operating at about 600 daily, its normal capacity, Hudson-Essex at about 250 daily, Hupp at about 125 daily, and Paige-Jewett at 125.

(*Continued on page 953*)

Business in Brief

NEW YORK, Nov. 6—Activity is reported maintained in wholesale and jobbing lines. Recent price advances in some lines have stimulated buying, but ultimate action by the retail buyer is uncertain. Industry is running at a fast pace, with employment more widely diffused.

Car shortage is delaying marketing over the whole country. Farmers have been particularly hard hit and coal and lumber interests in the Northwest have been unable to supply orders on this account.

Car loadings for the week ending Oct. 21 were 1,003,759 or 20,289 greater than the previous week. The biggest increase was in loadings of merchandise and miscellaneous which was the largest ever recorded. Railroads report a demand for 166,349 freight cars over and above the available current supply.

Reports show that farmers' returns are irregular. Cattle, corn and cotton lead, with wheat fair, and oats, potatoes and fruit poor. Iron and steel have become quieter with lower coke prices, but buyers tend to await stabilization. Railroads are still bidding for new car purchases. Scrap and pig iron prices have eased. There is some talk of steel mills not being sold very far into the new year.

Better household buying has tended to steady coal prices. Soft coal output continues to gain. 10,400,000 tons were produced in the fourth week of October. 2,100,000 tons of anthracite were produced. Gain in output was chiefly in the latter and indicates a slight improvement in the transportation situation which remains the principal factor limiting production.

Industrial and railroad stocks rallied after a further sharp decline from selling pressure, mainly professional. Call money eased from the 6 per cent point to which it had been forced. Bonds were stronger, Liberty bonds and the new 4½'s making substantial advances reflecting a revival of investment demand.

1922 Total So Far Placed at 2,119,227

Almost Equals Production of Cars and Trucks for All of Best Previous Year

NEW YORK, Nov. 6—Not only has October, with its estimated output of 244,000 cars and trucks, been the seventh consecutive month of the year to show production in excess of 200,000, but it has brought the figure for the ten-month period to within a few thousand of the total output for the best previous year in the production history of the industry. Thus far the aggregate for 1922 is 2,119,227, as compared with 2,205,197 in 1920.

Factories are still behind in filling orders for closed cars and are hampered in making deliveries by the unsatisfactory rail situation. It is probable that there will be a tapering off in production in November, although there is no evidence now that the demand for cars is showing any notable signs of weakening. This is the season when in other years the slowing up in sales has been pronounced. Manufacturing efforts are centering chiefly on closed models, for which there has been an exceptionally brisk demand.

No Stocking of Open Cars

Taken in conjunction with the remarkable record for the month, reports from all parts of the country show that there is only a negligible stocking of open cars. At present, it is not likely that there is more than one month's supply of this type in dealers' hands or on the road to dealers. This fact indicates that the entire production is being sold and that manufacturers are not producing in excess of actual demand.

Practically the only section of the country where there has been any accumulation, and that in very small numbers, is the Northwest. In that section, however, there is a pronounced feeling that such reserve is necessary to take care of the farmer demand which is expected to appear as soon as the returns from this year's crops are received.

Factories are making greater use of driveaways to surmount difficulties

(*Continued on page 953*)

Seek Easier Method in Drawback Claims

Bauer of N. A. C. A. and Treasury Representative Will Work on Problem

NEW YORK, Nov. 6—G. F. Bauer, foreign trade manager of the National Automobile Chamber of Commerce, and a customs expert from the Department of the Treasury are planning a trip to Detroit to study the drawback law and devise a method for putting in drawback claims without the necessity of keeping cumbersome books. This co-operation between the treasury department and the N. A. C. C. is expected to save the automobile industry something like $20,000 a year in drawback allowances which are not collected now.

Under the tariff law automobile manufacturers can collect drawbacks on imported material which has gone into finished cars. For instance, sheet aluminum used in car bodies carries a duty of 11c a pound. When this sheet aluminum is worked into a car body and that car body is exported, the car manufacturer can file a claim and secure the return of the duty that was paid on the crude material.

This same thing applies to crude aluminum used in crankcases, housings, running boards, etc., imported bearings and the like. Heretofore the red tape necessary to secure the return of this duty has caused automobile manufacturers to overlook an item which runs into considerable money in the course of the year.

This trip to Detroit will be made about Nov. 24, at which time there will be a meeting of the foreign trade committee, of which J. Walter Drake is chairman. The program of the foreign trade convention, to be held during the New York show, will be arranged at that time.

Half Million in Profits Peerless Mark in October

CLEVELAND, Nov. 17—All production and sales records and earnings for the past twenty-one years were shattered by the Peerless Motor Car Co. in October this year, President R. H. Collins states.

Profits for the month were at the annual rate of $28 a share for the stock, and the month was closed without a stock of unsold finished cars.

Shipments for the month of October totaled 1009. This is more than five times the number shipped in October, 1921, and more than 35 per cent greater than last May, when the present management established a new record for production and shipping figures.

The largest annual output of the old management was 5100 cars. A total of 10,000 is expected to be reached in the year ending August, 1923.

Profits in October available for dividends and surplus are reported in excess of $500,000. Annual dividend requirements are $600,000.

Olds Breaks Records

LANSING, Nov. 7—As the result of a price reduction late in September, all post-war production records of the Olds Motor Works were broken during October, according to Guy Peasley, general sales manager.

CHEVROLET BUILDS IN OAKLAND

OAKLAND, CAL., Nov. 7—Construction of a large addition to the East Oakland plant of the Chevrolet Motor Co. is under way. The new unit will double the capacity of the plant, and will be a two-story building of brick and concrete, to cost $280,000. It will cover an entire block and will be completed and occupied early next year. The new unit will be devoted largely to building of bodies for closed Chevrolet cars, according to announcement by officials of the company.

Lower Manufacturing Costs Have Reduced Closed Car Prices and This Has Increased Its Popularity

By J. DALLAS DORT,
President, Dort Motor Car Company

Detroit, Nov. 7.

NEVER before in the history of the automobile industry has there been such a volume of buying sustained so late into the fall and winter seasons as is being experienced this year. Public interest in automobiles was never more pronounced and sales have never approached the marks that are now being made week after week.

There can be but little question but that this volume of business is due in a large sense to the progress the industry has made in reducing the cost of manufacture and, as a result, the market price of closed cars. High prices kept the closed cars from a position which they might normally have occupied earlier and now that these prices are lower, we find them gaining in favor steadily in every part of the country.

Even in southern California we find closed cars in the ascendancy in a large part of our business, running from 50 to 60 per cent. Where less mild or even climates are found our demand is now averaging about a similar figure.

The progress of the closed car indicates the progress of the industry as a whole. Closed car prices are lower because manufacturers have discovered ways of lowering manufacturing costs, of eliminating weight and unnecessary material, both in bodies and chassis. Business is becoming more and more confined to the large manufacturers because they have been most successful in reducing costs of producing cars. Reducing the weight of cars is important both from a manufacturing and an owner operating standpoint.

To me the outlook for business in 1923 is exceptionally good. Conditions in Europe, bad as they are, are improving. France, Germany and Russia should make definite progress toward reparation. Even in the Far East the worst seems to be over. Australia is already taking a large number of American cars as are South America, South Africa and many other parts of the world.

In the United States the year should be one of great national prosperity. There will be bad spots due to industrial conditions from time to time but we have learned pretty well to discount strikes and their effects. It seems as though there are always enough good spots to make it look like one vast field of green. Last year it had a very yellow look. Throughout the South from the Atlantic to the Pacific coast there is a very healthy tone due to good crop conditions and fair prices. Thousands of automobiles are being purchased and many more thousands will be sold as rapidly as the farmer makes his successful turnover.

I have talked with many distributors and dealers in the past few weeks and there is a healthy tone in the reports they gave me. There is a strong general demand and a pronounced demand in sections such as the coal districts where there has been pent-up business due to industrial conditions or other causes.

$1,751,905 Earned by Nash in Quarter

KENOSHA, WIS., Nov. 6—Nash Motors Co. for the three months ended Aug. 31, 1922, reports net earnings of $1,751,905. Net earnings for the nine months of the fiscal year total $5,023,441. C. W. Nash, president of the company, commenting on the above showing, said:

All this year we have been in a practically oversold condition despite plant additions and increased production. Sales figures of the first 10 months of 1922 show that 95 per cent more Nash cars have been marketed this year than during the first 10 months of 1921. The advent of better business conditions generally and the noticeable improvement among agricultural districts of both the Middle West and Southwest, together with a better outlook in tobacco and cotton territories of the country, point to a continued greater demand for Nash cars this coming year than we have ever witnessed.

Ford's Boston Visit Rouses Speculation

May Be Interested in Securing Squantum Plant Site for Export Station

BOSTON, Nov. 6—Henry Ford has been spending several days in Boston and has been keeping to himself all plans pertaining to his visit. It is reported, however, that he appeared to be much interested in the Squantum plant, where the Government built submarine destroyers during the war.

For more than a year Mayor Bradford of Quincy has been in touch with Ford regarding a site in that city fronting on Massachusetts Bay near the big Fore River Shipbuilding Co. The Squantum site would be admirable for an export station, and that is what Ford is looking for, presumably.

Visited Barge Canal

Not long ago Edsel Ford made a trip through the New York State Barge Canal and obtained all the data needed to give him some idea of utilizing the canal for freighting motor vehicles eastward. It is stated that bids have been asked from shipbuilding companies on barges of a special type for this work.

As the cars could come across from Detroit, Cleveland and Toledo on boats and be dumped off at Buffalo, it would be easy to transship them and drop them off along the route easterly. Toledo has just discovered it has some land and dock available, and this is to be used for a tie-up with the New York Canal.

Goods from Buffalo, Toronto and other places could be taken along also, and other cars in addition to the Fords and Lincolns could be shipped, while cargoes westward would be easy to handle. With a regular schedule and a few good towboats, deliveries might be made in a couple of days between Buffalo and New York.

No Extensions on Pacific Coast

SAN FRANCISCO, Nov. 6 — There will be no additions to the Ford plants on the Pacific, with the exception of a small increase in the size of the assembling plant at Los Angeles, according to Edsel Ford, who passed through the San Francisco Bay district on an inspection tour of Ford plants and dealers. He said:

Our business does not warrant extensions or expansions of the Pacific coast plants at the present time. Existing facilities are sufficient to take care of the present normal increase in business, and there will be no additions to the plants on this edge of the continent except a small one to the assembly plant at Los Angeles. In fact, it probably will be some time before any automobile manufacturing, as distinguished from assembling, is done away from the main plant at Highland Park, near Detroit. That plant is in closest and most convenient proximity to sources of supply, and it is there that the manufacturing of cars will be done for some time to come.

This puts at rest reports which had been prevalent among Ford dealers and had even been printed in the newspapers up and down the coast that Edsel Ford had come here looking for a site for a large western manufacturing plant.

Besides Mr. and Mrs. Ford, the visiting party included E. C. Kanzler, production manager for Henry Ford, and Mrs. Kanzler, who is a sister of Edsel Ford; W. A. Ryan, sales manager; B. L. Graves, western district supervisor, and R. H. Tannahill. They came in the Ford special car, "Fair Lane," from southern California, and left on the evening of the 31st for Portland, Ore.

FATALITIES INCREASED 28 PER CENT IN 1921

WASHINGTON, Nov. 7—Statistics compiled by the Bureau of the Census show that during 1921 automobile fatalities increased 28 per cent. The record shows that 10,168 deaths resulted from accidents caused by automobiles and other motor vehicles, excluding motorcycles. This number represents a death rate of 11.5 per 100,000 population as against 10.4 in 1920 and 9.4 in 1919 and 9.3 in 1918.

The State of New York had 1633 casualties or 15.4 per cent per 100,000 population in 1921, as against 13.5 per cent in 1920. Pennsylvania was next with 1086 casualties or 12.2 per cent for each 100,000 population, as compared with 11.9 per cent in 1920. According to the Bureau of Census there were 886 deaths resulting from automobile accidents in Illinois; 865 in California; 737 in Ohio; 519 in Massachusetts; and 443 in Michigan. The other states had fewer casualties. In Detroit there were 133 deaths from automobile accidents.

KNOX TIRE REORGANIZED

MOUNT VERNON, OHIO, Nov. 6—There has been a reorganization of the Knox Tire & Rubber Co., whose plant here was purchased recently by the reorganization committee for $175,000. F. O. Levering will continue as president, while George Jones succeeds F. D. Spencer as secretary-treasurer. As soon as the necessary machinery can be installed, the reorganized company will start producing tires.

MIDWEST RUBBER MEETING

CHICAGO, Nov. 4—Official notice that the November meeting of the Midwest Rubber Manufacturers' Association will be held in St. Louis Nov. 14 has been sent out by the secretary. The meeting place will be the Missouri Athletic Association, and arrangements are in charge of a committee, of which the chairman is F. W. Knoke of the American Zinc & Lead Smelting Co.

52 Companies Added as M.A.M.A. Members

General Manager Heminway Announces New Names in Membership of Association

NEW YORK, Nov. 6—Fifty-two new members have been admitted to the Motor and Accessory Manufacturers' Association, General Manager M. L. Heminway announces. The new members are:

Akron-Selle Co., Akron; Aluminum Co. of America, Pittsburgh, Aluminum Die Casting Corp., Garwood, N. J.; American Chemical Paint Co., Philadelphia; American Taximeter Co., 16 West 61st Street, New York City; Arrow Grip Manufacturing Co., Inc., Glens Falls, N. Y.; Automotive Products Corp., Hazleton, Pa.; Auto Specialties Manufacturing Co., St. Joseph, Mich.

R. & L. Baker Co., Cleveland; Baush Machine Tool Co., Springfield, Mass.; Bijur Motor Appliance Co., Hoboken, N. J.; Britton Auto Products Co., Inc., New York; Broad Brook Co., New York; Buckeye Forging Co., Cleveland; Bullard Machine Tool Co., Bridgeport, Conn.

Canton Drop Forging Manufacturing Co., Canton, Ohio; Columbus Bolt Works Co., Columbus; Cuno Engineering Corp., Meriden, Conn.

Dalton & Balch, Inc., Chicago; Delphos Bending Co., Delphos, Ohio.

Empire Tire & Rubber Co., Trenton, N. J., Everyday Piston Ring Co., E. Rochester, N. Y.

Franklin Die Casting Co., Syracuse, N. Y. Glidden Co., Cleveland.

Harvey Spring & Forging Co., Racine, Wis.; Holley Carbureter Co., Detroit; Hoover Steel Ball Co., Ann Arbor, Mich.; Houdaille Co., Buffalo, N. Y.

Indiana Steel Products Co., Chicago.

Morand Cushion Wheel Co., Chicago; Metropolis Bending Co., Metropolis, Ill.; Morgan Manufacturing Co., Keene, N. H.; Muzzy-Lyon Co., Detroit.

Nairn Linoleum Co., New York.

Packard Electric Co., Warren, Ohio; Pharo Manufacturing Co., Bethlehem, Pa.; Pines Manufacturing Co., Chicago.

Recording Devices Co., Dayton, Ohio.

Scintilla Magneto Co., Inc., New York City; Spencer-Smith Machine Co., Howell, Mich.; Standard Parts Co., New York City; Spiro Manufacturing Co., New York City; Stemco Engineering Co., Dayton, Ohio.

C. A. Taylor Trunk Works, Chicago; Ternstedt Manufacturing Co., Detroit; Trumbull Steel Co., Warren, Ohio.

Universal Products Co., Detroit.

Westinghouse Lamp Co., New York City; Whyte-Duffield Manufacturing Co., Chicago; Wickey Battery Co., East Chicago, Ind.; Wood Hydraulic Hoist & Body Co., Detroit; Wyman-Gordon Co., Worcester, Mass.

U. S. TRACTOR PROGRESSES

MENASHA, WIS., Oct. 30—Rapid progress has been made in the last six months by the U. S. Tractor & Machinery Co. in liquidating its indebtedness, and adequate capital has been provided to enable the concern to resume quantity production of tractors and farm operating equipment in a larger scale. Manufacturing schedules will be increased Nov. 1.

South Hails Cotton Rise and Ford Cut

Alabama Newspaper Points Out Two Outstanding Features of Price Situation

BIRMINGHAM, ALA., Nov. 7—Under the date line of "Greenville, Ala.," the Montgomery (Ala.) *Advertiser* prints an item reading: "The farmers of Butler county are rejoicing no little bit to-day (Oct. 18), for they received notice that cotton had increased $3 per bale in price and that Fords had declined $50.

"The farmers of this county are big buyers of automobiles, due to the excellent roads over which they can drive them, and Butler county is one of the state's biggest cotton-producing counties. The increase in price of cotton and the reduction in Fords will put much extra money into circulation and everybody in the county will profit thereby."

What is true of Butler county is also true of practically all cotton producing counties of South Alabama. With the cotton crop of Alabama worth approximately twice what it was worth last year, and on the present market a little more than twice as much, the farmers of Alabama are in a good position to buy automobiles, and while a great many of them are purchasing Fords, others want larger cars, and prefer to spend the extra amount on the automobile.

Alabama's other crops are also increasing in value. This is particularly true of the corn crop, which will be almost equal in value to that of last year, although 20,000,000 bushels short in quantity.

The cotton producing counties of South Alabama are a good bet for sales of medium priced cars this fall and winter, and they never have a closed season on account of cold weather.

Motor Truck Industries Outlines Year's Program

DETROIT, Nov. 7—A vigorous constructive program for 1922-23 was outlined at a meeting of the National Association of Motor Truck Industries held at the Detroit Athletic Club. The speakers were M. L. Pulcher, president of the association; Don Whittaker, general manager; C. A. Musselman; C. A. Vane, general manager of the National Automobile Dealers' Association; Tom Snyder, secretary of the National Association of Commercial Haulers and also secretary of the Indiana Transfer & Warehousemen's Association, and S. B. Hadden of the Allied Motor Commerce.

The program of the association calls for constructive education of the motor truck dealer. The keynote of the meeting was that the future of the industry will be based entirely upon the soundness of the manufacturing and merchandising policies of the companies in this business. This soundness can be reached, it is pointed out, only by proper co-operation between the manufacturers and parts makers.

According to the program which the association has set for itself, the manufacturer and dealer who is operating his business with a spirit of permanency and sound values will receive the support of the organization which is composed of assemblers, parts manufacturers and dealers, each of which group is represented on the controlling board.

DEALERS NOT WAITING FOR PAINTING OF CARS

DECATUR, ILL., Nov. 7—Decatur automobile dealers have devised one scheme to speed-up deliveries of closed cars, so greatly in demand as fall and winter season purchasers appear.

"We're taking cars from the factory before they are painted," explained one dealer, "and finish them in our own shops. It costs us more but we save time and meet the consumers' demands for immediate delivery. Our shop is kept busy, too."

Mexico City Places Order in England for 50 Buses

MEXICO CITY, MEXICO, Nov. 4—An order has been placed in England for fifty double-deck motor buses by the Mexico City Traction Co., Ltd., which operates the electric street railway system here. It is stated that these buses will be equipped with both electric and gasoline power, one to be held in reserve for emergency use. The vehicles will each accommodate about fifty passengers. They will be made to serve populous quarters of the city which are now without transportation facilities. It is stated that if the buses prove the success that is now expected, many others will be brought here and placed in service to suburban towns.

Plans are also on foot for the establishment of motor truck freight lines between the capital and various cities of this part of Mexico. Some hauling of this character is now being done, but when the proposed lines are put into effect, which will be about the first of the coming year, motor trucks will handle shipments between Mexico City and Toluca, Puebla, Pachuca, Cuernavaca and even more remote points, it is asserted.

CORRECTION

Henry J. Eberhardt of the Newark Gear Cutting Machine Co., who is chairman of the Tooth Form Committee of the American Gear Manufacturers Association, presented the report of that committee at the recent Chicago convention, and not F. L. Eberhardt, as erroneously stated in the report of the convention contained in AUTOMOTIVE INDUSTRIES of Oct. 19.

Gasoline Drops Cent in Producing State

No Reason Assigned for First Price Cut Made in California in Year

LOS ANGELES, Nov. 5—Without assigning any reason, the retail price of gasoline has been reduced one cent a gallon. This is the first change in price for approximately one year. Despite the enormous quantities produced in this State, California motorists have been paying more for fuel than those in some other parts of the country. By some it is claimed the price reduction is a move on the part of the biggest producers to keep new competition out of this field.

The Shell Oil Co. recently bought out a number of so-called independent concerns and has entered upon a program of expansion. The Associated Oil has gradually advanced its service stations from Northern California to within forty miles of Los Angeles and is known to intend to operate here eventually. At present the Union and Standard companies are the largest operators. The General Petroleum is a big producer, but does not market its product to the retail trade.

Record Consumption in State

Gasoline is now enjoying its record consumption in California. The market is at its best and gasoline is the only oil product of the industry which does not have a surplus stock at this time. Under date of Sept. 1 a report was issued stating that gasoline stocks were 19,000,000 gallons less than on the same date a year ago. This amount is said to be barely a sufficient cushion to protect adequately the industry from a temporary gasoline shortage.

The production of oil is gaining daily, and it is said refineries are reluctant to increase the manufacture of gasoline at this time because of the necessity for accumulating other residue stocks.

With enormous quantities of crude oil going into storage and new wells being brought in daily, also the demand for gasoline increasing constantly, refineries are at a loss for a market for fuel oil and are hoping to develop a foreign export business sufficient to relieve the situation.

LINCOLN AGREEMENT ENDS

DETROIT, Nov. 6—Lincoln Motor Co. has given notice that the stockholders' protective agreement, dated Nov. 20, 1921, has been terminated. Depositors have been notified that upon surrender of their certificates of deposit, properly endorsed in blank to the respective depositaries, they will be entitled to deliveries of shares represented thereby. The depositaries are: the Central Union Trust Co., New York; Union Trust Co., Detroit, and Commercial Trust Co., Philadelphia.

Service Heads Make Ready for Meeting

Choose Subjects That Will Come Up for Discussion in Chicago Next Week

NEW YORK, Nov. 6—H. R. Cobleigh, secretary of service of the National Automobile Chamber of Commerce, has completed the program for the meeting of factory service managers, which will be held at the Hotel LaSalle, Chicago, on Nov. 14 and 15.

The first day will be devoted to factory problems and the second day given over to selling service associations to the dealer associations. The meeting will be opened with an address of welcome by Thomas J. Hay, president of the Chicago Automobile Trade Association. H. J. Leonard, vice-president and general manager of the Stephens Motor Car Co., also will talk.

There also will be reports from the service and the pirate parts committees, after which the following topics will be discussed:

How to save transportation costs by shipping parts in carload lots of cars.
How are the taxable and the non-taxable parts distinguished?
Parts discounts to independents.
Boxing parts for shipment.
Flat rate systems in practice.
Lubrication and inspection policies.
Overcoming misrepresentation of service by over-zealous salesmen.

The feature of the second day, which will be the service association conference, will be a three-cornered discussion of the importance of better service and service associations as a means to improve it. The owner's point of view will be handled by Alexander Johnston, editor of Motor; the car seller's point of view by Gene Silver, Cole distributor in Chicago; and the maker's point of view by B. B. Bachman, president of the Society of Automotive Engineers and engineer of the Autocar Co.

The afternoon of the second day will be given over to a discussion on how to make service associations most effective. There will be an experience meeting of service association and service division delegates. The N. A. C. C.'s service division's speaker's bureau also will take a hand and will tell how it functions for the service associations and divisions, helping them get topics, speakers and films to make their meetings of greatest interest and benefit. One of the speakers will be C. J. Buckwalter, president of the Ambu Engineering Institute.

ASKS TO SELL PARKER TIRE

INDIANAPOLIS, Nov. 8—Permission to sell the assets of the Parker Tire & Rubber Co. has been asked by the receiver, the Bankers Trust Co. of this city. It is said that recapitulation of the assets of the company made by a former office manager of the firm and a representative of the receiver has reduced the ledger value of the concern from $550,147 to $65,415.

Liabilities are said to consist of a bonded indebtedness of $150,000 secured by a mortgage held by the Security Trust Co. of Indianapolis. It is stated that all but a small part of these bonds were deposited with creditors. No action has yet been taken on the application.

CAB FIRM IN PARIS HAS YELLOW AS COLOR

PARIS, Oct. 26 (by mail)—The Yellow Taxicab Co., having nothing in common with the Chicago concern except the name, began operations in Paris this week. The French concern has adopted yellow as the color for its cabs with the idea of attracting American clientele.

All the drivers, in addition to their native tongue, are capable of speaking English. The cabs are 12 hp. Renaults with high-class landaulet bodies, and carry a selection of American and French daily newspapers for the convenience of passengers.

Fleet Owners Returning to Market, Day States

DETROIT, Nov. 6—Vance Day, general sales manager of the General Motors Truck Co., asserts that for the first time in two years large fleet owners are again buying trucks on a large scale.

It is his contention that instead of receiving small orders for one or two trucks, as they have been doing, the five big packers, owners of some of the largest truck fleets in the world, are again in the market with the Standard Oil Co. and other large fleet owners. The truck company, Day says, has been filling single orders for 20 and 25 trucks at a time and salesmen report that still larger orders will be forthcoming soon.

Would Shift Tax Burden from Farmers to Trucks

TOLEDO, Nov. 7—The Commonwealth Highway Association has been formed here with the expressed purpose of launching a campaign to lighten the road-tax burden on farmers and place more of it on the owners and operators of motor trucks.

Maintenance of roads which will bear up under heavy loads is also urged by the association.

Several truck owners here are in favor of the plan, as it will permit them to do greater business on the roads as well as stand part of the cost.

The heavy burdens placed upon farmers, it is believed, is holding up considerable road improvement which would benefit the truck operators.

New Buses Planned for Chicago System

Ritchie States They Will Be Better Than Those of London or New York

CHICAGO, Nov. 6—Changing the name from the Chicago Motorbus Co. to Chicago Motor Coach Co. and deciding to call the manufacturing corporation the Yellow Coach Manufacturing Co., John A. Ritchie and George A. Green, former executives of the Fifth Avenue Coach Co. of New York and now with the Hertz interests here, have decided to make some aggressive moves toward giving Chicago a bus system of which it can be proud.

All but three or four of the present heavy lumbering buses will be junked, and their places taken by 300 modern coaches of a design originated by Green. It is expected that soon after the inauguration of this new service, it will be necessary to increase the fleet to 500.

Production to Start in 1923

Production of the new vehicles is to start early next year, and in preparation for this an addition will be built to the present Yellow Cab factory. It is expected that by April the Yellow Coach Manufacturing Co. will be producing two coaches a day. The capacity of the plant will be four daily and this, it is thought, will be reached before the end of 1923. Although a considerable proportion of the first production is expected to go for use in Chicago, President Ritchie declares he will start building up a sales organization for the merchandising of the coaches and the method of operation throughout the country.

There will be two types of coaches, both of which will be powered with specially designed Moline-Knight engines. A double-deck low level coach, with a crew of two men and with a seating capacity of 68, will be operated over the trunk lines leading from the residence sections to downtown. On outlying boulevards which serve as feeders to the main line a large limousine type will be operated. This also is designed for interurban use. Completely enclosed and seating 25 passengers, the limousine coach will be operated by one man and passengers will pay as they enter. The double-deck will weigh about 11,000 lb. and the limousine coach about 6300 lb.

Similar to New York Bus

The double-decker is to be similar in design to that used by the Fifth Avenue Coach Co. in New York. It will not be an exact duplicate, however. Ritchie says that in designing this new vehicle the best buses and motor coaches in the world, including those of the General Omnibus Co. of London and the Fifth Avenue Coach Co. of New York, have been studied critically and the best points of all have been embodied in the new design.

Massachusetts Has Light Regulations

N. A. C. C. Asks That Time Be Allowed Makers of Tail Lamps to Meet Demands

NEW YORK, Nov. 6—Massachusetts threatens to set a new style in tail-lights which is expected to spread throughout the country. In brief, it has ordered that after Jan. 1 all rear signals used in the Bay State must really illuminate all the numbers of the license tag. In order to do this the new regulation specifies that the lamp and bracket to which the number plate is affixed shall be integral; that the numbers be legible at a distance of 60 ft. and that the slot through which the rays of light shine on the numbers be made of glass.

Inasmuch as this radical order will affect the car manufacturers and cause them to change their lighting system to a certain extent, so far as Massachusetts is concerned, the matter has come to the attention of the National Automobile Chamber of Commerce, which has investigated the new law.

N. A. C. C. Not Greatly Opposed

"We are not violently opposed to it," said Alfred Reeves, general manager of the N. A. C. C., to-day. "We have asked that we be given time to so arrange manufacturing plans that we can meet Massachusetts demands. Also we want the assurance that none of our manufacturers will be prevented from manufacturing the kind of a bracket demanded and not run foul of a patented article."

Motor Vehicle Registrar Frank A. Goodwin, of Massachusetts, has set Monday, Nov. 13, as the date upon which he will test out the rear lamps submitted to him by motor vehicle and lamp manufacturers to see if they comply with the new regulations. Each maker must deposit $50 with the registrar, and on Nov. 15 Goodwin will announce the list of those lamps which have passed the test.

Advices from Boston state that Studebaker, Packard, Buick, Ford, Dodge Brothers and Overland have sent in lamps for approval.

Big Cost to Motorists

This new law will cost Massachusetts motorists at least $500,000, it is figured, because few if any comply with the regulations. There will be no evasion tolerated, and Goodwin declares that after Jan. 1 any motorist caught not using a lamp stamped as approved may be taken into court or Goodwin will revoke his license.

Before adopting the new regulations, which are shown elsewhere on this page, Goodwin sent inspectors out to make an investigation. They found that out of the first 182 electrically equipped cars there only was one whose rear numbers were visible 60 ft. away. In other words, 99 per cent of the vehicles were not obeying the law. On 97 of this number the slot through which the light plays was too small to give enough visibility; on 112 the celluloid over the opening was defective and 12 had no celluloid. There were 176 with the light not located properly. Briefly, 97 per cent were not located properly, 68 per cent had defective celluloid and 53 per cent had too small openings.

Table Showing What Massachusetts New Rear Light Regulations Effective January 1 Require

1st—It shall be so constructed that the lamp and bracket to which the number plate is affixed shall be one device.

2d—The lamp shall be so constructed with reference to the bracket that it shall be above the center of said number plate when said plate is affixed.

3d—It shall be so constructed that the slot through which the beam of light shines shall be a sufficient distance above, and beyond the plane of, the number plate so that there will be an even distribution of light over the entire face of said plate. The largest plate used in Massachusetts is 14½ inches by 6½ inches.

4th—There shall be used in said lamp a bulb of not less than 2 candlepower.

5th—On every lamp and bracket approved there must be stamped some distinctive mark or name so placed that it may be seen readily.

6th—The slot through which the beam of light shines shall be covered with glass, and no other substance, such as celluloid or mica, will be permitted.

Note—An oil lamp or an acetylene lamp must be so constructed as to comply with the 1st, 3d, 5th and 6th requirements. While it will be necessary for the lamp to be located with reference to the bracket holding the number plate so that there will be an even distribution of light over the entire face of said plate, it need not necessarily be so constructed that it will be above the center of the plate, but may be located at the left end of it. The light from an oil lamp must develop 4 candlepower, and a ¼-foot burner shall be required in connection with an acetylene lamp.

For commercial vehicles only the lamp will be permitted at the left end of the plate, on condition that a 4 candlepower bulb is used. All other requirements of the specifications are adhered to.

Present Year Will Prove Biggest in Remy History

ANDERSON, IND., Nov. 6—I. J. Reuter, general manager of the Remy Electric Co., states that the company by the end of this year will have broken all its previous production records, with an output of nearly half a million sets.

A schedule of 1500 generators and 1500 starting motors a day has been set for November and December with corresponding increases in other departments.

August has been set down as the biggest month in the present year and the biggest month in the history of the company.

DAIMLER INCREASES CAPITAL

NEW YORK, Nov. 6—A radio to the *Journal of Commerce* from Frankfort, Germany, says: "The Daimler Motorenfabrik, producer of the Mercedes is doubling its capital by an issue of 204,000,000 marks common and 12,000,000 marks preferred. A broad scheme of development of the company's home and foreign selling organizations is contemplated."

Complete Compiling Manual on Used Cars

NEW YORK, Nov. 5—A Manual of Used Car Co-operation, intended to assist dealer associations or groups of dealers desiring to work together for the profitable handling of used cars, will soon be ready for distribution to the trade.

The manual has been compiled under the auspices of the National Association of Automobile Show and Association Managers, 239 West 39th Street, New York. It will be made available for dealer association secretaries and others desiring it at a nominal price covering the cost of compilation and publication.

The manual does not make any claim to furnish a panacea for the used car situation. It sets forth the steps that can be taken by a group or association of dealers in any community to co-operate in establishing definite used car values in that community. In the book will be the forms necessary to set up and operate the machinery of co-operation with full explanations of how the forms are used.

Compilation of the manual was completed this week at a conference of the compilation committee, including Herbert Buckman, manager of the Cleveland Automobile Manufacturers and Dealers' Association, L. B. Sanders, secretary of the Boston Used Car Statistical Bureau and Neal G. Adair, editor of *Motor World* and executive secretary of the National Association of Automobile Show and Association Managers.

Tire Output Shows Gain Over Year Ago

Production in September Drops, However, from Mark Made in August, 1922

NEW YORK, Nov. 6—An increase in tire production for September over the same month a year ago is noted in the figures compiled by the Rubber Association of America, Inc., for the Department of Commerce.

The output, however, declined from the total for the previous month of this year.

A comparative table of inventory, production and shipments of casings, tubes and solid tires is as follows:

PNEUMATIC CASINGS

1921	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan.	45	5,219,605	703,430	965,417
Feb.	45	5,193,018	819,892	1,073,756
Mar.	46	4,597,103	1,163,314	1,611,654
April	49	4,527,445	1,651,418	1,785,951
May	59	4,451,668	2,100,917	2,085,882
June	63	4,154,456	2,313,365	2,643,850
July	63	3,892,037	2,570,524	2,757,581
Aug.	66	3,934,853	3,043,187	2,894,432
Sept.	63	3,340,798	1,929,268	2,047,329
1922—				
Jan.	66	4,174,216	2,055,134	1,596,306
Feb.	66	4,691,329	2,084,308	1,562,365
Mar.	63	5,183,286	2,645,790	2,073,963
April	65	5,464,336	2,401,187	2,086,651
May	65	5,523,095	2,721,503	2,639,273
June	64	5,042,147	2,838,890	3,133,260
July	63	4,834,106	2,476,656	2,685,995
Aug.	63	4,629,392	2,915,209	3,029,823
Sept.	64	4,612,037	2,504,744	2,502,106

INNER TUBES

1921—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan.	47	5,586,163	740,824	1,042,617
Feb.	46	5,415,464	916,627	1,129,881
Mar.	48	5,044,861	1,346,483	1,643,690
April	51	4,916,772	1,762,122	1,983,571
May	57	4,751,859	2,210,040	2,342,567
June	60	4,835,098	2,359,928	3,232,673
July	61	3,122,815	3,020,981	3,603,248
Aug.	64	3,649,319	4,430,152	3,804,060
Sept.	62	3,827,830	3,274,822	2,645,758
1922—				
Jan.	66	5,246,647	2,343,393	1,889,724
Feb.	65	6,141,956	2,596,774	1,702,583
Mar.	63	6,991,114	3,017,511	2,090,737
April	65	7,230,096	2,650,573	2,329,343
May	65	7,189,552	2,970,696	2,938,947
June	64	6,186,584	3,130,629	3,973,679
July	63	5,675,829	3,068,199	3,630,744
Aug.	63	5,207,228	3,808,224	4,220,055
Sept.	64	5,164,757	3,501,442	3,558,971

SOLID TIRES

1921—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan.	12	303,753	21,229	29,116
Feb.	12	304,374	23,365	29,599
Mar.	12	283,800	28,710	43,926
April	12	269,985	28,859	42,080
May	12	264,663	35,156	40,122
June	11	240,336	28,395	49,867
July	11	220,003	35,123	55,678
Aug.	11	216,367	55,694	66,866
Sept.	11	161,832	37,441	50,276
1922—				
Jan.	11	181,769	40,224	33,284
Feb.	11	183,448	39,492	36,565
Mar.	11	182,197	49,433	48,250
April	11	173,748	46,664	52,309
May	11	170,904	57,640	60,711
June	11	159,808	66,089	63,108
July	11	176,375	71,505	69,425
Aug.	11	189,698	84,313	69,425
Sept.	11	200,016	82,767	66,767

"Production" and "Shipments" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic work in factory and in transit to, or at warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch, or on a consignment basis, or abroad.

JAPAN IS GIVING UP USE OF JINRIKISHA

LOS ANGELES, Nov. 5—So sudden and pronounced has been the decrease in the use of jinrikishas in Japan that Daisuke Akiha, head of the oldest and leading jinrikisha manufacturing plant there has announced that the major portion of his large establishment will shortly be diverted to other lines of activity.

Akiha declares that the prejudice that so long existed against the use of motor vehicles is fast disappearing and, as he believes the days of the rikisha are rapidly drawing to an end, he has determined to anticipate the impending situation and proceed accordingly.

Whereas, ten years ago more than 300,000 jinrikishas were in use in Japan, the total now barely reaches 70,000.

New Chalmers Six Coach Has Unusually Wide Body

DETROIT, Nov. 6—The Chalmers six coach, just put on the market, is a five-passenger inclosed car of the composite type, built on the standard Chalmers chassis and listing at $1,585.

Distinctive features in design are found in the unusual width of the body, the broad doors, the front seats, which fold and then tip forward—the driver's chair completely clearing the steering wheel and wide windows all around, offering a clear view for all passengers.

The body is maroon with black superstructure. A carmine stripe on maroon runs around the body several inches below the belt. Black disk wheels, with maroon trimming, add to the striking appearance. The substantial fabric covering of the rear and rear side panels is cut in one piece running from one side-window to the opposite side-window. The roof is also fabric covered.

Interior trim is in broadcloth with hardware of satin finish. The door-window lifters are of the lever type. Rear quarter windows are operated by a strap.

A large trunk is mounted on a nickeled trunk rack at the rear. For this a dust cover is also supplied. Wood trunk bars of natural finish protect the body. Additional equipment includes parking lights, windshield visor, rear view mirror, windshield cleaner, dome light, non-skid cord tires, five disk wheels, heater and windshield of double ventilating type with the upper glass hinged from the top and the lower from the bottom.

Proposing Flat Cars to Hurry Deliveries

Manufacturer Advises California Dealer—Damage Is Feared from Tramps

LOS ANGELES, Nov. 6—The freight situation has become acute with automobile distributors in Southern California. Representatives of some of the most popular makes of cars are thirty days behind in deliveries of open models and sixty days behind in closed cars. One company has twenty-two carloads en route from the factory and trace of them has been lost.

Dealers who are in position to make immediate deliveries are enjoying the business they would not have otherwise. This is because of the large number of cancellations and the customer's determination to buy a car that he can get without delay. One distributor has been notified by his factory that the only way shipments can be made to him will be by using flat cars.

This puts him in a quandary because cars shipped at this time of the year with only a canvas covering to protect them from the weather usually are damaged in transit. Not only do they suffer from exposure to the weather, but there always is an especially large number of tramps headed for Southern California in the winter, and when they steal a rail ride, they like nothing better than to occupy the soft upholstery of an automobile.

Usually they are very careless in their habits and enjoy such pastiming as cutting holes in the leather, carving their initials on the instrument board, or scratching them in the finish. This makes the dealers hesitate before ordering shipments by flat cars.

Railroads acknowledge their inability to meet the situation. It is reported that at one point in Nevada there are approximately one hundred carloads of automobiles in the freight yards waiting for motive power to bring them to this city.

International Harvester Introduces Speed Sedan

CHICAGO, Nov. 8—The International Harvester Co. has introduced a de luxe bus for hotel, club and resort use. It is known as the International Model S speed sedan. The top is art-craft construction. The seats are wide and deep cushioned. Fourteen to fifteen passengers may be comfortably seated.

Entrance is obtained through three side doors, while a passage at the end of the third seat gives easy access to the rear without disturbing other passengers. Speeds of 25 to 30 m.p.h. can be obtained. The length of the chassis overall is 185⅝ in. Heavy pneumatic truck cord tires are a part of the regular equipment.

Men of the Industry and What They Are Doing

McMullen Is Apperson Treasurer

In the refinancing of the Apperson Bros. Automobile Co. of Kokomo, Ind., Roger B. McMullen of Chicago, a pioneer in the automotive industry, has been made treasurer, and A. S. Terrill of A. S. Terrill & Co., investment securities, has been added to the directorate. McMullen was in the bicycle and supply business before the days of the automobile as the Roger B. McMullen Co. of Chicago. In 1902 he was one of the organizers in Chicago of the American Motor Car Manufacturers Association, which was an association of those automobile manufacturers who did not recognize the Selden patent. He acted as its secretary and manager for one year. He has since been connected with the A. L. Smith Co., Hydraulic Pressed Steel Co. and Hale & Kilbourne Co., Philadelphia, all connected with the automotive industry.

Westcott Appoints Schreiber

Karl O. Schreiber, who has been assistant superintendent of the Springfield works of the International Harvester Co. for the last two years and prior to that served as general foreman at the Akron plant, has resigned to become assistant to the president and director of factory operations at the plant of The Westcott Motor Car Co. President B. J. Westcott has been in active charge of the plant since the first of the year. Schreiber has been identified with the engineering, manufacturing and inspection departments of the Continental, Chalmers, Hupmobile, Oldsmobile, Packard and Reo companies during the last twelve years. He went to the Harvester company from Lansing. Supt. C. H. Smart of the Springfield works of The International Harvester Co., states that Schreiber's successor has not yet been selected.

Changes with International

H. F. Perkins, vice-president of the International Harvester Co., has been assigned as assistant to the president in the general administration of the company's affairs, and G. A. Ranney, secretary, has been elected vice-president and treasurer. Cyrus B. McCormick, Jr., has been placed in charge of the manufacturing plants of the company throughout the world. A new office of director of engineering has been created with E. A. Johnson, who has been manager of the experimental department up until this time, appointed to the position.

Fox Announces Personnel

President Ansley H. Fox of the Fox Motor Car Co., Philadelphia, announces the personnel of his organization as follows: General superintendent and factory manager, William K. Swigert, formerly of Marmon, and for seven years Chalmers superintendent; chief engineer, Paul F. Hackethal, formerly with Mercer, Templar and Buick; purchasing agent, C. H. Landsittel, formerly with Haynes, Templar, Garford and Duesenberg; assistant superintendent, J. H. Kreidler, formerly with Hudson, Northway Motors, Steering Gear & Parts Co., and the Gear Grinding Machine Co.; general sales manager, Fred C. Vanderhoof, formerly with the Standard Steel Car Co. and before that general manager of the Philadelphia Ford plant.

Bitting's Duties Enlarged

George L. Bitting, sales manager of the Eaton Axle Co. since its organization, has taken over the sales managership of the Standard Welding Co. of Cleveland. Both companies are divisions of the Standard Parts Co. of that city. P. T. Hill succeeds his former chief as sales manager of the Eaton Axle Co. Hill also has been with the axle company since its organization and previous to that was connected with the Torbensen Axle Co.

Woodworth Returns to Fuller

Frank Woodworth, several years ago identified with Fuller & Sons Manufacturing Co., Kalamazoo, has returned to that concern as production manager, succeeding William T. Clarke. In the interim Woodworth has been with the Remy Electric Co.

Inches Buys for Hercules

Charles W. Inches has been appointed purchasing agent of the Hercules Motor Manufacturing Co. of Canton, Ohio.

Carmody with Chain Company

John D. Carmody, formerly a territory manager for the Champion Spark Plug Co. and more recently a district manager of the Wainwright Engineering Co., has been appointed middle western manager for the Columbus McKinnon Chain Co. of Columbus, manufacturer of Dreadnaught tire chains. He will have his headquarters in Chicago and will cover Illinois, Iowa, Missouri, Minnesota, Wisconsin, Kansas, Nebraska, North and South Dakota.

Star Rubber Names Hilbish

G. H. Hilbish has been appointed special factory representative out of Akron by the Star Rubber Co., Inc., of that city. He served with the B. F. Goodrich organization in various capacities for nine years, and later with Goodyear for approximately eight. With the latter company Hilbish had charge of the Akron branch, was afterward connected with its Cleveland and Grand Rapids branches and more recently was manager of the branch in Toledo.

Reeves on Washington Committee

Alfred Reeves, general manager of the National Automobile Chamber of Commerce, has been appointed by Secretary Hoover of the Department of Commerce as a member of the General Committee Co-operating on Trade Association Activities. The purpose of the committee is the compilation of a book on trade association activities, embracing more than 4500 trade associations, of which the automotive industry is one of the major associations. The work of the industry, as embodied in the activities of the N. A. C. C., will be shown by Reeves, under whose supervision the chapter on the automobile industry is being written. The book will be printed about Jan. 1 and will carry a complete list of trade associations in America, with an explanation as to their scope.

Sheldon Changes Agencies

George H. Sheldon, for a number of years closely identified with the automobile and tire industries in an advertising capacity, has resigned from Snodgrass & Gayness, Inc., New York, after being associated for the past three years, and has become general manager of Thresher Service, advertising, with offices at 136 Liberty Street, New York. Prior to his association with Snodgrass & Gayness, Inc., Sheldon was general manager of the New York offices of the McJunkin Advertising Co., Chicago.

Campbell-Ewald Toronto Head

Milton D. Bergey has been placed in charge of the Canadian office of the Campbell-Ewald Co., which has been opened in Toronto. Bergey was formerly advertising manager of General Motors of Canada., Ltd., and later associated with a Canadian agency. He has a wide acquaintance in Canadian advertising and selling circles.

Muir Joins Hall Lamp

James A. Muir has severed his connection with the Corcoran-Victor Co. of Cincinnati and associated himself with the C. M. Hall Lamp Co. of Kenosha, Wis., caring for the jobbing trade.

Prof. Wilson with Standard Oil

Prof. Robert E. Wilson, director of research of the Research Laboratory of Applied Chemistry of the Massachusetts Institute of Technology, has resigned and become identified with the Standard Oil Co. of Indiana.

Howe Advances Brown

Thomas R. Brown, Jr., formerly office manager of the Howe Rubber Corp., New York, has been appointed New York district manager with headquarters at 232 West 58th Street, New York City.

Chalmers Property Will Be Sold Dec. 7

Maxwell Likely to Purchase It —Receiver Is Now in Charge of Affairs

DETROIT, Nov. 8—The plant and properties of the Chalmers Motor Corp. will be sold at receiver's sale on Dec. 7 under the terms of a final decree entered in Federal court on the petition filed by the Fisk Rubber Co. and the Metropolitan Trust Co. of New York for the appointment of a receiver. William S. Sayres has been named special master to conduct the sale, the upset price on the entire property being fixed at $1,987,500.

Bids will be accepted on three parcels, the first comprising the land and buildings, the second the inventory of material and goods in process of manufacture and the third the claims, accounts, patents, good will, trade names, stocks, bonds, etc., and particularly the special claim filed by the Chalmers company against Maxwell Motor Co., Inc., in the suit of Jenks & Muir Manufacturing Co. versus Maxwell.

Parcel Protected by Lien

The sale will be made without valuation, appraisement, redemption or extension. All of the property in the first parcel is covered by the lien of the first mortgage made by Chalmers to the Metropolitan Trust Co. as trustee Sept. 1, 1917. Pledges must be deposited 24 hours in advance of the sale to indicate the intention to complete the purchase. Should the bid be accepted the upset prices on the three parcels, respectively, are $1,350,000, $225,000 and $412,500.

Deposits required in each case are $135,000, $22,500 and $41,250 or the collective sum where a bid on the entire property is anticipated. Pledges on each of the three lots may also be made in notes or claims on the first $405,000 of the first mortgage, six per cent five-year gold notes, the second claims of $65,500 and the third claims of $123,750. Deposits may also be made partly in cash and notes or claims.

Maxwell Holds Notes

Most of the notes and claims outstanding of the Chalmers company are held by Maxwell, $2,500,000 of the $3,150,000 mortgage issue and about $4,000,000 in other claims. Though technically the sale is open to the highest bidder, the conditions are such that it is practically limited to the Maxwell interests and the property will be bought in by this company at a reasonable market figure as part of its plan to merge the two companies and rejuvenate the Chalmers line.

Pending the sale, the affairs of the Chalmers company are being directed by B. E. Hutchinson, treasurer of Maxwell, as receiver. Limited production is being carried on until full control is vested in Maxwell, when it will undertake an extensive expansion. The Chalmers plant will be continued as the six cylinder car plant and will be further used to extend the manufacturing requirements of the two cars.

PERSONAL NOTES

Watson Stabilator Names Stephens

Earle Stephens, who has been president of the Earle Stephens Co. of Pittsburgh, distributor of Moon cars for the past three years, and formerly general manager of the Auburn company there, is now in charge of sales for the Watson Stabilator Co. of Pittsburgh, at 324 South Highland Avenue, which handles nothing but stabilators. This is in accordance with the uniform policy of the John Warren Watson Co. who are building a distributing system of their own in the principal cities of the country. The company in New York is headed by B. C. Helm, formerly sales manager for Packard Motor Car Co. of New York, in Detroit, E. V. Rippingille, formerly national service manager of Hudson and Essex cars is in charge. In Troy, N. Y., Julian Williams, who has distributed Kelly-Springfield tires, is handling the Stabilator.

Champion Appoints MacManus

Robert A. Stranahan, president of the Champion Spark Plug Co., Toledo, announces the appointment of MacManus, Inc., of Detroit, as advertising counsel.

Miller in Promotion Work

Franklin A. Miller, formerly advertising manager of Stromberg Motor Devices Co., has joined the staff of the Dunlap-Ward Advertising Co., Cleveland, and will have charge of promotion work. For the past three years Miller headed his own company, merchandising automotive parts and accessories.

Duffus Represents N. A. D. A.

R. O. Duffus has been appointed an assistant general manager of the National Automobile Dealers Association, further augmenting the association's field staff. He formerly was manager of the Packard branch at Kalamazoo, Mich., and later of the Lincoln sales department of R. E. Fair, Ford dealer in the same city.

Indictment Charges False Label Used on Spark Plug

CLEVELAND, Nov. 8—The Federal Grand Jury here has indicted David Goldston, alias David Goldstein, alias D. Charles, alias Charles David and Tom O'Leary on charges of using the mails to defraud by placing Champion X labels on alleged spurious spark plugs. The genuine spark plug is made by the Champion Spark Plug Co. of Toledo.

Franklin Postpones Building New "Four"

Cost of Materials Said to Make Production Impossible at Price Intended

SYRACUSE, Nov. 8—Production of the new Franklin four, which was to sell for about $1,000 and be on the market next April, has been indefinitely postponed by action of the board of directors of the Franklin Automobile Co.

The rising cost of materials, which, it is said, made it impossible to produce the car at the price intended, is the reason for the change in the plans of the company. The sale of additional stock has been discontinued.

The company also announced that it has discharged the force of 300 men which has been working at the experimental plant, and only a few engineers will be retained.

The indications are that the new Franklin four will not appear on the market at any time next year. Work on the proposed plant for the new car has not been started, though the company has already purchased a large factory site east of the city.

Officials of the company refused to discuss in any way the decision to postpone production, which came as a great surprise in automotive circles here.

The plant for the six cylinder car will continue to operate at present capacity.

British Send Assurance on Rubber Restriction

NEW YORK, Nov. 9—Assuring the members of the Rubber Association of America that they need have no fear that the new British law restricting crude rubber production will work adversely to their interests, the Rubber Growers Association of London has cabled a reply to the American invitation to send over a committee for a conference, suggesting waiting to see how the restriction will work out.

The cablegram says:

Council of Association thanks you for friendly message and cordial invitation to New York, but considers that as the scheme has only just been started it will be best to wait and see what effect it has on all branches of the rubber industry. Meantime we shall welcome your association considering advices in regard to U. S. A. needs of crude rubber during 1923 as we are all opposed to any idea of creating actual shortage of supplies. We therefore feel that American manufacturers need have no fear that the scheme will work adversely to their interests.

Chairman Hotchkiss called a meeting of the American committee for this week.

LEWIS-HALL RECEIVER

DETROIT, Nov. 9—The Federal Court has named the Union Trust Co. of Detroit receiver for the Lewis-Hall Motors Corp., manufacturer of trucks.

Banker Antagonism Nil, Haynes States

Dodge Brothers President Completes Tour of Cities in Northwest Section

DETROIT, Nov. 7—Following a six weeks trip through the Northwest territory and Pacific Coast, President F. J. Haynes of Dodge Brothers declares the general business condition to be "healthy from the feet up." With John A. Nichols, Jr., general sales manager of the company, he visited Dodge Brothers dealers, bankers and other merchants in all important cities, getting first-hand impressions.

Haynes said that a new cycle of prosperity has started which is sound and healthy and has none of the aspects of boom times. Bankers and merchants everywhere regard it as a substantial and permanent improvement. They are content to witness a gradual improvement because they have just seen a tragic example of the other kind of development—the kind that accumulates so much momentum that the brakes of good business judgment are useless in an emergency.

Haynes states that the improved conditions were most noticeable in the cities and larger towns, but that the purchasing power and inclination to buy in the rural sections are improving appreciably. Both Haynes and Nichols were impressed with the absence of antagonism which has been attributed to bankers by automobile men in some parts of the country. "The average banker to-day views certain makes of cars as standard merchandise," Haynes said.

In almost every State there was declared to be less evidence than ever before of the usual winter slow-down in business. This condition was declared to be reflected at the factory, which is maintaining production at a point approximating the high-pressure mark of earlier in the year.

Big Production Hinges on Body Supply for Cars

(*Continued from page* 944)

Maxwell has run into a shortage of closed bodies, and production has been reduced considerably below earlier season figures, but will rebound as rapidly as the body plant can be brought up to high output. Chalmers operations continue at the former rate, pending the completion of negotiations for the taking over of the company by Maxwell.

Cadillac continues to lead in the better priced car field, holding its schedule close to 100 cars daily. Packard production is continuing steadily at about 2000 monthly. Lincoln is at capacity, but the production facilities are low and will continue so until the completion of plant extensions now under way. Wills Sainte Claire is operating at approximately 20 cars daily.

Oakland and Oldsmobile sales are high, production at the factory showing increases in October with a probable further increase in November. Both are operating in excess of 100 cars daily. Reo is building in excess of 100 a day, this total including cars and trucks. Cole is building about 50 daily.

Dort is building about 100 cars daily. Durant is building 100 Durant fours a day at the Lansing plant, and is starting in on a production of more than 100 daily on the Star car. Gray is now building about 100 cars daily and is making additions to its dealer organization steadily. Earl Motors is building about 1000 a month.

Nash Output

CHICAGO, Nov. 6—Nash Motors at Kenosha is producing about 192 sixes and fours daily at its Kenosha and Milwaukee plants.

Total for 1922 So Far Is Placed at 2,119,227

(*Continued from page* 944)

in delivery. Last month these increased from 30,055 in September to 33,320. Instead of a falling off in carload shipments there was an increase from 25,950 in September to 26,980 in October. Boat shipments declined from 8002 to 7404 last month.

Most encouraging are the reports from truck manufacturing centers. Business shows an improvement of 75 per cent over a year ago, with production for September 35 per cent greater than in the same month last year. Some plants are operating at capacity to meet the growing demand for rail cars and motor buses. Better industrial conditions are enhancing sales of motor trucks in those sections, and interest is showing a greater awakening among farmers.

NEW GILL PISTON RINGS

CHICAGO, Nov. 7—Two new piston rings, known as the Special Oil Wiper and the Servus Step-Cut, are announced by the Gill Manufacturing Co. The former has a square oil-return space around the bottom, while the latter is a step-cut ring. Like the Gill Interlocking Joint ring, these rings are individually cast, out of round, of a gray iron composition. They are lathe-turned for quick-seating and are claimed to lap themselves in against the cylinder walls in a short time.

Dort to Solve Sales Problems in Branch

"Experimental Studio" in Detroit to Be Used for Introducing New Methods

DETROIT, Nov. 8—Dort Motor Car Co. has opened a factory branch in Detroit under the management of E. J. Poxson, assistant general sales manager at the factory, who at the same time will retain his factory connection, so that there will be a distinct factory tie-up in the conduct of the branch.

It is the plan of the company to use the branch as an experimental studio in which will be worked out methods for improving retail merchandising and servicing of cars. As methods are tested out and found productive, they will be recommended for adoption by all Dort retail establishments.

With the exception of New York, Detroit will be the only city in which a factory branch will be maintained, and this because of the proximity to the factory and the generally close competitive condition of the market. Very careful investigations and analysis of the market will be made and its particular requirements from both sales and service angles studied.

In its selling plan, the company will operate to a large extent on a specialized salesman plan rather than the districting plan. Salesmen equipped to handle certain types of trade will specialize upon them with the fundamental thought of easy servicing as a common working ground. They will be free to extend their activities to any part of the city where their class of trade may be found. As a dealer organization is built up in the city ahe same open privileges will be extended. Only distributor territory will be restricted. Two years' experience has shown the open plan most successful.

On business involving trade-ins the company will make it a policy to accept cars only at a price permitting of ready re-sale.

CORRECTION

The export shipments of motor parts, not including engines and tires, for the first nine months of this year, was given in the previous issue of AUTOMOTIVE INDUSTRIES as having had a total value of $128,410,260. This statement, as the accompanying detailed table showed, was a typographical error, the correct total being $28,410,260.

Table of Imports and Reimports of the Automotive Industry for September, 1922, and Nine Preceding Months

	Month of September				Nine Months Ending September			
	1921		1922		1921		1922	
IMPORTS	No.	Value	No.	Value	No.	Value	No.	Value
Automobiles	69	$97,365	26	$27,443	399	$698,771	269	$497,599
Parts, except tires		29,254	..	34,214	...	768,995	...	470,034
All other		1,251	..	2,061	...	113,096	...	65,199
REIMPORTS								
Automobiles (free of duty)	443	695,586	85	114,581	3,182	5,021,757	1,117	1,871,272

Railroads Ordering More Freight Cars

Present Number Available Now for Automobile Shipments to Be Augmented by 3900

NEW YORK, Nov. 8—James S. Marvin, head of the traffic department of the National Automobile Chamber of Commerce, sees relief ahead for the industry in the report he has received that six railroads have ordered 3900 new automobile cars, which will bring the total in service up to 110,000. The new cars have been ordered by the Northern Pacific, Norfolk & Western, A. T. & Santa Fe, 1000 each; C. M. & St. P., 500; C. R. I. & P., 300, and Western Pacific, 100. In addition, the Grand Trunk is figuring on ordering 2000, the C. R. I. & P. and C. M. & St. P. an additional 500 each.

Marvin also calls attention to the fact that the Car Service Division at Washington has sent out another order to all railroads to relieve grain shipping. Box cars are ordered sent West empty from territory west of Pittsburgh, Cleveland and Detroit. Automobile cars are specified as exempt from this, and instructions to send these cars into manufacturing territory are re-stated.

Co-operating with the N. A. C. C., General Manager C. A. Vane, of the National Automobile Dealers' Association, has asked the dealers to watch for the improper use of automobile equipment and get it back immediately to the manufacturing area.

"If you will report to this office any such misuse in your territory, we will take it up immediately with the American Railway Association, so that proper steps can be taken to put these carriers back into automobile service," writes Vane.

Receiver for Syra-Cord Works on Reorganization

SYRACUSE, Nov. 8—Reorganization of the Syracuse Rubber Co., maker of the Syra-Cord, is under way following the appointment by Federal Judge Cooper of William Rafferty of this city as receiver for the company. Rafferty posted a bond of $50,000 to continue operations.

Even though the assets of the company exceed its liabilities by $360,000, the company in its petition stated that it is unable to borrow sufficient funds necessary to work its way to reorganization. The action is one in equity brought by Albert J. Richards of Mountainview West, N. J., a creditor for $3,100. The company consented to the appointment of a receiver.

The company has been in business since 1920. Within a short time it was in financial difficulties, but was able to pull through by loans from President E. R. Caldwell, who died July 6. Caldwell's death was a severe blow to the company.

The inventory shows $784,003 assets, compared with current liabilities of $228,779, first mortgage bonds of $123,800, leaving a capital balance and reserve for unpaid dividends amounting to $360,300.

Studebaker Big Six Line Is Increased $50 to $135

SOUTH BEND, IND., Nov. 6—Studebaker Corp. has increased the list on its Big Six, the increases ranging from $50 to $135, according to body style. The list is as follows:

	Old Price	New Price
7-pass. phaeton	$1,650	$1,785
4-pass. sport phaeton	1,785	1,835
4-pass. coupe	2,275	2,400
Sedan (regular)	2,475	2,475
Sedan (special)	2,650	2,750

The increase was made in order to place the Big Six line on an earning basis justified by the actual value built into the car and the somewhat limited production possibilities in this particular model, it was stated at the factory.

In connection with the change in price, the company has adopted a strict policy on used car valuations and is urging its dealers to accept cars only at a price well within the resale price established by current sales, so that quick turnovers may be made.

Autocar Increases Lists Effective in December

ARDMORE, PA., Nov. 6—The Autocar Co. has announced a price increase on all truck models to take effect Dec. 11. The new prices will be as follows:

SHORT WHEELBASE MODELS

	Old Price	New Price
4 to 6 ton	$3,950	$4,200
2 to 3 ton	2,950	3,100
1½ to 2 ton	1,950	2,200

LONG WHEELBASE MODELS

	Old Price	New Price
4 to 6 ton	$4,100	$4,350
2 to 3 ton	3,075	3,200
1½ to 2 ton	2,050	2,300

ROLLS-ROYCE OUTPUT GROWS

SPRINGFIELD, MASS., Nov. 8—Production is on the increase at the Rolls-Royce plant here. Better than eight chassis a day are now being turned out, and the coach department is very close to the same rate of output. It is expected the goal of ten chassis a day will be reached by the beginning of 1923.

Sales of the phaeton were much stimulated by the price reduction.

ELECTRICAL ENGINEERS MEET

WASHINGTON, Nov. 7—The Washington Society of Engineers of the American Institute of Electrical Engineers, held their fall meeting here with an attendance of more than 100 members. E. R. Whitney, president of the Commercial Truck Co., the principal speaker, delivered an illustrated lecture on the development of the electric truck.

Mason Tire Prices Increased 5 Per Cent

Does Not Put Lists Materially Higher Than Those of Other Manufacturers

AKRON, Nov. 7—Mason Tire & Rubber Co. of Kent, near Akron, has announced a blanket increase of five per cent in prices of all tires, effective Nov. 15.

Just what effect the Mason move will have upon Akron tire manufacturers is problematical. Tire men here refuse to commit themselves as to whether or not their companies definitely are planning price boosts this month, although many admit that such upward revisions are logical in view of the steady increase in cost of cotton and crude rubber.

When tire companies, a few weeks ago, engaged in their last price-cutting scrimmage with each other, Mason undercut practically all competitors so that the 5 per cent increase does not put Mason tires at a mark materially higher than the standard list prices on the same size tires of other manufacturers.

It is admitted that tire men want to increase prices but on the other hand they express the fear that increases may serve as a damper upon spring orders from dealers, and as they want to keep their factories running up to standard as much as possible through the winter months by working on spring orders already received and upon those anticipated, they do not want to do anything to jeopardize the spring spurt.

Tire production, which reached a low mark in the Akron district during October, has been increased slightly and further increases are contemplated. Factories not only will build back above normal their finished goods inventories but will work on spring commitments so as to be amply prepared for heavy spring tire buying.

Jackson Motors Prepares to Turn Out New Models

DETROIT, Nov. 8—Jackson Motors Corp., a division of Associated Motor Industries, is employing about 60 men in the development of tools, jigs, etc., for new models which are expected to be introduced some time around the first of the year, according to C. L. Halliday, vice-president and general manager.

Definite production plans have not been formed, but the plant at Jackson will be used principally for the manufacture of Jackson cars and will also be used in part for body building for Jackson and other cars in the Associated Motors line.

No fundamental changes from the former Jackson models are expected, according to Halliday, except that the cars will be refined both as to chassis and bodies to bring them up to latest developments in the industry.

Business on Sound Basis in Uruguay

More Firmly Established Than Ever Before—Conditions Returning to Normalcy

MONTEVIDEO, URUGUAY, Oct. 5—(*by mail*)—The automobile business in Uruguay is gradually returning to normalcy, and although it will be some time before the movement of the years 1919 and 1920 is reached, it can be safely said that the business is more firmly established and on a sounder basis than ever before.

The boom of 1919 and 1920 undoubtedly did more harm than good to the trade, because, in the excitement of the time, firms and individuals who had no experience rushed into the automobile business. When the reaction of 1921 came along, a large percentage failed or otherwise dropped out. Many automobiles of various makes were brought out from the States on the strength of bank credits, which could not be met when the crash came and eventually were sold at auction, in many cases at ridiculous prices.

Fittest Survive

But all those who were not fitted to survive the depression have gone, and, therefore, it can be truthfully said that the automobile trade in Uruguay is now on a sound basis.

If the import figures for the first half of 1922 are taken, it would seem that the car trade is in worse shape than ever, because a total of only 190 cars were imported into the country from Jan. 1 to June 30, 1922, as against a total of 833 in the same period of 1921. Such a conclusion would, however, be erroneous, because a large proportion of the cars imported during the first half of 1921 were still in stock unsold on Jan. 1, 1922. In fact, a careful estimate shows that around 800 new cars were in Montevideo dealers' hands at the beginning of this year. While only 190 cars were imported during the first half of the year, actual sales of all makes approximated 1000 cars during the same period, divided about equally between Montevideo and the country.

European Popularity Gone

Practically all the cars that are being imported now are of American manufacture, the one time popularity of European makes having disappeared, and while the Citroen, Renault, Wolseley, Austin, Fiat, Lancia and others are still on the market, their sales are few and far between. The American car is now firmly entrenched in Uruguay.

It is interesting to know that Uruguay ranks among the countries having the highest per capita proportion of cars. On June 30, 1922, it had a total of about 12,500 cars and trucks in service, of which 5200 are in the city of Montevideo. There is one automobile for every 120 inhabitants, so that it is on a par with Argentina, but ahead of every other Latin-American country.

Also it has a higher percentage of cars than any European country, except Great Britain. The city of Montevideo with a population of fewer than 400,000 can show a higher proportion of cars than other large South American cities.

Montevideo used to be the paradise of medium priced cars, but during the past year there has been a distinct trend toward the low priced car, so much so that more than 60 per cent of the cars licensed every month correspond to the "less than $800" class in the States.

As regards the immediate future, it must be borne in mind that the country still is in a precarious financial situation, but ever since the beginning of the year a steady improvement has been observed and it is safe to say that during the second half of the year, retail sales of automobiles will exceed 1200.

—BENJAMIN KOPT.

Contest Committee Announces Official Air Records Made at Meet Which Was Held in Detroit

NEW YORK, Nov. 4—The following official records of the events at the Detroit air races have been announced by Russell B. Shaw of the Contest Committee of the Aeronautical Chamber of Commerce in charge of the meet:

CURTISS MARINE TROPHY RACE

PILOT	PLANE	TOTAL TIME	SPEED M.P.H.
Gorton, Navy	Navy TR-1	85:13.17	112.6
Elliott, Navy	Vought	88:18.38	108.7

SPECIAL PRIZE FOR GREATEST AIR SPEED

		Greatest Air Speed
Sanderson, Navy	18 T	124.6 m.p.h.

DETROIT AERIAL MAIL TROPHY

Nelson, Army	Martin Transport	2:27:20.72	107
Melville, Army	Martin Bomber	2:29:40:33	103.2
Cummings, Army	Martin Bomber	2:32:29.07	101.5

AVIATION COUNTRY CLUB OF DETROIT TROPHY

Harris, Army	Honeymoon Express	1:54:40.35	134.9
Jones, Curtiss	Curtiss Oricle	2:21:17.54	109.4
Worthington, Army	Fokker Transport	2:50:22.55	90.7

LIBERTY ENGINE BUILDERS TROPHY RACE

Koenig, Army	Lapere Observation	2:00:01.54	128.8
Bradley, Army	DH-4B Observation	2:02:14.21	126.5
Carter, Army	DH-4B Observation	2:10:50.62	118.1

PULITZER TROPHY RACE

Maughan, Army	Curtiss H.S.Pursuit	45:16.62	205.8
Maitland, Army	Curtiss H.S.Pursuit	45:52.34	198.8
Brow, Army	Curtiss Navy CR-2	48:07.19	193.8

GENERAL WILLIAM MITCHELL TROPHY RACE

Stace, Army	MB-3	50:25.73
Guidera, Army	MB-3	54:48.32
Broberg, Army	MB-3	55:07:87

ON-TO-DETROIT RACE

Beech	Laird Swallow
Jones	Curtiss Oriole
Stinson	JL Monoplane

Duesenberg Argues Suit on Liberty Engine Work

WASHINGTON, Nov. 8—The Duesenberg Motors Corp. of Elizabeth, N. J., has argued its appeal before the United States Supreme Court on a claim for $1,201,851, alleged to have been lost on a contract with the Government for the construction of Liberty engines during the war.

It is stated that in the early part of January, 1918, the Government entered into a contract with the company for the construction of 2000 Bugatti engines, which were to be a duplicate of the French models. A model furnished the company, it is said, proved of faulty construction, necessitating the construction of new designs. Eight engines were completed at the time of the armistice.

The company claims that because of the delay in furnishing the designs, it lost the amount it sues for. The lower court held that the profits claimed were "contemplated profits."

FINANCIAL NOTES

Allis-Chalmers Manufacturing Co. for the quarter ended Sept. 30 reports net profits of $450,415 after Federal taxes, equivalent after preferred dividends to 62 cents a share earned on the $25,770,750 common stock outstanding. In the preceding quarter net reached $299,796, or at the rate of about 4 cents a share on the common and in the third quarter of 1921 was reported at $421,366, or 51 cents a share. For the nine months, net profits aggregated $1,028,944, equal to 63 cents a share on the common after preferred dividends, compared with $1,831,435 or $3.74 a share in the same period of the previous year. Unfilled orders on hand at the end of the quarter amounted to $8,288,929, compared with $9,110,514 on June 30 and $7,260,574 on Sept. 30 last year.

Mullins Body Corp. reports for the nine months ended Sept. 30, last, sales of $1,692,687 and a surplus after dividends of $66,872. The statement in detail follows: Sales, $1,692,687; allowances, $76; net sales, $1,692,611; cost of sales, $1,436,831; gross profit, $255,780; general expenses, etc., $118,931; operating profit, $136,849; interest and discount, etc., $11,777; net profit, $125,072; dividends, $58,200, and surplus, $66,872. The condensed balance sheet as of Sept. 30, last, shows cash amounting to $270,474; trade accounts and notes receivable, $372,052; merchandise inventories, $432,364; accounts receivable, $237,494; notes payable to banks, $450,000; accounts payable and accrued, $101,095; surplus, $2,004,976, and total assets and liabilities, $4,150,901.

Mack Trucks, Inc., reports net earnings of $1,205,738, after charges for depreciation, maintenance and repairs, for the quarter ended Sept. 30, 1922. This is equal to $3.25 a share on 283,108 shares of common stock. This is in marked contrast to the same quarter of 1921, when the company reported net profits of only $12,632. For the nine months ended Sept. 30 net profits totaled $2,766,564, equal to $6.79 a share on the common. Total current assets as shown by the financial statement of Sept. 30 are $22,052,844; liabilities, $32,428,940. The company has no outstanding bank loans or funded indebtedness.

Johns-Manville Co. has called for retirement at $120 a share and accrued dividend all of its outstanding preferred stock and will pay at some date in December a cash dividend of $40 a share upon its common stock. A stockholders' meeting will be called to authorize conversion of the company's 25,000 shares of its outstanding common stock into 250,000 shares without par value at the rate of eight shares of new for each share of old, reserving 50,000 shares for sale to employees on favorable terms. No new financing is contemplated. Preferred stock will be retired between Dec. 15 and Jan. 1.

Timken Roller Bearing Co. reports earnings for the first nine months of the year of $6,339,000 after depreciation and taxes. October's gross business exceeded September's and current operations are up to the October total. This would indicate not only a new high record for the last quarter, but total earnings after all depreciation charges and tax write-offs of around $8,500,000 which is more than $7 a share on the stock.

Willys-Overland Co. and subsidiaries for the quarter ended Sept. 30, 1922, show estimated earnings of $4,099,675, from which a reserve of $475,000 for the balance of price decrease was deducted, leaving a balance of $3,624,675. Shipments for the last quarter were: Overland, model 4, 27,448; Willys-Knight, model 20, 8277; Willys-Knight, model 27, 352; total, 36,077.

Hudson Motor Car Co. reports net earnings for the quarter ending Aug. 31 were $3,656,215, or at the rate of $3 a share on the outstanding stock of the company. Total profits for the quarter were $4,183,327. Reserve for Federal taxes amounted to $527,109. Dividends paid amounted to $600,247, leaving a balance for surplus of $3,055,971.

H. H. Franklin Manufacturing Co.'s regular quarterly dividend of 1¾ per cent on the cumulative 7 per cent preferred stock was paid on Nov. 1 to all stockholders of record on Oct. 20.

Moon Motor Car Co. for the quarter ended Sept. 30 reports net profits of $326,478, equal after preferred dividends to $2.08 a share on the 154,213 shares no par common stock.

Wolverine Truck Trailer Co. has decreased its capital stock from $200,000 to $12,000.

Durant Gets Gear Plant With Bid of $2,100,000

SYRACUSE, Nov. 9.—William C. Durant, president of Durant Motors, Inc., has purchased the plant of the New Process Gear Co. in this city for $2,100,000. The sale was confirmed by Federal Judge Cooper, who had previously rejected a bid of $1,904,000, made by T. W. Warner of Toledo.

Judge Cooper expressed the belief that the price of $2,100,000 is still inadequate and that the only reason it was accepted was because the sale would prove advantageous to the stockholders. Mayor George R. Lunn and Col. Francis G. Gaffy had approved the offer of $1,904,000, which was made at the first sale.

When Judge Cooper refused to confirm the sale, the Durant corporation offered $1,925,000, which Judge Cooper also rejected.

The New Process plant has been working at full capacity for many months, making gears for the Durant and Star cars. It is believed it will continue under the same management, for the present at least.

Peru May Lower Tariff Effective First of Year

WASHINGTON, Nov. 4—Lowered tariff duties into Peru on passenger cars, motor trucks, parts and tires are expected to be in effect by Jan. 17, according to a cablegram from Commercial Attaché Dunn, at Lima, to the Bureau of Foreign and Domestic Commerce. The final draft of the revised tariff law has been introduced into the Peruvian Senate, and the Government is urging action so that the law may be in force at the end of the year.

Motor trucks, now subject to an import duty of .20 soles per kilogram of weight, will be reduced to .03 soles per kilo, as a special concession to foster their use, and passenger cars, now taxed at .60 soles per kilo, with additional special surtaxes, will be changed to an advalorem tariff of 15 per cent. Truck tires will be changed from 1.60 soles per kilo to .50 soles, tires for passenger automobiles from 1.60 per kilo to 1.00, and solid tires from 1.60 to .05 per kilo.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Last week rates for call loans ranged between 4½ per cent and 6 per cent, as compared with 4 per cent to 6 per cent in the preceding week. The increased firmness was attributed to the increased demand for funds to meet end-of-the-month requirements, to a considerable calling of loans during the early part of the week, and to the continued flow of funds to the interior to satisfy crop-moving demands. Increased firmness also developed in the time money market. The rate for 60 days' to 6 months' maturities was 4¾ per cent to 5 per cent, as compared with 4½ per cent to 4¾ per cent for the shorter maturities the preceding week. The prime commercial rate was 4½ per cent, as compared with 4¼ per cent to 4½ per cent.

The volume of business for the week ending Nov. 2, as indicated by bank clearings at the leading cities of the United States, totaled $7,794,359,000, which was a gain of 1.4 per cent over the preceding week and 10.3 per cent over the corresponding week of last year. New York City alone showed a gain of 9.2 per cent over 1921.

Another favorable factor was to be found in the car loadings for the week ending Oct. 21, which totaled 1,003,759 cars, the largest amount in two years, and only 14,780 cars below the loadings for the week ending Oct. 14, 1920, which constituted the peak in the history of American railroads. Total loadings of merchandise and miscellaneous freight, 596,392 cars, were the largest ever recorded.

Of a more adverse nature is the report of railroad earnings for September. The net operating income of Class I railroads for the month amounted to $58,428,000, which indicates a yearly return of only 2.88 per cent on the tentative valuation. This compares with $87,534,000 for September.

Comet Assets, $461,000; Plant Will Remain Closed

DECATUR, ILL., Nov. 8—Assets of the Comet Automobile Co. of this city, as given recently by John W. Evans, master in chancery, in his report to the Circuit Court, in the case of that company against the Farmers State Bank & Trust Co., amount to $461,000; and the total ascertained liabilities, other than the $250,000 of bonds held as collateral security by the bank, are considered to be less than half the value of the assets.

The future of the company is uncertain. The receivers will make no effort to operate the plant. They are now taking an inventory. The parts department is open in order that owners of Comet cars can purchase spare or extra parts if they require them. The receivers will probably also order the completion of a number of cars.

Petroleum Meeting Attracts Engineers

Members of S. A. E. Will Take Part in Some Sessions at Meeting of A. P. I.

NEW YORK, Nov. 3—Some details of the program for the annual meeting of the American Petroleum Institute, to be held in St. Louis December 5 to 8, have been announced. Certain of the sessions will be, in effect, joint sessions in which members of the Society of Automotive Engineers will take a prominent part, while all members of the S. A. E. are invited.

The general sessions of the A. P. I. meeting will not open until the afternoon of Dec. 6, but on Dec. 5 there will be meetings of the Association of Natural Gasoline Manufacturers at which the use of natural gasoline in motor fuel will be discussed; and of Committee D-2 of the American Society for Testing Materials, at which standard methods for testing petroleum products will be considered.

Outline of Program

The so-called group sessions of particular interest to the automotive industry will begin at 10:30 a.m. Thursday, Dec. 7, at which time papers on the subject "What Constitutes Good Gasoline?" will be read. One of these, by Dr. S. W. Stratton of the Bureau of Standards, is entitled "The Answer so Far Given by the General Research Program of the Bureau of Standards, the Oil and Automotive Industries." A "Demonstration of the Relationship of the Knock to the Gasoline Problem—the Remedy for the Knock" will be given by Thomas Midgely, Jr., of the General Motors Research Corp. There will follow discussions by B. B. Bachman, O. C. Berry, R. C. Clarkson, C. F. Clarkson, H. R. Cobleigh, H. M. Crane, H. C. Dickinson, H. L. Horning, F. A. Howard, W. S. James, T. J. Litle, Van H. Manning and others.

A second session of automotive interest will be that to be held at 10:30 a.m. Friday, Dec. 8, and devoted to a discussion of the present status and probable development of the internal combustion engine to consume heavy fuels. Henry L. Doherty is scheduled to present the chief paper. This is to be followed by discussion by various engineers concerned in the development of heavy fuel engines of automotive and other types.

To Take Part in Revisions

NEW YORK, Nov. 7—The Interdepartmental Committee on Petroleum Specifications, a Government committee charged with formulating specifications for gasoline, lubricating oils and other petroleum products, is to hold an open joint meeting with committees of the Society of Automotive Engineers and the American Petroleum Institute in the auditorium of the Interior Building, Washington, at 10 a. m., Nov. 13.

At that time certain revisions in the present Government specifications for gasoline and lubricating oils will be considered, as will also the recommended standards for lubricants formulated by Lubricants Division of the S. A. E. Standards Committee.

INDUSTRIAL NOTES

Moore Drop Forging Co., automobile parts manufacturer, has awarded a contract for a machine shop at its Chicopee plant. Its dimensions will be 93 x 35, and it will be ready for operation by the end of the year. November production is said to be running about even with October, which represented the high mark for the year, and prospects for the rest of the year are good.

Norwalk Iron Works Co., builder of compressors, manufacturing air and gas compressors for all purposes and also refrigerating machinery, with general offices and works at South Norwalk, Conn., has opened a Chicago office at 627 West Washington Boulevard. It is in charge of L. R. Bremser, who for 13 years was associated with Gardner Governor Co.

Herberts Machinery & Supply Co., Los Angeles, Cal., has been appointed representative by the Diamant Tool & Manufacturing Co., Inc., of Newark, N. J., in connection with the sale of Diamant standard punch and die sets, in the territory covered by the entire States of California, Arizona and Nevada.

Black & Decker Manufacturing Co.'s Philadelphia branch office and service station, formerly located at 318 North Broad Street, has re-located, the new address being 824 North Broad Street.

Few Changes in Chassis of New Locomobile Model

BRIDGEPORT, CONN., Nov. 8—A new model Locomobile to be known as the Series 8 is now ready for production. The chassis remains practically the same as before, the improvements being in the nature of refinements rather than radical departures from Locomobile traditions.

The changes include the use of a Delco battery ignition system of the two spark type with two independent units, each with its own coil, breaker and distributor; a new type clutch, a new arrangement of timing gears and a redesigned camshaft with cams ground to reduce noise to a minimum.

The springs are more resilient, and the manifolding is hot water jacketed. The bodies show no changes and the prices remain the same as before, ranging from $7,600 for the phaeton to $11,000 for the sedan. The chassis price is $6,800.

NEW LYCOMING ENGINE

WILLIAMSPORT, PA., Nov. 8—With the perfection of a new engine, the Lycoming Motors Corp. has announced that its force of 700 men will be gradually increased, until an output of 125 engines a day has been reached.

METAL MARKETS

To all appearances the transformation of the iron and steel markets from their recent condition of producers' supremacy into one of mastery over values by consumers has been completed. Sellers are far more anxious for orders than buyers are to place them. In these circumstances it is all the more astonishing to encounter predictions of early price advances by the leading interest. These prophecies have it that "finished steel products are expected to remain stabilized at present levels, except some specialties, and these are expected to go up, not down." Named among the latter are certain grades of forgings.

This forecast, which was disseminated via Wall Street a few days ago, concluded: "It is also said sheets may be advanced by the corporation in the near future." No more convincing evidence of the change that has come over the sheet market could be adduced. Its only hope lies in the more than remote possibility of price advances by the chief interest. As a rule early upward changes in the Corporation's prices are predicated on positive factors, such as excess of the demand over the supply or marked increases in costs of production, and not on an altruistic desire to make it easier for the independents to replenish their backlog of orders.

In fact, sheet interests heretofore enthusiastically bullish in their sentiments have changed their tone in the last few days and admit that the slowing up in the demand is becoming pronounced. The full-finished sheet market is in somewhat better shape than that for ordinary grades, but even here a change in the tone is noticeable. The fact that many of the rollers of full-finished automobile sheets have orders on their books that will carry them through the remainder of the year is not so much of a solace as it would seem at first glance. The end of the year is only seven weeks distant and what with the holidays that intervene, the backlog of orders necessary to keep mills running to the end of the year need not be much in excess of a normal month's business.

It is generally admitted that the steel market in the course of the next few weeks faces another period of readjustment. There have been periods in the steel market when lack of buying appetite was relieved by a drastic resort to higher prices. Those who make the steel industry's price policies know, however, the grave risk incurred in revising values upward unless there is reasonable assurance that developments will vindicate such a move.

Pig Iron.—Prices are melting. Representative transactions between blast furnace interests and automotive foundries are lacking, but even in carlot sales buyers are usually able to cut under published quotations.

Aluminum.—Important aluminum consumers in the automotive industries are reported to have covered considerable of their wants for the first half of next year. Several millions of imported metal are said to have been contracted for in the last few weeks. The domestic producer is reported to be averse to commitments beyond the current quarter and importers have been booking considerable business for 1923 deliveries. Shipments of British and Swiss metal continue to arrive and so far as ingots are concerned the higher tariff appears to have made little inroads on the business of importers.

Copper.—Producers of wrought copper and brass products explain advances in prices by pointing to the rise in virgin metals and the draining of the supply of war scrap.

Calendar

SHOWS

Nov. 13-18 — Chicago, Annual Show and Meeting of the Automotive Equipment Association.

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8 - 13 — New York, Second National Automobile Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Nov. 3 - 11 — London (Olympia), Automobile Show.

Nov. 9 - 19 — Buenos Aires, Argentina, Annual Exhibition, Automovil Club Argentino.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

Dec. 15 - Jan. 2 — Paris, Aeronautical Salon, Grand Palace. Chambre Syndicale des Industries Aeronautiques, 9 Rue Anatole de la Forge.

Jan. 13-24 — Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

May - July, 1923 — Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

CONVENTIONS

Oct. 26-28—Washington, Second National Conference for the Study of Highway Engineering and Highway Transport Education.

Nov. 14 - 15 — Chicago, Semi-Annual Convention, Factory Service Managers, National Automobile Chamber of Commerce, La Salle Hotel.

Dec. 6-8—St. Louis, Third Annual Meeting of the American Petroleum Institute, Hotel Statler.

Jan. 15-19—Chicago, Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show.

Jan. 29 - 31 — Chicago, Annual Meeting, Automobile Electric Service Association, Congress Hotel.

S. A. E. MEETINGS

Metropolitan Section

Nov. 16 — Speaker, A. L. McNurty, Consulting Engineer, Connecticut State Motor Vehicle Commission; Subject, Regulations Governing the Use of Rural Highways.

Dec. 14 — Speaker, Charles P. Grimes, Research Engineer, H. H. Franklin Manufacturing Co.; Subject, Air Cooling in Automotive Engines.

March 15—Speaker, William P. Kennedy, President, Kennedy Engineering Corp.; Subject, Trolley Buses and Flexible Vehicles for Street Railway Service.

April 19—Speaker, Edw. E. La Schum, General Superintendent, Motor Vehicle Equipment, American Railway Express Co.; Subject, Engineering Features of Fleet Operation.

May 17—Speaker, F. P. Gilligan, Secretary, Henry Souther Engineering Co., Subject, Metallic Materials for Automotive Work.

Other Meetings

Jan. 9 - 12 — New York, Annual Meeting.

Jan. 31 — Chicago Meeting and Dinner of the Society at the Congress Hotel.

Industry Increases Number Men at Work

WASHINGTON, Nov. 8—Increased employment in the automotive industry has been noted by the United States Employment Service in its industrial analysis for the month ending Oct. 31. Under the industrial classification of "vehicles for land transportation" the industry which sustained a decrease last month of 16,232 shows an increase in October of 8297 employees.

In the industrial survey for Michigan, the Department of Labor says that the state reports a favorable outlook in the automobile, metal, textile, and iron industries, with an unusually promising outlook for the steel industry.

There is a shortage of skilled workers in the automotive industry at Flint and an automobile body plant is under construction in that city, which will ultimately employ 12,000 workers.

In Illinois, particularly in the Chicago industrial district, automotive plants are holding their high rate of production. In Indiana there is a shortage of workers in all industries, especially tool and die makers and automobile mechanics. Many Indianapolis factories are working overtime.

Conditions in Cleveland

CLEVELAND, Nov. 7—Employment in Cleveland increased during October, although the number on the rolls of automobile and accessory establishments decreased 5.9 per cent, according to a survey of the Cleveland Chamber of Commerce.

In the last month two companies, Templar and Grant, went into the hands of receivers, as protective measures, and both plants were shut down for invoice. Orders were not interfered with or shipments delayed.

Iron and steel mills and fabricating plants, which are the backbone of Cleveland's industry showed an increase of 5.9 per cent in the number of employees.

Servicemen and Dealers Hear Oil Pumping Talks

NEW YORK, Nov. 6—Oil pumping was discussed at a meeting of the Automotive Service Association of New York at the Automobile Club of America, which was attended by 80 service managers and dealers. The principal speakers were A. Ludlow Clayden of the Sun Oil Co. of Philadelphia, H. E. Pengilly of the Standard Oil Co. of New York and George A. Round of the Vacuum Oil Co.

Discussing the pressure type of lubrication, Clayden told his audience that oil pumping troubles usually occur as wearing takes place in the bearings, being followed by an apparent drop in oil pressure. A remedy is to cut the supply of oil still further by opening the by-pass, said Clayden.

Round, talking on splash lubrication, claimed that faulty design of the connecting rod dippers and incorrect oil levels in the troughs often cause trouble, while Pengilly urged the service managers to make a special campaign to educate owners to change oil regularly.

Pengilly condemned the practice of flushing out the crankcase with kerosene and told of a new flushing oil which, he claims, has all the advantages of kerosene without its detriments.

Another meeting will be held at the A. C. A. Dec. 1 at which the subject will be: "Modern Production Methods, with Particular Attention to Hand Operations."

FRANKLIN OVERSOLD

SYRACUSE, Nov. 5—The Franklin Automobile Co. reports that the number of unfilled orders now on hand is equivalent to all of November production and one-third of December production as well.

Increase in Exports Reported by Canada

WASHINGTON, Nov. 4—The exports of automotive equipment from Canada during September reached a total value of $2,038,030, an increase of 14 per cent over the previous month. This announcement from the Automotive Division of the Bureau of Foreign and Domestic Commerce also showed that the outgoing passenger cars from Canada totaled 2943, valued at $1,718,931, and trucks 274 with a value of $131,473. No month of this year has shown such a heavy shipment of trucks, and in only one were the passenger car shipments lower, that month being March, when 2983 vehicles were exported. The value of the parts exported during September was $188,399.

Foreign shipment of 5862 passenger cars and 1295 motor trucks from the United States during September had previously been announced here. Thus the total export movement from the two countries consisted of 8805 passenger cars and 1569 motor trucks. All records for truck shipments during the present upswing of sales, therefore, were broken. The September exports of cars were exceeded only in August and June of this year.

MOON'S OCTOBER SALES

ST. LOUIS, Nov. 7—The Moon Motor Car Co. reports that its sales last month were 390 per cent greater than sales for October of last year, and were 70 per cent of the sales for last August, which was the largest month in the company's history. The dropping off of business in some sections of the country has been compensated for to a large extent by an increase in other sections, notably in Texas and California. The November production schedule calls for the same output as in October.

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Registrations Grow More Rapidly Than Population

New car sales will finally be in proportion to population growth. This period of stability still more than ten years away in all sections of country except Mountain States. Sales ability of dealer limited by rate of registration growth.

By Norman G. Shidle
Charts and Statistics by Raymond B. Prescott

AUTOMOBILE registration will continue to make marked upward strides every year for some time to come. Its progress is basically dependent upon the growth of population and, eventually, the registration curve will advance at about the same rate as the population curve. That period has not yet been reached, however, and will not be reached for a decade throughout the United States.

Everywhere, except in the Mountain States of Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah and Nevada, registrations will continue to climb more rapidly than population for about ten years or more.

These are the outstanding conclusions of a detailed statistical and economic survey of registration trends throughout the United States that has just been completed by AUTOMOTIVE INDUSTRIES. The survey bears out the general idea recently expressed by leaders in the industry, but adds to those general statements a wealth of accurate and detailed information upon the basis of which sales efforts can be directed.

Automobile sales are a function of population and for this reason their future growth can be predicted in a general way, over limited periods of time, by proper correla-

HERE is the first of a series of articles that every sales manager in the automotive industry will want to read and file.

Registration trends for nine chief geographical divisions of the United States are presented, their relation to population growth is shown, and their significance in planning future car sales indicated.

Later articles will have similar information for each of the States, beginning with some of those States most important from an immediate sales standpoint.

Proper interpretation of this material depends upon careful reading of the text and attention to the basis of the trends discussed. It should be noted that chiefly "rates of growth" in registration and population are discussed in this article. Actual sales figures are already available to most factories, but the significance of the rate of growth in various sections has not been clearly understood.

GEOGRAPHICAL DIVISIONS

(Considered in accompanying registration analysis)

NEW ENGLAND (Fig. 2)
- Massachusetts
- Rhode Island
- Connecticut

MIDDLE ATLANTIC (Fig. 3)
- New York
- New Jersey
- Pennsylvania

EAST NORTH CENTRAL (Fig. 4)
- Ohio
- Indiana
- Illinois
- Michigan
- Wisconsin

WEST NORTH CENTRAL (Fig. 5)
- Minnesota
- Iowa
- Missouri
- North Dakota
- South Dakota
- Nebraska
- Kansas

SOUTH ATLANTIC (Fig. 6)
- Delaware
- Maryland
- District of Columbia
- Virginia
- West Virginia
- North Carolina
- South Carolina
- Georgia
- Florida

EAST SOUTH CENTRAL (Fig. 7)
- Kentucky
- Tennessee
- Alabama
- Mississippi

WEST SOUTH CENTRAL (Fig. 8)
- Arkansas
- Louisiana
- Oklahoma
- Texas

MOUNTAIN (Fig. 9)
- Montana
- Idaho
- Wyoming
- Colorado
- New Mexico
- Arizona
- Utah
- Nevada

PACIFIC (Fig. 10)
- Washington
- Oregon
- California

tion of registration figures with growth of population figures. The economic, psychological and statistical basis of this method of sales analysis was thoroughly discussed in an article entitled "Statistics for Use in Making Sales Plans," published in AUTOMOTIVE INDUSTRIES of Nov. 17, 1921. It is available there for those interested in the method as well as the results, but is not repeated here because of its somewhat technical nature.

The general trend in registrations is shown in Fig. 1. Here are the actual and normal registration curves for the United States compared with the growth of population for the country. Registration figures are predicted for 1923 and 1924.

Automobiles, as other commodities have done, passed through a certain period during which they were a novelty in the life of the community. They gradually took their place as a part of the common life of the community and became a necessity rather than a luxury. As the industry finally comes into its period of stability, the growth in registrations will be in proportion to the growth of population, barring the introduction of some medium of transportation replacing the motor vehicle or the chance of extremely radical changes in the vehicle itself which would render it practically a different commodity.

Probable Progress Shown

The probable progress figures shown here, while not exact, contain a comparatively small factor of error, certainly less than 10 per cent and probably not more than 5. Consequently, they form a far better basis for long range sales planning than do guesses based on temporary economic conditions.

Flattening out of the registration curve for the United States, it appears, need not be feared for several years. Registration figures next January should show something like 11,600,000 motor vehicles in the United States.

These general figures are of interest to every sales manager in an inspirational rather than an immediately practical way. They point to the huge possibilities for business during the next few years, followed by a period of stabilization in which there will be a large replacement business supplemented by new business about in proportion to the rate of population increase.

But for immediate use, more detailed studies are needed.

Where shall we concentrate our sales activities during the next few years? Where will competition be keenest? Where is the best opportunity left to get in somewhere near the ground floor? Where will the most rapid sales development be in the near future?

Immediate questions of this sort are confronting sales departments. Proper allocation of sales effort depends upon the answers found. Success in carrying on the fight for dealers and wise handling of those dealers now in the organization are also involved. Data in this article and in those to follow will be useful in trying to answer those questions.

Trend in Nine Sections

Registration trends for nine important sections of the United States are shown in the accompanying charts. Future articles will discuss registrations and their relation to dealer and sales problems for each of the various States.

These charts must be considered from two points of view:

1. The relative growth of registrations as compared with population.
2. The actual growth of population as an index of sales after registration growth has become about analogous to population growth.

The second phase is of more academic than practical interest in most sections at the present time, since registration growth will be more rapid than population growth in all but one section for a number of years.

For the sake of brevity, we will refer to the time at which registrations reach the same rate of growth as population as the "period of stability."

The West South Central States (Arkansas, Louisiana, Oklahoma and Texas) are farthest from this period of stability than any other group. The West North Central States (Minnesota, Iowa, Missouri, North Dakota, South Dakota, Nebraska and Kansas) and the Pacific States (Washington, Oregon and California) also have a

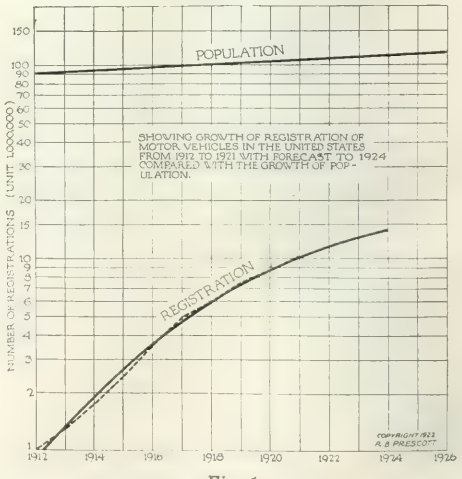


Fig. 1

good way to go. In the West South Central States, however, the rate of population growth is rapid, in addition to the registration curve having strong upward tendencies. The registration curve for this section shows no more signs of flattening out than it did several years ago.

Sales quotas in this section can be increased constantly for some years. There should be a good number of new buyers every year, entirely aside from those brought in by the normal population increase.

Investigations Needed

If sales records do not show such an increase in business, there is probably need for an investigation. Perhaps it will be found that some temporary economic condition is responsible for the drop, in which case nothing much can be done about it. There may not be enough dealers, however, properly to handle the territory, or the dealers already there may not be functioning efficiently.

It would be foolish, of course, to take the trends shown in these charts as absolute statements of the possibilities of a section over a given period, without considering as well various local changes and temporary conditions that may arise. The figures do give a good general picture of the situation, however, and will be reliable for general studies. They will frequently indicate a necessity for investigation which would not otherwise be recognized.

The situation indicated in the West South Central States pertains also in large measure to the West North Central and the Pacific Coast States, although the rate of growth of population in the second instance is markedly lower than in the first and third. This simply means that after the period of stability has been reached the annual growth in sales volume will be less in the West North Central section than in the two other sections just mentioned. (Figs. 5, 8 and 10.)

New England, the East South Central and the East North Central States, show a certain similarity, although

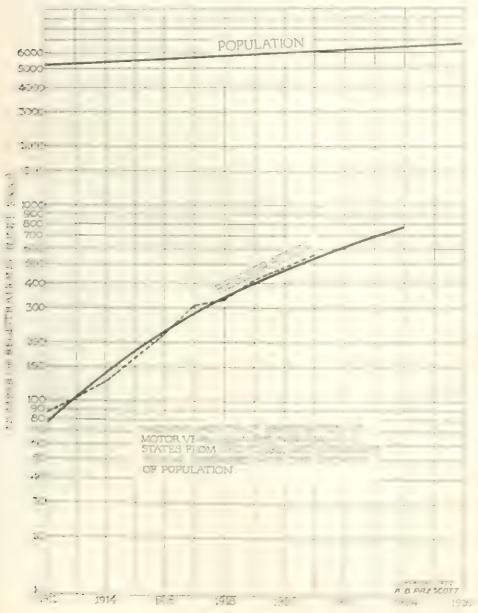


Fig. 2

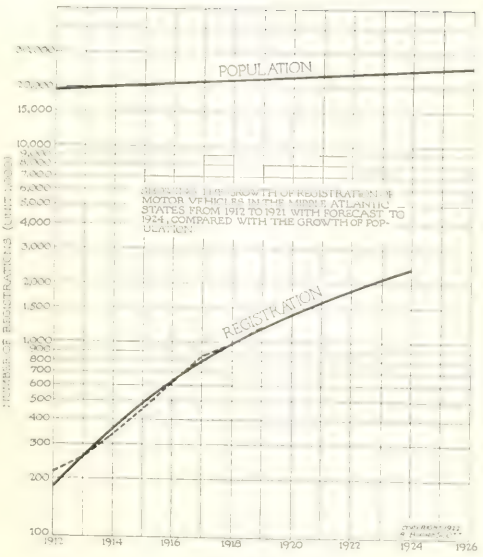


Fig. 3

it should be noted that for the purposes of this analysis only the States of Massachusetts, Rhode Island and Connecticut have been included in the New England chart. Maine, New Hampshire and Vermont show characteristics so greatly different from those of the three important States included that a curve combining all six would have been distinctly unrepresentative of any of them. (Figs. 2, 4 and 7.)

The New England States charted, the East South Central States (Kentucky, Tennessee, Alabama and Mississippi) and the East North Central States (Ohio, Indiana, Illinois, Michigan and Wisconsin) show a registration growth curve that is still moving more rapidly than their respective population curves. The rate of registration growth in each case, however, is already showing a distinct tendency to decrease as compared with its progress a few years ago. The reader will not confuse, of course, the term "rate of growth" with the actual growth of either registrations or population.

Sales Limited

In these three groups of States dealers cannot be expected to increase their sales at the same rate as in the past. They will continue to sell more cars every year for some time, but the rate of increase can be expected to decrease.

Competition is likely to be more keen in these sections than in the three western sections previously discussed. There is already a greater proportion of replacement buyers than in the first three cases discussed, and sales effort will be directed more toward people already familiar with some type of automobile. The number of new buyers coming into the market will be proportionately smaller and more intense merchandising effort will be necessary on the part of the individual dealer who is to make a success.

Sales will increase faster than population in these sections, however, for ten years or more. After that time the rate of increase in sales will be considerably smaller than in some of the western sections because the rate of growth of the population is less.

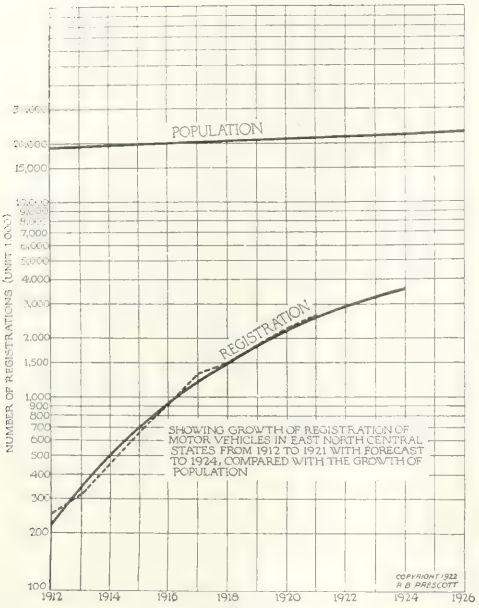


Fig. 4

Registrations are still growing rapidly in the South Atlantic States and in the Middle Atlantic States and bid fair to continue to do so for some time. In these cases, however, the continued rapid registration growth seems to be dependent upon the comparatively rapid population increase rate in these sections. The upward trend in population in both of these sections is rapid as compared with that in New England and the East South Central States. (Figs. 3 and 6.)

Stability in Atlantic States

The registration growth curve in the two sections of Atlantic States is rapidly reaching its period of stability.

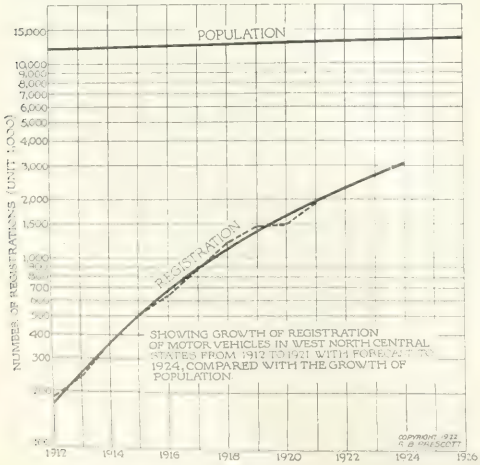


Fig. 5

It is already nearer to the population curve than in the New England and East South Central States, although population is growing faster in the Atlantic States.

The period of stability has almost been reached in the Mountain States (Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah and Nevada). Here the registration curve has distinctly flattened out until it practically coincides in general characteristics with the growth of population curve. (Fig. 9.)

Whatever increased sales are made in this section will be largely due to the national population increase, which will probably go forward at a good rate, as indicated on the chart. A larger proportion of sales will be replacement sales than in any of the other sections of the country.

If a dealer in the mountain States has had his quota increased 10 per cent every year in the past, it would not seem fair to expect him to continue to increase his sales at the same rate in the future. His territory in

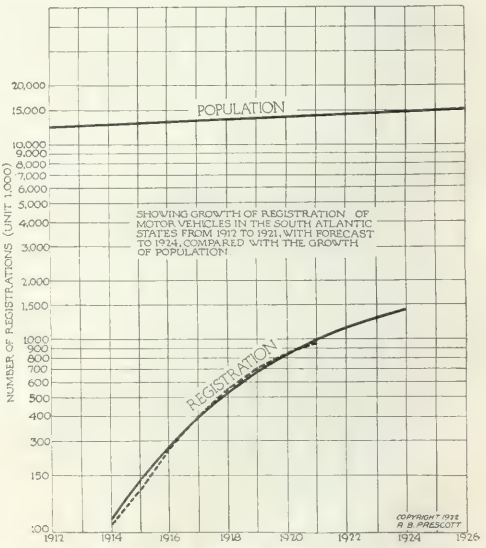


Fig. 6

general, at least, has reached the point where his sales from year to year should be more nearly stable and the yearly quota increase given him should be decreased in proportion.

These charts bring forcibly to mind the necessity for considering individual territorial characteristics in setting sales quotas. One factory, for instance, has been in the habit of setting a dealer's quota each year by giving him 10 per cent more cars than he had the year before. This policy has been in effect for the whole country for some years. Obviously, it is not sound practice, since it fails to take into consideration the special economics and population growth characteristics of the particular territory in which the individual dealer is located.

A flat percentage of increase over last year's sales, given to every dealer in the country will be fair to only a few, and to those few simply by chance. There are certain sales conditions that a dealer can control. He can properly be held responsible for having an attractive place of business, an effective method of finding and fol-

lowing up prospects, a capable and efficient sales staff and good business methods in general.

Other important factors, however, affect sales possibilities which the dealer cannot possibly control. The rate of population growth, current business conditions in a given territory, crop failures and other similar factors are in this group. If the factory is to set dealer quotas intelligently, play fair with the dealer, and properly correlate its own production and sales, all such factors should be considered in setting the quota.

How to Use the Curves

The charts given here, as a matter of fact, are useful only in a general way in allocating sales. The curve for a given group of States may not hold entirely true for a given State or a given territory within a State, although further articles will show that the sectional curve is about the same as the individual State curves in most cases. The curves are useful, moreover, for localizing trouble. If the sales in a given section seem out of line with the general curve, an investigation is probably needed. That investigation will split the territory up into its integral parts and thus finally uncover the real trouble. The charts given here are extremely useful, but should by no means be regarded as thinking or magic organisms. They do constitute an excellent basis upon which to begin study and investigation.

The fight for dealers which is now going on must finally take into account the possible prosperity of the individual dealer. A manufacturer cannot simply assume that he will profit by having as many dealers as possible. He benefits in the long run by having the greatest number of stable, prosperous dealers.

Questions such as these will have to be answered:

How many cars per dealer should there be in a territory? How many service stations are necessary to service a given number of cars? Should the number of dealers increase in direct proportion to the number of cars in a territory? Or will one dealer be able to sell more cars as car population becomes more dense?

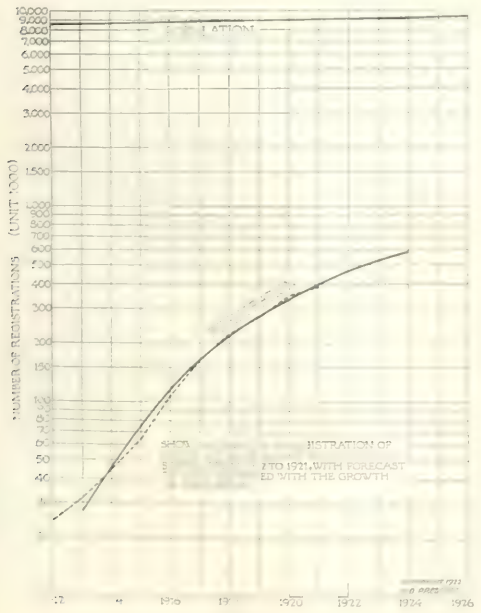


Fig. 7

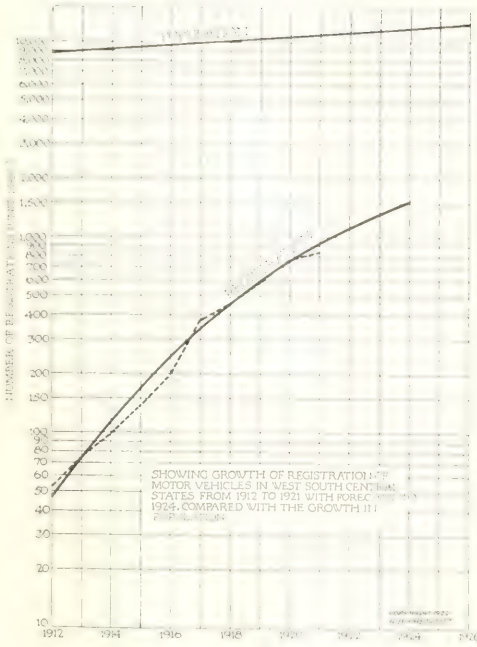


Fig. 8

Practically no studies have been made along this line. The questions cannot be answered offhand in a brief article nor accurately on the basis of information now available. The chart shown in Fig. 11, however, gives an interesting record of what has happened in the past, taking the country as a whole.

Dealers Increase in Numbers

The total number of retail establishments selling automotive products has not grown quite so rapidly as the total car registration. The figures include dealers, garages, and repair shops, a single retailer fulfilling all three functions in many cases. The curve showing number of dealers by years and the curve showing number of garages by years, exhibit approximately the same characteristics as the total retailers curve. Dealers have not increased quite so rapidly as have car registrations.

Looking only at the figures in the curves, it might be predicted that as car population becomes more dense, a single dealer will be able to visit and sell more replacement owners and new buyers; that, for this reason, there will continue to be more cars per dealer.

This statement is true for the time being, simply because increased density of population has thus far made it easier and easier for a single dealer to reach a larger number of prospects. During this time, the automobile has been going through its period of adjustment into the normal economic fabric. Car registrations have therefore grown more rapidly, as already pointed out, than population. Keenness of competition has been offset by the fact that there has been plenty of business for everyone, speaking in a general sense. If this condition were likely to continue the story of the figures alone would be true.

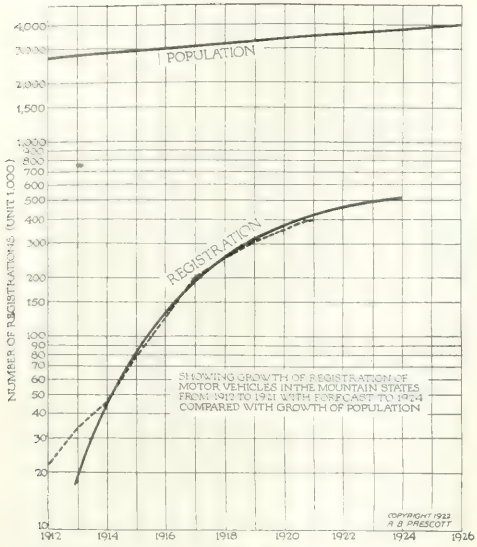


Fig. 9

But conditions are changing, as is shown by the sectional charts already discussed. A few years hence a large part of total sales will consist of replacement sales. While a dealer will physically be in a position to reach more prospective buyers than in the past, competition will be much more keen. More time and effort will be necessary to make a sale.

More Intensive Marketing

Considering these factors, it appears likely that the pendulum will swing back in the other direction. Fewer cars per dealer will result. More dealers will be required to sell a given number of cars. The dealer curve in Fig. 11, if projected forward for ten years, would probably show a rate of growth more rapid than that of car registrations.

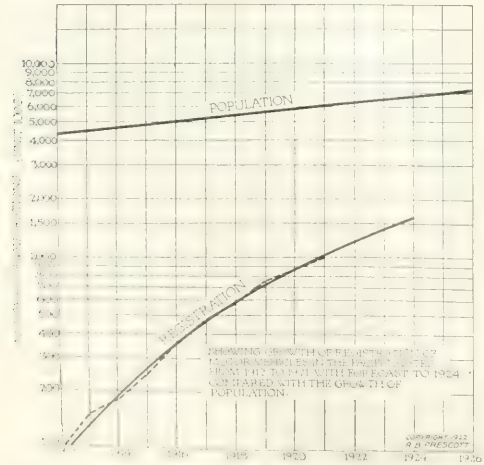


Fig. 10

Such a development means that there must finally be a rather nice adjustment between the extent and character of a dealer's territory and his ability to stay in business. The manufacturer needs more dealers to produce the maximum sales possibilities. The dealer must be allowed enough possible sales in his territory to make it profitable for him to stay in business.

The dictates of economic law will settle the adjustment, of course, eventually. Whatever studies make it possible to effect an adjustment before this harsh judge steps in, however, will be distinctly to the financial advantage of the manufacturer.

Repair shops have increased more rapidly than car registrations during the last two years. This trend is in line with the increased necessity for proper service and the realization of that need on the part of manufacturers. There is no means of telling what the future trend of the repair shop curve will be, because we cannot determine to what extent maximum service demands have been met by those shops now in existence.

It will be interesting to note the distribution of these shops by States, however, in the future articles which will discuss registration trends in greater detail.

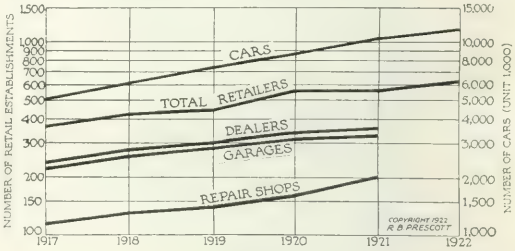


Fig. 11

Three-Joint Propeller Shafts

AT the time the present Society of Automotive Engineers Recommended Practice for three-joint propeller-shafts was voted upon by the Society members, one or two criticisms were submitted in reference to the use of the square type of shaft end. This matter was reviewed at a recent meeting of the Truck Division of the S.A.E. Standards Committee and, as it was felt that it is preferable to use either the taper or spline type of shaft end, the Division recommended that the present square type be omitted. It was thought that in case a square type of shaft end is desired for use at this point, the present S.A.E. Standard square shaft fitting should be used as a basis for the shaft end design.

THE container system of burglar-proof mail transportation in operation between New York and Chicago has been extended to St. Paul and Minneapolis. The railroad container car carried nine large steel boxes equipped for loading and unloading by crane to and from motor trucks.

Tank containers for the transportation in bulk of milk or other fluids is the latest extension of the system, which has proved so successful in the handling of freight through efficient co-ordination with motor trucks.

Each of the nine milk containers carries 600 gallons or the equivalent of sixty of the standard 10-gallon cans. Two hours of manual labor of loading and unloading of cans are saved, as well as avoiding detention of the railroad cars in the yards and terminals.

Mason Road King, New Durant Product

Speed truck type, carrying 35-40 h.p. Hercules engine with 1¼ in. carbureter. Full electrical equipment. Final drive is by spiral bevel gears. Pressed steel frame. Chassis with cab weighs 3320 lbs. Full-floating type axle. Half-elliptic springs used throughout.

A 1-TON speed truck has been developed by the Mason Motor Truck Co., a subsidiary of Durant Motors, Inc., and will be marketed under the trade name, Mason Road King. It has been designed to meet the general requirements of the speed truck field; that is, to furnish rapid transportation at moderate cost for operation and maintenance.

The engine is a Hercules four-cylinder type of 4-in. bore and 5-in. stroke and is rated at 35-40 hp. It is fitted with a 1¼-in. carbureter, which is supplied with fuel from a 12-gal. dash tank by gravity feed. The cylinders are block-cast, with a detachable head and an aluminum oil sump. Full electric equipment is provided, including lighting, starting and ignition, the whole system being of Auto-Lite make. A U. S. L. storage battery of 117 ampere-hours capacity (rating based on 5-ampere discharge rate) is included in the equipment. Lubrication of the engine is by pressure to the main bearings and by splash to interior parts, and an oil pressure gage is fitted to the dashboard. The cooling water is positively circulated by means of a pump, the latter being provided with a "through" shaft for the generator drive. The flat tube, cellular type radiator is of large capacity and back of it is fitted an 18-in. fan driven by a 1½-in. flat belt from the forward end of the accessory shaft. The fan spindle is mounted in a vertical slot of the fan bracket and the belt tension can be readily adjusted by means of a screw with lock nut located on the top of the bracket in a very accessible position.

A plate clutch with external adjustment and a light driven member is used. The gearset is a three-speed type of Warner manufacture and is separately mounted on the sub-frame. Between it and the clutch there is a Spicer double-universal joint to take care of any misalignment between the engine and gearset bearings. The reduction ratios of this transmission are as follows: First forward, 3.53; second, 1.74; third, direct drive; reverse, 3.97. The control lever for the gearset is mounted on the cover plate and the truck is therefore arranged for center control.

The rear system is of the torque arm type, comprising an exposed tubular propeller shaft with two Spicer universal joints. Final drive is by spiral bevel gears with a reduction ratio of 4.9 to 1, though a specially low reduction gear of 5.5 to 1 will be furnished for hilly countries if desired. The rear axle is of the full floating type of built-up construction. The truck has a wheelbase of 130 in. and the standard 56-in. tread.

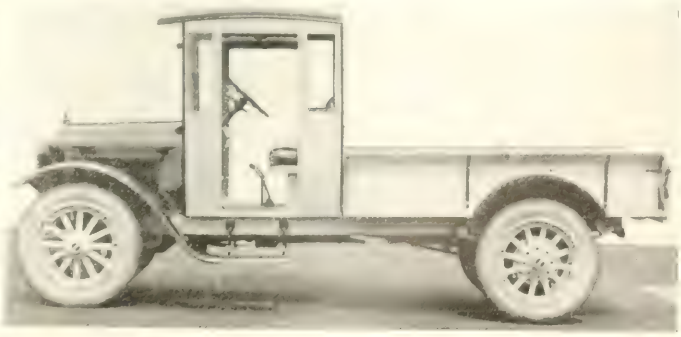
The frame is of pressed steel, the two side members extending parallel of each other and having a 5 9 16 x 1¾ x 3/16 in. section. Suspension is by half-elliptic springs all around, the front springs being 38 in. long and 2 in. wide and the rear springs 40 in. long and 2½ in. wide. Driving thrust is taken up on the rear springs. The wheels are of the wood type, fitted with demountable rims and 34 by 5 in. pneumatic tires all around. Both sets of brakes act on drums on the rear wheels, which drums are 14 in. in diameter and have a width of braking surface of 2¾ in. The outside or contracting brakes are the service brakes. The front axle is of the usual I-beam section, 2⅝ by 1¾ in. The steering gear is mounted on the left side of the chassis and carries an 18-in. hand wheel.

A number of body types will be standardized, including a stake body and an open express body. The truck chassis with cab but without body, weighs 3320 lb. The complete truck with stake body weighs 3950 lb. and with box body 3690 lb. The cab furnished has sliding curtain doors with celluloid windows that can be quickly lowered or raised. Equipment furnished with the truck includes a pump, jack, set of tools, head, dash and tail lamps, ammeter, Stewart speedometer and ventilating windshield. Lubrication of the chassis bearings is partly by grease and partly by oil.

The chassis lists at $1200 and with cab at $1325.

AN opening exists in the Ceylon market for American-made automobile-top canvas, according to Consul Marshall M. Vance, Colombo, Ceylon. Ceylon top-makers require a canvas guaranteed absolutely water-proof. The local requirements are for a canvas of 72-in. width, the ordinary 56-in. width being insufficient.

The colors most in vogue in Ceylon are khaki or various shades of green. Wholesale prices of importations from other countries are from 4s. 6d. to 8s. per yard, dependent upon quality.



Mason one-ton "Road King," a new Durant product

Just Among Ourselves—

Lifting Veil of Secrecy from Output Figures

THERE appears to be a gratifying tendency toward less secretiveness in regard to production figures. The recent publication by General Motors Corp. of its output by divisions for the past four years was an interesting sign of the times. No logical reason is apparent for the reluctance of big production companies to let the public know what they are doing. Nearly all of them are getting their fair share of business and they may well be proud of their records. It is possible to understand why some of the smaller companies, whose output is not as large as they would like the public to think, might prefer secrecy but their aggregate sales make up a comparatively small percentage of the total.

The totals for each month are now available through the N. A. C. C. reports to the Department of Commerce and N. A. C. C. members get the totals by companies each quarter. The industry generally is mightily interested in what individual companies are doing and those which are having a good business might well show their pride by telling the world about it.

"Where Are Cars Going?" Is Popular Query

ANOTHER astounding production record was established by the industry in October with a total of 244,000. It means that 1922 unquestionably will be the biggest year in the history of the industry in volume if not in profits. It also brings with it the inevitable query:

"Where are they going?"

It's a question which is hard to answer. Sales undoubtedly have fallen off somewhat in the larger centers of population but a survey made by correspondents of AUTOMOTIVE INDUSTRIES shows that few cars are going into storage. There must have been, therefore, a big increase in sales in the smaller towns and in the rural districts.

The farmer has been a bit slow in coming back into the market but he certainly is coming. He will do a lot of buying the rest of this year and he will do much more in the spring. He is grumbling at the prices he is getting for his crops but that is nothing new. He needs cars, trucks and tractors and he's going to have them. He also wants farm lighting equipment and he's beginning to buy it.

We have said time and again that the farmer isn't broke. He's much better off than a great many people think he is. He had gotten out of the buying habit for a long time but he'll acquire it again. The South is vindicating the prediction we made in August that it would be a good market for automotive products. It is one of the brightest spots on the sales map. The farmers down there have $1,000,000,000 more to spend than they had a year ago.

Truck Makers Coming Into Their Own

THE truck market is steadily expanding as the year advances and as the traffic jam on the railroads becomes more acute. This applies both to light and heavy duty vehicles but more especially to the former. Indications now are that commercial vehicles will constitute around 12 per cent of the total output for the year. This percentage will increase in 1923. The sale of trucks will expand more rapidly in future than the demand for passenger cars. The bus business this year has been larger than ever before and it is just in its infancy. Sales of rail cars have reached respectable proportions, also.

Truck makers have had a long, hard, discouraging pull, but they are about to reap the reward of their patience. Growth of this branch of the industry in the next ten years will be comparable to that of the passenger car in the past decade. We hope in the near future to tell some of the reasons why this cannot fail to be true.

"Secondary Inflation" Must Be Watched

ALFRED REEVES, general manager of the National Automobile Chamber of Commerce, whose advice to the members of the organization he represents generally is mighty sound, has warned them that the country is entering a secondary period of inflation. He bases his conclusions upon sound premises. Inflation and deflation follow in rather regular sequence. The only difference is that some of the ups and downs are greater than the others.

Freight car loadings indicate that the present volume of general business probably is greater than ever before and it is inevitable that there will be a reaction sooner or later. The lesson of 1920 has not been learned well if this fact is not understood.

The disturbance will not approach in its severity that from which the country has now emerged, but it will bring elements of danger to the unwary or the reckless. There will be splendid business for a long time to come for those who proceed cautiously and sanely, but those who don't may find themselves in trouble.

Reeves attributes the remarkable sales of motor cars this year to the "dammed up" demand resulting from the war period and the depression. He is right. The

What Men in the Industry Are Thinking as Recorded in the Editor's Note Book

same condition prevails in almost all other lines. When this demand is satisfied there is likely to be something of a slowing up in industry generally unless there is a sharp increase in export trade. This will depend chiefly upon the recovery of Europe.

There is enough business in the United States alone to insure a reasonable amount of prosperity, however, no matter what conditions may be in the rest of the world.

A Little Speculation About Prices

PROFITS are looming large on the automotive horizon, not because of their size but because of their importance. There is much speculation as to whether vehicle prices will go lower. If they do it will be surprising. Parts makers are strongly inclined to feel that about all the car and truck manufacturers have passed on to the public in the way of price reductions has been what they have saved in the cost of parts and materials.

This view is supported by the statement to us the other day by the executive head of one of the largest producers in the business, that he believed profits generally were as large as they were at the beginning of 1920. He admitted the public had merely been given the benefit of savings on materials plus a few manufacturing economies.

It would not be surprising if the parts manufacturers were to take the bull by the horns in the near future and boost their selling costs a bit. They are doing plenty of business but they don't feel they are making as much as they should in proportion to the volume. The materials they use are costing them more all the time, they assert, and some of them are about ready to take a firm stand. They contend that if they do there will be no excuse for adding the difference to the retail selling prices.

"Let the vehicle makers be content with a little smaller profit for a while, just as we have been," they say.

Farm Machinery and Prices

SPEAKING of prices, the farm equipment manufacturers contend they can't reduce theirs because of the higher costs of materials. They have made some slight concessions since the depression began in 1920, but not many. Their business hasn't come back in anything like the proportion it has in the car and truck fields. They assert that the farmer can't buy because he isn't getting enough for his crops. As a matter of fact, the farmer is getting pretty fair prices. He is buying the things he needs on which he feels reasonable price cuts have been made. Motor vehicles come in this category. If the farm machinery makers were to take smaller profits and modernize their selling methods they might find the volume of sales much larger.

Can Shortage of Closed Cars Be Avoided?

THERE is an actual shortage at this time of closed cars. Dealers are howling for them and they are losing sales because they can't fill orders on their books. This is especially true with those handling the more popular lines. Many factories have increased their closed car schedules until they are 30 per cent or more of the totals. They probably would boost them higher if they could get enough bodies.

While nearly every one conceded at the beginning of the year that there was going to be an unprecedented demand for closed cars, almost all manufacturers underestimated the volume of sales. A serious body shortage has handicapped them all the year. As a consequence, at a time when there is an insistent call for closed cars, few dealers have anything to sell except open models. Naturally, open cars are not as popular in the fall as they are in the spring. When there are not enough of the closed type to meet the demand both factories and dealers lose money.

It would be a happy arrangement if some system could be worked out whereby a reserve of closed cars could be built up when open models are selling best and vice versa. It would tend to stabilize the business. Perhaps it can be done when the body building capacity of the country can keep pace with current needs.

New Type of Discount Proposed by Dealer

A PROMINENT New York distributor made an interesting suggestion the other day which might be of interest to manufacturers. It was based partly upon his complaint that he was losing money because he couldn't begin to fill all the orders on his books for closed cars. He contended that if manufacturers would give a longer discount on open models in the fall and winter it would help them to keep their factories going full blast at a time when sales are slack. Dealers would have a chance to stock cars on this special discount basis and they could make more money selling them in the spring when demand is strongest. Their earnings for the year would thus be equalized.

From the point of view of the dealer, at least, it doesn't look like a bad idea if he has sufficient capital or credit to buy the cars and carry them in stock until he can get rid of them. J. D.

Five Bearing Crankshaft Important Feature of New Lycoming Engine

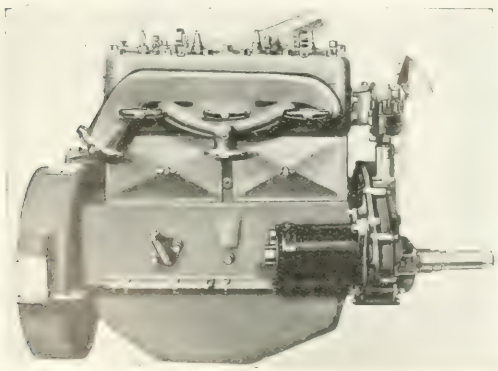
Smooth operation obtained by use of long connecting rods and light reciprocating parts. Special type force feed lubrication used. Bore 3½, 3⅝, or 3¾ in. and stroke 5 in. Lynite or cast iron pistons optional. Performance good in power and flexibility.

By Donald D. Blanchard

UNUSUALLY smooth operation at all speeds has been secured in the new Lycoming four-cylinder engine through the use of long connecting rods and light reciprocating parts. In addition to freedom from vibration, the performance of the new engine is highly satisfactory from the standpoints of power and flexibility. For test purposes the engine was installed in a five-passenger phaeton weighing about 2700 lbs. and with a rear axle gear reduction of 4.8 to 1. It is claimed that a speed of 65 m.p.h. has been attained with this car and that it will accelerate from 5 to 25 m.p.h. in 8 seconds. A stiff five-bearing crankshaft and a system of force feed lubrication, in which the pressure is controlled by the throttle, are important constructional features of the new engine which will undoubtedly contribute much to its durability.

The new engine will be known as the Model C Series and is offered with 3½, 3⅝ or 3¾-in. bore and 5-in. stroke. It may be had with either Lynite or cast iron pistons.

The cylinder block, the upper half of the crankcase and the detachable cylinder head are all gray iron castings. The water jackets are integral with the block. Water passages are provided around all valve ports, spark plug bosses and over the combustion chambers. The block is attached to the crankcase by eleven 7/16-in. studs. The cylinders are rough bored, tested under 100 lbs. water pressure, finish bored and ground to size. The crankcase is stiffened by the webs which carry the main bearings. The flywheel housing is an integral part of this casting. The cylinder head is fastened to the block by eighteen ½-in. studs.



Lycoming engine. Intake and exhaust manifolds integral

The crankshaft is drop forged of .40-.50 carbon steel and is heat treated. The flywheel is attached by means of six ½-in. bolts to a 6-in. flange forged integral with the crankshaft. All bearing surfaces are ground and the crankshaft is drilled for force feed lubrication to main and connecting rod lower bearings. The finished shaft is tested for dynamic balance.

The crankshaft is carried in five main bearings. These bearings are 2⅛ in. in diameter. The front and rear main bearings are 2⅝ in. long, the center bearing is 1 13/16 in. long and the two intermediate bearings are 1 5/16 in. long. The connecting rod bearings are 2⅛ in. in diameter by 1 13/16 in. long.

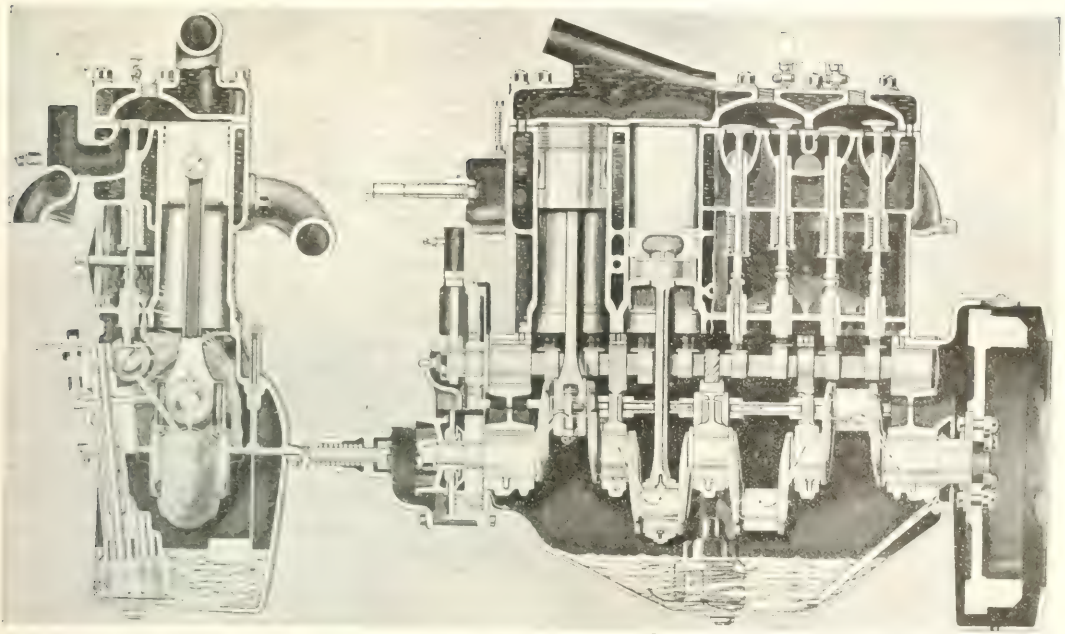
Piston Equipment Optional

Either Lynite, an aluminum alloy, or cast-iron pistons may be had with this engine. Both types are fitted with .003-.004 in. clearance at the first land. The Lynite pistons are of the split-skirt type. Three piston rings are used, all located above the piston pin. Two of the rings are ⅛ in. wide and the third is 3/16 in. The piston length is 4⅛ in. The piston pins are 1⅛ in. in diameter and 2 29/32 in. long. They are made of case-hardened steel, drilled hollow and ground.

Full floating piston pins are used in the Lynite pistons, endwise movement being prevented by snap rings in the piston pin bosses. The connecting rod is bronze bushed. When cast-iron pistons are used, the piston pin is clamped in the connecting rod, the bearing being in the bosses.

The connecting rods are of I-beam section, drop forged of .40-.50 carbon steel and heat treated. The length from the center of the piston pin bearing to the center of the crank pin bearing is 12 in. Bronze backed, babbitt-lined bearings, ground to size, are used in the big ends. The cap is held in place by two 7/16-in. nickel steel, heat-treated bolts. The main bearings are also bronze backed, babbitt lined. No shims are used to fit the bearings. They are fly cut and line reamed to a clearance of .0015 in. to allow for the oil film.

The valves are interchangeable and have cast-iron heads electrically welded to steel stems. The valve lift



Sectional views of new Lycoming engine showing pressure lubrication system, water jacketing, and manifold construction

is 11 32 in. and the effective working diameter is 1⅝ in. The tappets are of low carbon steel, case hardened, ground and fitted with hardened steel adjusting screws and lock nuts.

The camshaft is a .15-.25 carbon-steel drop forging and is case hardened and ground. The cams are tested for a scleroscope hardness of from 75 to 90. The camshaft is carried in four removable bronze bushings. The camshaft diameter is 1⅛ in. and the bushing diameters and lengths are respectively: Front bearing 2 1/32 x 2⅛ in., second bearing 2 x ⅞ in., third bearing 1 3/32 x ⅞ in., and rear bearing 1 15/16 x 2 in. A spring-operated plunger bearing on a hardened steel button on the front end of the camshaft takes the end thrust and automatically adjusts for wear in the timing gears, which are helically cut. The crankshaft and generator gears are fiber and the camshaft gear is cast iron. Removal of the timing gear cover renders these gears easily accessible.

Semi-Steel Flywheel

The flywheel is of semi-steel. It is machined all over and tested for dynamic balance. Teeth for the starting motor are cut in the periphery of the flywheel.

The intake and exhaust manifolds are an integral casting which is held in position by clamps. Proper alignment between the intake manifold and the intake ports is secured by means of steel sleeves fitted into the intake ports. A hot spot is provided to assist in the vaporization of the fuel. The 1-in. S. A. E. carbureter flange is for a carbureter top outlet.

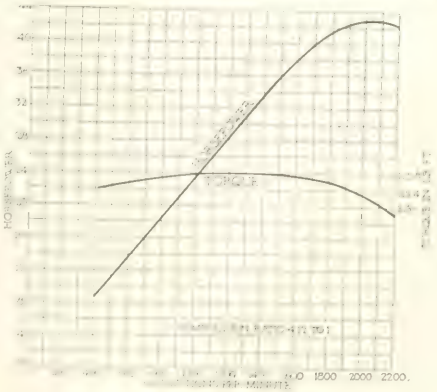
Cooling is by thermo-syphon. The fan drive pulley is mounted on the front end of the crankshaft, and there is ample clearance for removing and replacing the fan belt. The belt is a 1¼-in. flat type. The fan is carried on an adjustable supporting bracket which is fastened to a pad on the front end of the cylinder block. The fanshaft is ¾ in. in diameter and is threaded into the fan bracket for easy adjustment.

Provision is made for mounting the ignition unit at the front end of the gear case over the timing gears. It is driven off the camshaft gear by a spiral gear. The mounting is adapted to take any standard make of distributor. The rotation of the distributor is clockwise when looking down on it from above the engine.

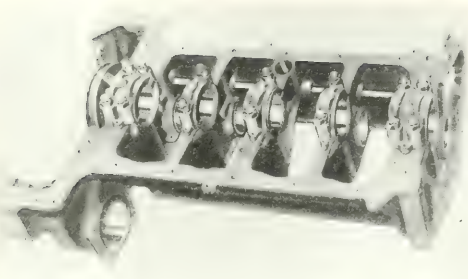
The lower half of the crankcase is pressed steel. A cork gasket is provided between oil pan and case to prevent oil leakage.

Pressure lubrication is used. Oil is carried under pressure to all main, connecting rod big end and camshaft bearings. The entire circulating system is contained in the upper half of the crankcase.

The gear type of oil pump is driven at camshaft speed



Performance curve of Lycoming engine



Five main crankshaft bearings of new Lycoming engine

by spiral gears located at the center of the camshaft. It is supported by the upper half of the crankcase but extends down into the oil reservoir. This construction permits removal of the oil pan without interference with other parts of the lubrication system. The pump intake is always immersed in oil and requires no priming.

The pump discharges directly into a distributor tube cast into the upper half of the crankcase. This tube is connected by holes drilled through the webs to all camshaft and main bearings. A nozzle on the front end of the distributor tube directs a continuous stream of oil onto the timing gears. Valves, push rods, pistons and piston pins are lubricated by oil thrown off the crankshaft.

The oil pressure varies from 2 to 5 lbs. at idling speeds up to 25 lbs. at wide-open throttle. A pressure relief valve is provided which discharges into a bypass leading back to the oil reservoir. This relief valve is connected to the throttle control. In this way, the oil pressure is regulated to conform to the load on the engine. Maximum pressure is secured with wide-open throttle and minimum with closed throttle.

An oil strainer is provided at the pump inlet. The oil level indicator is operated by a cork float and is in plain view on the side of the engine. The combined oil filler and breather is constructed with suitable baffles to prevent the escape of oil.

The engine is designed for three-point suspension. The front support is a trunnion on the crankshaft center line. The two rear support pads are cast on the flywheel housing. The bell housing flange is either a No. 3 or No. 5 S. A. E. standard size. Provision is made for the installation of a two-unit starting-lighting system. The starting motor flange is a No. 1 S. A. E. standard type outboard and the generator flange a No. 2 S. A. E. standard. Provision is made for governor mounting only on engines equipped with magneto ignition.

A Device to Facilitate Starting

A DEVICE intended to minimize gear shifting and to facilitate starting is being marketed under the name "Flexo-Drive." It makes starting in high gear feasible under most conditions without the noise which is more or less characteristic of the starting period in average cars. When once in gear the car fitted with this device can be repeatedly started and stopped without employing the clutch, so that the control is confined for the most part to use of the throttle and brake.

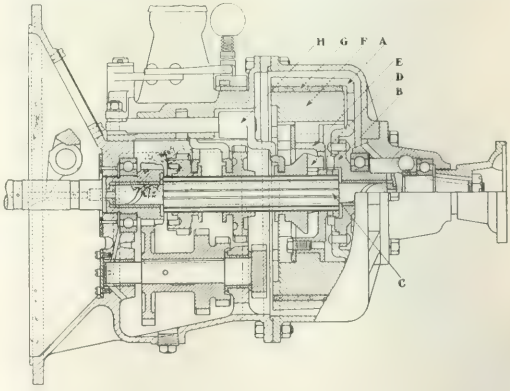
The Flexo-Drive does not replace the gearset, but is designed to attach to it. Certain control parts of the gearset must be altered and the main shaft extended, as will be seen by reference to the accompanying cut. It will be noted that the arrangement of gearing is conventional so far as gearset itself is concerned, but that the case of the gearset is provided with an additional housing in which the Flexo-Drive mechanism is located.

The drum *A* is riveted to the flange *B*, the hub of which is bushed to receive a pilot on the rear end of the splined main shaft *C* of the gearset. The weight spider *E* is splined on shaft *C* and consequently is positively driven by it. In low or second gear the jaw clutch *D* locks the flange *B* to shaft *C*. This is accomplished by moving control rod *H*. The operation is then precisely the same in effect as in the first and second gears of a conventional gearset.

Ordinarily, however, the gearshift lever is placed in the high speed position, even when starting the car, except on a considerable grade or in very heavy going. In the high speed position the spider *E* carrying weights *F* faced with brake lining *G* transmits the torque to the weights and thence, by friction of the facings with the drum *A*, to the drum and its carrying flange *B*, to which the propeller shaft is attached. The facings *G* are held in contact with the drum only by the centrifugal force acting upon them and the weights to which they are attached. There is, of course, some slipping when a start is made from rest. As the throttle is opened the engine speeds up and the pressure on the facings immediately increases in proportion to the square of the speed, until it reaches a point sufficient to carry the load without slip. When this point is reached, as it can be very quickly by proper use of the accelerator pedal, the propeller shaft rotates at the same speed as does the crankshaft of the engine and the gearset shaft *C*, so that operation is then the same in effect as it is in high gear with a conventional arrangement.

Competent observers who have ridden in a car fitted with the Flexo-Drive state that it accomplishes exceptionally smooth and easy starting and that, when once engaged, neither the clutch nor the gearshift lever have to be used as long as the torque required to propel the vehicle does not exceed that of the engine on direct drive.

The device is manufactured by the Flexo-Drive Corp.



Sectional view of the Flexo-Drive attached to a conventional gearset

Suggested Terminology for Various Types of Radiator Cores

Three names proposed are the fin and tube, the ribbon cellular and the air-tube cellular. Much confusion now caused by lack of standard nomenclature. Radiator Division of S. A. E. Standards Committee is expected to give the matter early consideration.

By Herbert Chase

IN compiling statistics covering various types of automotive vehicles there has been found to be a marked lack of uniformity in the names used to designate certain parts. There is a chance for confusion when different names are used for the same part, but when the same name is used to describe types of parts which are materially different in principle of construction or operation confusion is almost certain to occur. This is precisely the case in respect to radiator cores. The terms honeycomb, cellular, hexagon-tubular, genuine honeycomb, true cellular, etc., are used more or less interchangeably for quite different types of construction with important differences in operation. Even radiator manufacturers do not agree among themselves, hence it is not surprising that persons who are unfamiliar with the different types of construction are easily confused or quite unaware that a distinction should be made.

After corresponding with several radiator manufacturers and giving the subject considerable study the accompanying definitions are suggested as being logical and tending to minimize if not eliminate confusion. There are numerous subdivisions which can be made under each of the three heads, but we believe that all radiators now extensively used for automotive purposes fall under one of the three. A few practically obsolete types and a few aircraft radiators of special design may not be covered by the definitions.

Suggested Definitions of Core Types

Fin and Tube Type

The fin and tube type radiator core is one made up from continuous water tubes over which fins are fitted. The tubes have various shapes of transverse section but are not crimped and are not of that wide flat type which is formed by joining two metal ribbons at each edge.

Ribbon Cellular Type

The ribbon cellular type of radiator core is one made up from continuous water tubes formed by joining two metal ribbons at each edge. The walls of the tubes are usually crimped and are so grouped as to form a cellular structure. In some cases a part of the cellular structure is formed by flat or crimped ribbon, which is not a part of the water tube walls.

Air Tube Cellular Type

The air tube cellular type of radiator core is one made up from air tubes which are nested in such a way as to form water passages between the tubes, these passages being sealed by soldering at the ends of the tubes. In this type of core the general direction of water flow is at right angles to the tubes, but the water can flow transversely as well as vertically through the passages between tubes.

Under the first definition given in the accompanying table will be included all radiators containing continuous water tubes except those which are crimped or formed from ribbon. These need not be placed in a vertical position and need not be straight as some proposed definitions suggest. The radiator used on the larger Mack trucks, for example, is a fin and tube type, but the tubes are bent to form an arc of a circle for convenient positioning in relation to the blower used in that instance.

Although the fin and tube type of core is made up in some cases with a front giving it a cellular appearance, so that the uninitiated may be led to refer to it as a cellular or honeycomb type, there is probably less confusion in respect to this type than is the case with either of the others.

A few examples of the plain tube or unfinned type are still used, but they are seldom seen to-day; hence a separate definition is not thought necessary.

The fin and tube type is partly direct radiating surface—with water on one side of the tube and air on the other—and partly indirect, the fins having no direct contact with the water.

The ribbon-cellular type of core is made up in a great variety of designs, but is always formed from ribbon which is crimped into various shapes. The tubes between headers are continuous, so that there is no transverse flow such as is possible in the third type defined.

In several makes of ribbon-cellular radiator cores the surface is all in contact with water on one side and with air on the other, but in other makes indirect surfaces are employed to complete the cellular structure and fasten adjacent tubes together.

Air tube cellular cores are quite distinct from the other two types in that the tubes carry air instead of water while the space between them is filled with water. The difference between the fin and tube and the air tube cellular types is similar in a way to the difference between the water tube and fire tube types of steam boiler. In the first the tubes carry water and gases pass between them, while in the second the tubes carry gas and the water passes between.

Air tube cellular cores are the only type in which the water is not constrained to pass from header to header in the tube which it enters. In this type the water can flow across as well as downward through the core.

The tubes are spaced apart by expanding the ends or by use of a wire or strip of metal at the front and rear which is soldered in place. The tubes can have circular, hexagonal or square section. A core made in this fashion often has the same frontal appearance as other types, but the surface is all direct radiating type.

From the foregoing it will be seen that there is, in the absence of a recognized nomenclature, good reason for the confusion which exists. It has therefore been suggested that the matter be considered by the Radiator Division of the S. A. E. Standards Committee, in order that a standard terminology be formulated. The foregoing definitions are suggested for consideration in this connection.

Composite Aluminum and Cast Iron Piston

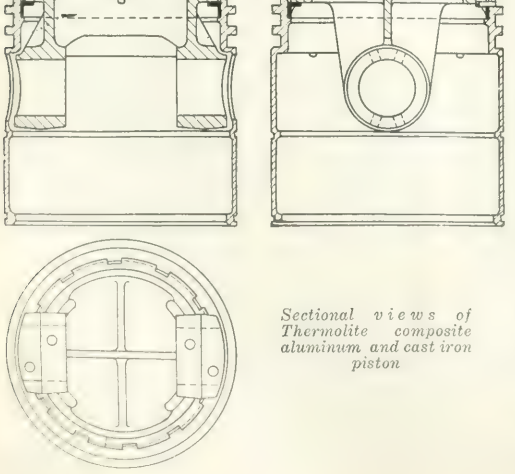
A COMPOSITE aluminum and cast iron piston has been brought out under the trade name, Thermolite. The central part of the piston head, the piston pin bosses, and the ribbing extending between the two, form a separate piece made of an aluminum alloy. The thrust of the explosion is taken directly on this aluminum part and the cast iron part acts merely as a sealing and guiding element.

An ingenious device is utilized for locking the two portions of the piston together. It consists of a drawn steel split collar with reinforcing webs for strength and to receive the spanner wrench. The lower face of the locking collar has twelve inclines or cam faces which engage twelve cam faces on the iron skirt and, when locked and pinned, constitute a positive lock.

It is claimed that these pistons weigh from 25 to 40 per cent less than cast iron pistons. Particular thermal advantages are also claimed for these pistons in that the heat conductivity of the aluminum head is three times as great as that of iron, resulting in a cool headed piston and helping to eliminate motor knocks.

Long life is also claimed for the piston, due to the fact that the wearing surfaces are of cast iron. Weight reduction results from the fact that the wall can be made as light as 3/64 in., because the iron does not carry any of the actual driving stresses. Simple radial ribbing is used on the skirt, the pin bosses being supported by the aluminum head, so that no distortion of the skirt by explosion impulses or the expansion of the mass of metal necessary for the formation of the piston pin boss can take place. Provision is made for the difference in the coefficient of expansion of the aluminum head and the iron skirt to prevent undesirable stresses. The explosion pressure is not transferred to the locking device, but is carried directly on the shoulder.

These pistons will be made for the replacement business as well as for original equipment. We are told that the cost is a little less than that of the regular aluminum pistons and a little less than that of cast iron pistons. The Muskegon Motor Specialties Co. is the manufacturer.



Sectional views of Thermolite composite aluminum and cast iron piston

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THE gasoline consumption of South Africa has averaged about 7,500,000 gal. in the past five years. The consumption figures of 1920 and 1921 were 10,872,929 and 9,530,018 gal. respectively. Undoubtedly, a certain percentage of these totals has been used for building up reserve stocks which were practically non-existent during the war period and even up to the middle of 1920. This is apparent from the lessened imports in 1922.

Up to June, South Africa imported 4,453,373 gal. of motor spirit, including small amounts of naphtha and benzine, compared with 5,510,580 gal. in the corresponding five months of 1921 according to the Department of Commerce.

The United States and the Dutch East Indies have been practically the only countries supplying gasoline in this market, the share of each remaining fairly constant over the last five years. The figures for the Dutch East Indies represent the imports of the British Imperial Oil Company.

In addition to the numerous alcohol substitutes for gasoline that have been announced from time to time, oil shales have also been regarded as potential source of competition for gasoline, but, according to present indications, this source of sompetition will remain potential.

The Royal Dutch Shell interests have now publicly announced the results of their 1921 geological expedition to the Wakkerstroom oil sha'e field as follows: "under the present circumstances plans for further exploration and exploitation of the fields will probably have to be abandoned."

Moll Car, German Product, Designed for Quantity Production

Four cylinder engine, 2.75 bore and 3.94 stroke, turning radius of 14¾ ft., 118 in. wheelbase, ground clearance of 9 in. and weight of 2200 lbs., are chief characteristics. 30,000 in five years.

By Benno R. Dierfeld

A 2200-LB., four-cylinder car, designed for quantity production, is being produced in Germany by the Moll Works. The British Summers firm has contracted for 30,000 of these cars to be delivered within five years.

The engine is built by Siemens & Halske of Berlin and comprises four 2.75 by 3.94-in. cylinders, cast in a block with the top half of the crankcase. It develops 30 hp. at 2800 r.p.m. The valves are located in the detachable cylinder head and are operated by an overhead camshaft driven from the crankshaft through a vertical shaft and helical gearing. The pistons are of aluminum and the crankshaft runs in three ball bearings. Lubrication is by the circulating splash system, with vane pump. The inlet and exhaust manifolds are cast in the cylinder head, which is claimed to result in better carburetion and to give an engine very smooth outside lines.



The Moll car, of German origin, designed for quantity production

The cooling water is circulated by gravity. The radiator is flat, instead of being of V-type, as found on practically all other German cars, and has a brass case and a ribbon type core. The two-bladed fan is cast of aluminum and driven by belt. Throttle control is by pedal only, the carbureter being a Zenith. A Siemens & Halske magneto with automatic spark advance is fitted. The gasoline tank has a capacity of 12 gallons and is located on the dashboard, the fuel being fed by gravity. An electric lighting and starting outfit is standard equipment. The starting motor operates on the toothed flywheel rim and the whole flywheel with motor drive is inclosed in a dust-proof case. The battery is carried between the running board and the frame side member. Both the output regulator and the automatic battery switch are inclosed within the housing over the commutator.

The inclosed cone clutch has asbestos fabric lining and is provided with a simple clutch brake. The clutch spring can be adjusted from outside the housing. Between the clutch and transmission there is a short shaft with two disk joints. The transmission has four forward speeds. All bearings are ball bearings and the gearshift lever is located in the center of car on the transmission cover plate. The propeller shaft has only a single universal joint, of the disk type. Torque is taken up by the propeller shaft tube which has a yoke forward end. The rear axle thrust is transmitted to the frame by the springs.

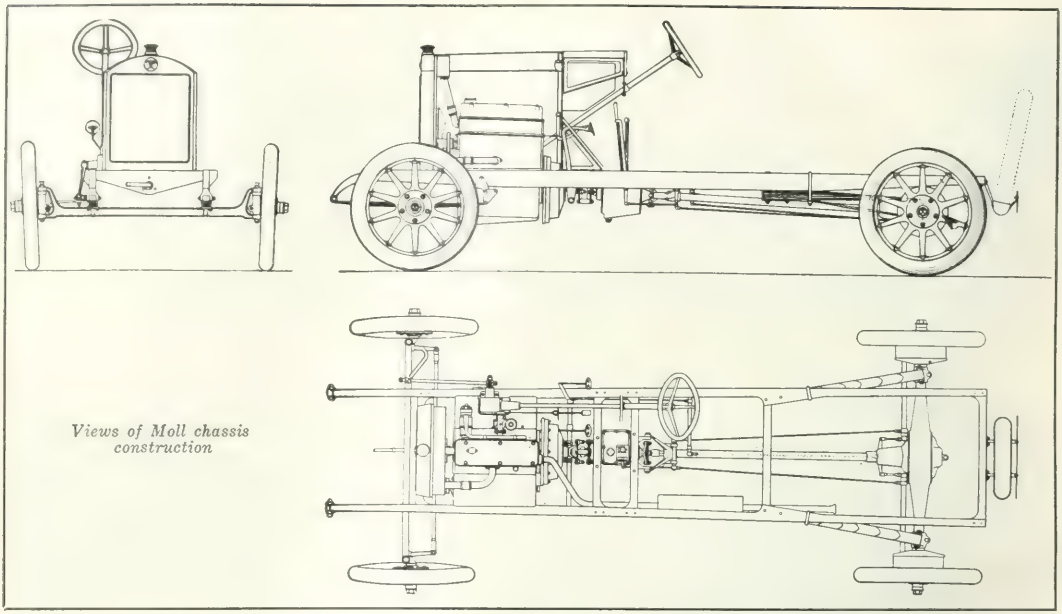
Final drive is by spiral bevel gears. The rear axle has ball bearings throughout and is of the semi-floating type. Its housing is a large steel casting with gear carrier and cover plate. A Dorr-Miller differential is fitted, this being manufactured in Germany under license by the Fischer A. G. in Schweinfurt.

Both brakes are internal and act directly on the rear wheels. The front axle, of the conventional type, is fitted with ball bearings. The rear springs are heavy quarter elliptics arranged diagonally and mounted beneath the frame side members. The frame members are parallel, which facilitates the mounting of the body. Either steel spoke or steel disk wheels of the demountable type are fitted with 30 x 3½ in. tires.

From the photographic view of the car it will be seen that the top does not disappear in the body, that the windshield is not pointed and that side lamps are mounted on top of the pressed steel fenders. The car has a wheelbase of 118 in., a tread of 55 in., a ground clearance of 9 in. and turns in a radius of 14¾ ft. The open car in condition ready for the road weighs 2200 lb. and has a maximum speed of 56 m.p.h.

The production proposed for this new car is larger than any previously attempted in Germany. The Moll Works, which is making the car, comprises several medium-sized plants in and near Chemnitz which previously manufactured machinery of different types, especially for autogenous welding. During the summer of 1921 the British Summers firm entered into an agreement with the Moll Works whereby the latter were to deliver within a period of five years 30,000 cars of a light and inexpensive type.

One plant of the Moll Works was devoted to the manufacture of the car, but it was far too small to produce 6000 complete machines a year, so the engine and other chief components were purchased from or built under contract by other manufacturers, the Moll Works con-



Views of Moll chassis construction

fining themselves almost entirely to assembling. Rumor had it that English engineers were to furnish the design but this evidently meant only that they laid down the general lines of the car, for all the most important parts such as the engine were wholly designed by German engineers and design follows German practice throughout.

A New Gasoline Filter

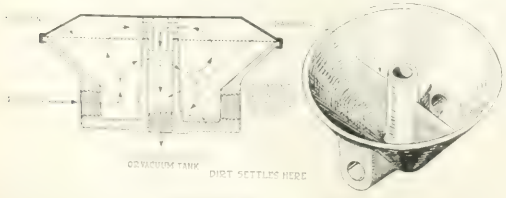
A FILTER which combines in a simple structure a number of important features frequently overlooked in filter design, is being marketed by the Standard Filter Co.

The device is an inverted cone about 3 in. in diameter with a screen near the top. Fuel enters at one side, as indicated by the arrows in the accompanying cut, and passes over the baffle, which divides the conical settling bowl into two parts. The dirt falls beyond the baffle, while the liquid fuel passes up through the screen, and down through a central tube to the carburetor or vacuum tank. The use of the baffle is important when the filter is used with a vacuum system since the fuel flow reverses momentarily when the vacuum is released and dirt in the settling chamber would, except for the baffle, be carried back into the fuel line.

The screen is of ample size for all ordinary automobile engines. The straining material is Monel wire, very closely woven in layers, quite different from the ordinary wire mesh. The inlet and outlet are tapped with ⅛-in. pipe thread and are interchangeable, that is, the filter is right or left hand, as desired.

The instructions placed on the top of the filter read: To clean, drain only; to test passage blow into outlet. Drain sediment from main tank yearly.

Since the velocity of flow through the screen is low and the flow is upward there is little tendency for clogging, while the screen is non-corrosive. Opening the drain flushes out the sediment chamber without dismantling. In fact, the filter is sealed at the top by a sheet metal cover which is spun on and is therefore not removable. The bowl is of such shape that if any water collects in it and becomes frozen it will not crack the aluminum casting. The device is simple to manufacture and easy to install.



The Standard fuel filter

SPARKING PLUGS, by A. P. Young and H. Warren; published by Sir Isaac Pitman & Sons, Ltd., Bath, England, treats the subject of sparking plugs in a technical manner. Much of the subject matter is based on experimental work done by the authors in the Research Laboratories of the British Thomson-Houston Co. The book contains 106 pages and 64 illustrations.

The first chapter discusses the history and general principles of electric ignition. Succeeding chapters deal with sparking plug design, plug electrodes and the composition and properties of plug insulators. Numerous standard makes of plugs are described in the final chapter.

New 14-Cylinder Air Cooled Radial Engine of British Design

Armstrong-Siddeley "Jaguar" passes test to comply with British Air Ministry "ideal specification" thought unattainable. Enclosed fan serves as mixture distributor and provides forced induction effect. Sample engines ordered by United States Government.

By M. W. Bourdon

A BRITISH aero engine which has gained considerable prominence during the past few months is the fourteen-cylinder air-cooled radial type known as the Jaguar and made by Armstrong-Siddeley Motors, Ltd., Coventry, England. It is stated that the original design of this engine, and of a seven-cylinder model (the Lynx) made by the same firm on similar lines, was the result of the issue of an "ideal specification" by the British Air Ministry as far back as 1917.

The "ideal specification" was considered at the time to contain certain provisions which were not practically attainable, and it is doubtful whether those who drew it up realized the number and nature of the problems to be solved before an engine to comply with it could be produced. But the Jaguar engine has now passed the "type-test" imposed by the British Air Ministry, a test which of late has been made considerably more difficult to pass. Under the new regulations, five 10-hour non-stop runs are called for, instead of one such run plus 40 hours running completed in convenient instalments.

Samples of this engine have been ordered by the American Government, but at the moment of writing have not been shipped.

The Jaguar engine has its fourteen cylinders (5 x 5½ in. bore and stroke) arranged in two staggered rows, from which it follows that a two-throw crankshaft is used. Dealing first with the cylinder design, each of these has a barrel machined from the solid steel with integral and horizontal fins extending right down to the crank case. The head is separate and of an aluminum alloy; it is screwed over the threaded upper end of the barrel and has an abutment in the form of a bevelled shoulder and a lock-nut which also constitutes one of the steel radiating fins of the barrel.

The valve seats in the head are of bronze, as also are the guides and the spark plug bosses; there are three holes for the latter in the aluminum, though two only are used, the third being filled by a screwed plug removable, if need be, for cylinder priming, though a third spark plug instead can be fitted if desired.

The cylinder is secured to the crank case through the agency of a flanged steel sleeve or adapter, the latter located in the hole in the aluminum crankcase by means of set screws. Into this sleeve the threaded lower end of the cylinder is screwed until the valve gear and ports are in correct alignment, when the cylinder is locked in position by a split and double-coned locking ring, the ends of which are drawn together by a pinch-bolt. The bevels of the ring have seatings on crank case and barrel respectively, so that tightening the pinch-bolt imposes thrust in opposite directions upon the threads of sleeve and cylinder as in the case of an ordinary lock nut.

The engine body consists of three parts, i.e., the crank case proper and two end covers. The rear end cover houses one of the crankshaft bearings, while the front main bearing is located at the center of an integral wall between the crank case interior and the front cover. The latter carries another main journal and the thrust bearings and encloses the auxiliary drives for cams, ignition gear and oil pumps.

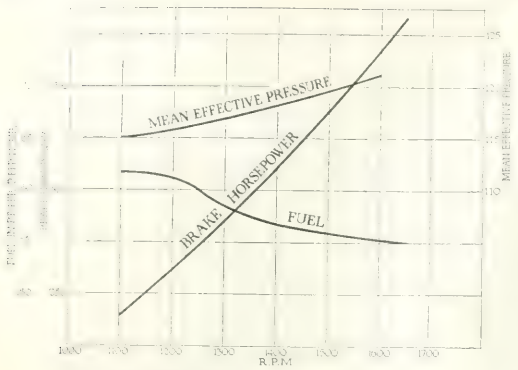
Each cylinder has only two valves. The inlet and exhaust valves, operated by push rods and rockers, are changeable, being of the same design, material and dimensions; they are of approximately 2 in. overall diameter and are tulip shaped. There are two short concentric springs for each valve, the coned spring abutment plate being located by a split steel cone which screws on to the valve stem and is pinched tight on the threads of the latter by spring pressure exerted through the conings. Duplicated springs of U-form are applied to each valve rocker to assist in the return of the latter and to keep the rocker, pushrod and cam follower in contact.

Latticed Design Rockers

The rockers are of latticed design and each pivots on two ball bearings located in standards screwing into brackets integral with the aluminum cylinder head. The pushrods are formed of steel tubes with spherical end pieces. Roller-type cam followers are used, the rollers being about 1½ in. in diameter. They resemble four-spoked steel wheels with integral axles.

Valve actuation is by means of two cam rings, one for exhaust and one for inlet, bolted together to form a unit having an internally toothed flange driven by a train of straight-toothed pinions from the front end of the crankshaft. Each ring has three cams and rotates at one-sixth engine speed.

The two-throw crankshaft has three parallel-sided roller journals and a double-thrust ball bearing at the propeller end. It has bronze counterbalance weights bolted to extensions of the outer webs and is drilled for lubrication purposes. Each master connecting rod is of H-section, while the six auxiliary or anchor rods are tubular. All rods are machined all over.



Jaguar engine performance curves

The master ring or big-end is a split steel bearing shell of two dissimilar parts with side webs carrying the connecting rod pins, the webs being extended in the line of the master rod to accommodate the second pin which in effect makes the big-end and master rod a single unit. The pins for the auxiliary rods float in bronze bushes in the big-end webs and there are floating bronze bushes in the rod ends; the pins are located axially by rings of spring steel sprung into grooves. The big-end bearing is of the white metal cast direct into the shell.

Short skirted aluminum pistons (standard weight, 2 lb. 4¼ oz.) are used. There are two compression rings and two scraper rings; the latter are chamfered at their upper edges and lie in grooves with bevelled lower edges, holes passing from the bevels to the piston interior. The upper scraper ring is immediately below the two gas rings and supplements the latter in retaining compression, while the lower scraper is at the bottom of the piston skirt. The hollow wrist pin floats in the bosses of the piston and in a floating bush in the connecting rod end.

The lubrication is, of course, by the dry sump system. There is a dual pump of which the scavenger section has 30-35 per cent greater capacity than the feed section. Both pumps or sections are of the gear type, with duralumin pinions, and are driven by skew gear from the front end of the crankshaft, the drive shaft being continued upward with a coupling to drive one of the two ignition distributors. The scavenger section draws from a small sump which is bolted to the bottom of the crankcase and which communicates with the latter by way of holes through which drains the surplus oil.

Oil Filter Design

This sump also forms the casing of a coarse filter. A second filter with a finer mesh gauze is located on the delivery side of the feed pump. This second filter has its gauze in a lanterned frame with a coned seating backed by a helical spring and is so arranged that, in the event of the gauze becoming choked, the lantern is forced by oil pressure off its seating and the engine is lubricated for the time being by oil strained only by the coarse filter.

The feed pump delivers to the front end of the crankshaft which is drilled at that end to receive a distributing unit; the latter, in conjunction with dual drilling in two of the crank cheeks and distributing pipes in the hollow pins, causes oil that is in excess of the needs of the big-end bearings to return to the front end of the shaft and issue there to lubricate the cams and distribution gearing. By this system there is no liability for the crank case to be flooded with oil, for there is no "dead-end" to the passages leading to the crank pins and the end clearances of the big-end bearings and crank cheeks permit only sufficient oil to issue to provide for the efficient lubrication of the pistons, journal bearings and other internal working parts.

The oil pressure release valve is set to operate at 50 lb. per sq. in., and the pressure gage is connected to the circuit between the fine mesh filter and the crankshaft, so that it indicates the actual pressure of oil reaching the shaft and not that existing to force oil through a partly clogged filter.

A dual carbureter is bolted to the back cover of the crank case. Besides its initial purpose in enclosing that end of the crank chamber, this cover comprises a distributing chamber for the mixture and also a heating jacket. Through the latter the engine oil is circulated, thus assisting vaporization and cooling the oil. Within the distributing chamber, from which radiate seven branched intake pipes, is a fan or blower rotating at crankshaft speed. The mixture is fed through the center of the rotating unit, and thus the fuel and air are thoroughly mixed and more even distribution is claimed; further, at high speeds a certain degree of forced induction effect is obtained.

To comply with varying requirements, both magneto and battery ignitions are provided for; the latter has been used up to the present and will be found on the engines for the American Government, but either one type or the other can be fitted. When the battery system is used, the two fourteen-point distributors are arranged, as seen in one of the accompanying photographs, at the propeller end, the generator being driven from the rear end of the crankshaft. When magneto ignition is fitted the two machines—for the ignition outfit is duplicated with either system—are driven by bevel gearing from the rear end.

The mounting of this engine in the fuselage is accomplished by means of a pressed steel coned-shaped unit, machined inside and outside, and secured by its flange to studs extending from the rear of the engine body.

The following are some of the more important specifications of this engine and some details of the type-test made by the British Air Ministry:

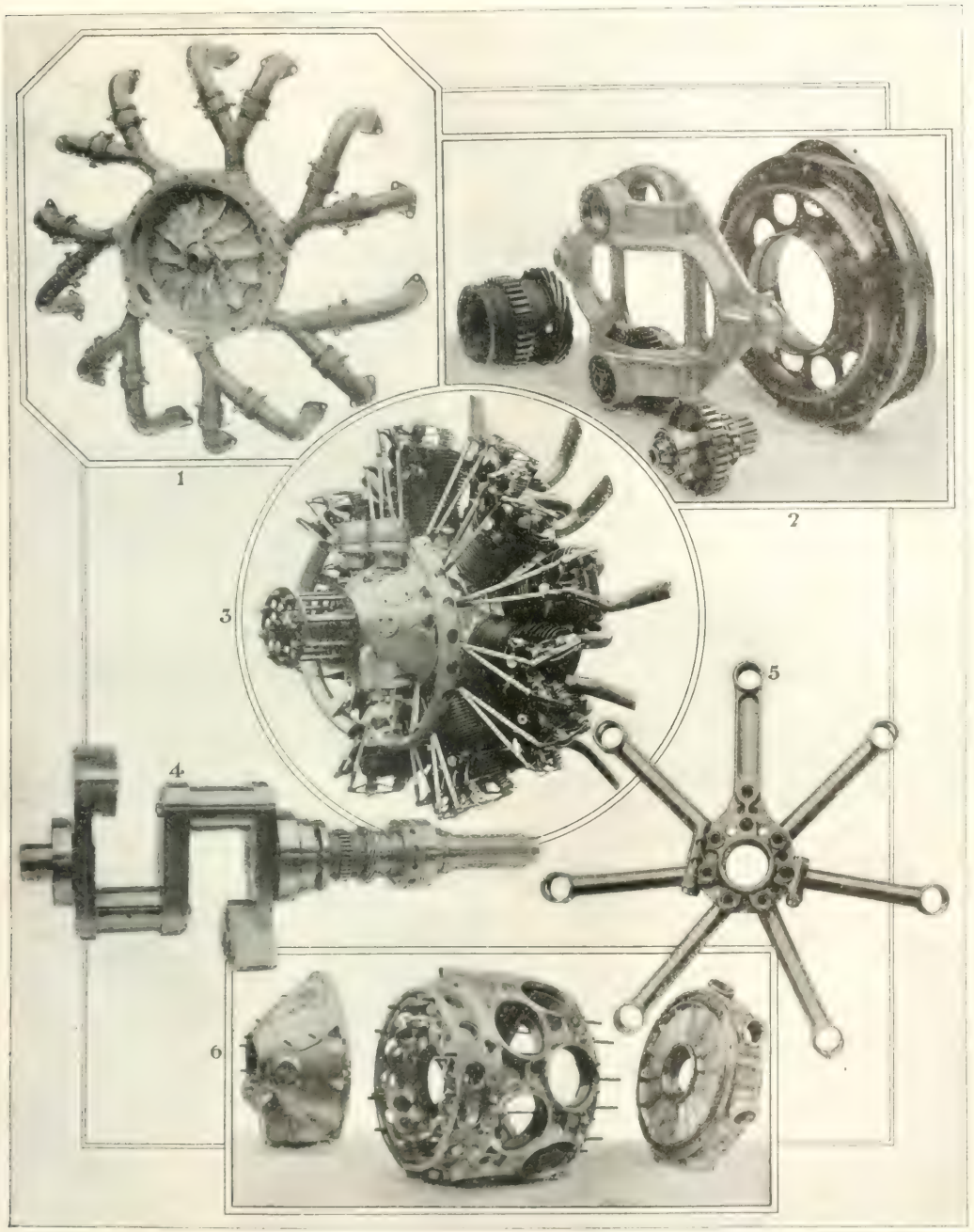
No. of Cylinders	14
Bore	5 in.
Stroke	5½ in.
Normal rated b.h.p.	320
Maximum rated b.h.p.	360
Normal r.p.m.	1,500
Maximum recommended r.p.m.	1,650
Weight	710 lbs.
Compression ratio	5 to 1
Length, overall	46.5 in.
Diameter—over cylinder heads	43 in.

Endurance Tests

Conducted by British Air Ministry.

No.	Time Hrs.	Time Min.	Average brake hp.	Brake hp corr.
1	9	55	284.6	
1a		5	330.2	331.4
2	9	55	294.1	
2a		5	329.7	330.4
3	9	55	293.6	
3a		5	326.0	326.0
4	9	55	293.9	
4a		5	....	330.0
5	9	0	292.8	
5a	1	0	....	342.2

Slow run, 30 mins. at 737 r.p.m.
High speed run, 1 hr. at 1751 r.p.m. 267 b.h.p.
High power test, 1 hr. at 1648 r.p.m. 373.5 b.h.p.
Average fuel consumption, .581 pt. per b.hp. hr.
Average oil consumption, .02 pt. per b.hp. hr.



1—Mixture distributor casing and intake pipes of Jaguar engine; within the casing is shown the fan or blower which rotates at crankshaft speed and tends to provide a forced induction effect besides thoroughly mixing and distributing the fuel and air. 2—Valve actuating cam rings and distribution gear. 3—Jaguar 14-cylinder engine. Front end view showing the two 14-point distributors of the generator ignition system. 4—The two-throw crankshaft showing bronze counterbalance weights bolted to outer web extensions. 5—H-section master connecting rods and tubular auxiliary or anchor rods shown with big end assembly. 6—Crankcase and end covers of the Jaguar engine

Forged Aluminum vs. Steel for Connecting Rods

Reduction in weight, obtained by use of aluminum, results in reduced inertia and reduced bearing pressures, according to Pomeroy. Smaller bearings can be used or engines can be run at higher speeds. Manufacturing advantages also present.

By Laurence H. Pomeroy *

FROM the point of view of specific strength forged aluminum is greatly superior to the steels used in the vast bulk of automotive engine connecting rods, where from the *strength* point of view a steel giving from 80,000 to 90,000 lb. tensile strength has proved perfecty satisfactory.

There is no doubt but that the development of the forged aluminum connecting rod follows logically from the aluminum piston to which many makers have been forced to return, and for the same reason, i.e., the reduction of internal wear and tear in engines by 50 per cent, and the vastly improved performance obtained thereby.

The primary advantage of forged aluminum as a material for high duty connecting rods in high speed internal combustion engines arises from the fact that the chief cause of bearing wear and failure is the loading imposed upon the crankshaft and connecting rod bearings due to the inertia of the moving parts.

The loading on the connecting rod big end bearings is composed of two parts—

(*a*) That due to the cylinder pressures during compression and expansion
(*b*) That due to inertia forces arising solely from the mass of moving parts, i. e. piston and connecting rod

In only three positions of the crankpin (out of 12 investigated), namely, the end of the compression stroke and the beginning and middle of the explosion stroke, do the fluid pressures in any appreciable way counteract the effect of the inertia pressures. The pressure on the inside of the crankpin bearing due to the centrifugal action of the big end of the connecting rod is always present. This action is approximately that due to the weight of the big end of the connecting rod, i.e., the weight obtained by placing the big end of the rod on a scale pan, while the small end is freely supported in space. It should also be noted that at the top and bottom of the stroke, the inertia pressure on the inner side of the crankpin is that arising from the whole mass concerned, i.e., piston complete *plus* the whole connecting rod.

In general the inertia effect of the connecting rod may be considered as if the weight of the big end, as previously described, is concentrated to the crankpin; while the difference between this weight and that of the whole connecting rod, i.e., the weight of the small end, is concentrated at the wrist pin. For example, a steel connecting rod for a 3½-in bore engine made as light as practicable weighs about 3.5 lb., of which 2.75 lb. can be reckoned as rotating mass, and the remaining 0.75 lb. as reciprocating mass. In aluminum this could be reduced to 2 lb., of which about 1.5 lb. would be rotating and 0.5 lb. reciprocating mass. A cast iron piston, 3½ in. bore, weighs about 2.25 lb. complete.

The effect of using an aluminum connecting rod would in such a case reduce the big end loading due to inertia—neglecting connecting rod angularity—in the ratio of 2.5 : 1.5 at the middle of the stroke where the piston inertia forces vanish, and in the ratio of 5.75 : 4.25 at the ends of the strokes, i.e., an advantage in reduction of load factor varying from 40 per cent to 26 per cent, or a mean reduction of some 33 per cent.

The advantage thus obtained can be utilized—

(*a*) By reduction of width of bearings by 33 per cent, which in turn reduces overall length and total weight of engine
(*b*) By reducing the gear ratio and running the engine at a higher speed thus obtaining better performance with the same factor of bearing safety
(*c*) By improving this factor in engines which are unduly supplied with bearing surface

In brief, the use of aluminum for connecting rods affords a ready means of making great overall economies in a new design and of allowing considerable development of existing designs.

Problem of Connecting Rod Design

The greatest difficulty in connecting rod design is to give adequate support to the babbitt in direct contact with the crankpin without undue increase of weight. This is not a matter of strength of the supporting means, either steel or aluminum, but of securing stiffness. In this connection aluminum is particularly valuable owing to its low density. For example, a connecting rod to suit a 2-in. diameter crankpin must be bored out at least 2⅛ in. diameter, leaving 1/16 in. for babbitt. The necessary mean thickness of the metal surrounding the babbitt in steel should be at least ¼ in., neglecting big end bolt bosses, etc. The mass of such a big end in steel is, therefore, proportional, the difference between the squares of the outside and inside diameters multiplied by the density or

$$2\tfrac{5}{8}^2 - 2\tfrac{1}{8}^2 \times 0.28 = 0.7.$$

The stiffness for the same internal diameter is approxi-

*Consulting engineer, Aluminum Manufactures, Inc. Excerpt from paper read before Buffalo Section, Society of Automotive Engineers.

mately proportional to the mean thickness[3] × modulus of elasticity =

$$0.25^3 \times 30{,}000{,}000 = 468{,}750.$$

Since the stiffness of a part is proportional to its modulus of elasticity, other things being equal, and as the modulus of elasticity of aluminum is 10,000,000, while that of steel is 30,000,000, it follows that to obtain the same stiffness of the big end in aluminum as in steel the thickness must be increased according the

$$\sqrt[3]{\frac{30{,}000{,}000}{10{,}000{,}000}} = 1.44 : 1.$$

The equivalent thickness, therefore, in the above example becomes

$$0.25 \times 1.44 = 0.36 \text{ in.}$$

From this the relative weight of the aluminum big end is, as before, proportional to the difference of the squares of the outside and inside diameter multiplied by the density or

$$2.845^2 - 2\tfrac{1}{8}^2 \times 0.1 = 0.36.$$

From this it will be seen that the same stiffness can be obtained in an aluminum rod for about one-half the weight of material required in a steel construction. Apart from the amount of metal required to give the desired stiffness of bearing support, the question arises as to the number of bolts for securing the big end bearing cap. As a rule four bolts make a much better job than two and incidentally need be no heavier. It is important to provide plenty of bearing surface between the cap and its abutment on the connecting rod. The proportions of the small end of the connecting rod are dependent upon the vagaries of the designer of the wrist pin, but it should be kept in mind that the weakest part of the wrist pin is in a vertical engine at the top of the rod through which an oil hole is generally drilled. The metal at this point should be two and one-half to three times as thick as at the sides of the wrist pin.

Coming now to the proportions of the shank of the connecting rod, in the present state of knowledge it appears to be perfectly safe to make the section of an aluminum rod which replaces a reliable steel rod similar in shape of twice the area. All designers will realize the number of exceptions there may be to this rule and the desirability of consultation with the prospective suppliers of the aluminum connecting rod forgings.

The effect of aluminum connecting rods as affecting crankshaft bearing design is also important. Many engine builders use counterbalanced crankshafts to reduce main bearing wear, particularly on middle main bearings. There are, however, certain distinct objections to this practice. In the first place, a counterbalanced crankshaft is heavy and expensive, and, in the second, it introduces a distinct liability to torsional periodicity, particularly in six-cylinder engines.

Reduction of Bearing Wear

The necessity for such crankshafts arose from bearing wear due to heavy pistons and connecting rods. The use of aluminum rods reduces very considerably the crankshaft skipping rope action which causes bearing wear, while in combination with aluminum pistons as well, it is safe to say that counterbalanced crankshafts are unwarranted and disadvantageous.

An interesting example of the truth of the foregoing remarks is obtained by comparing the characteristics of a steel connecting rod taken from one of the best four-cylinder engines produced and an aluminum rod which has done many thousands of miles under most exacting conditions without a suspension or failure. The only criticism that can be urged against the steel connecting rod under discussion is that it is too light, particularly in respect of the metal supporting the babbitted shell in the big end. The steel connecting rod is from an engine 3⅜ in. bore and 5 in. stroke. The aluminum connecting rod is from an engine 4⅛ in. bore and 4¼ in. stroke.

The detail dimensions are as follows:

	Steel	Aluminum
Length between centers	12⅛	11⅝
Diameter of big end bearing	1⅞	2
Length of big end bearing	2¼	2¼
Diameter of wrist pin bearing	⅞	1⅛
Length of wrist pin bearing	1¼	1⅝
Total weight of rod	2.9 lbs.	2.14 lbs.
Weight of big end	2.34	1.69
Weight of small end	.56	.45

Weight of Pistons (Aluminum in Each Case)

Complete with wrist pin and 3 rings	1.206 lbs.
Complete with wrist pin and 4 rings	2.04 lbs.

Total Reciprocating Weight

Weight of Small End		Weight of Piston Complete	
.56	1.206	.45	2.04
1.766 lbs.		2.49 lbs.	

Total Rotating Mass

i. e. weight of big end of connecting rod

2.34 lbs.	1.69 lbs.

Now, as previously stated, the loading of the crankpin bearing due to inertia forces is in part due to the centrifugal effects of the rotating mass of the big end of the connecting rod itself and in part due to the reciprocating inertia effects of the piston and connecting rod small end. These latter apply at the top and bottom of the stroke only while the former acts continuously. The mean loading, therefore, is that due to the rotating mass of the big end plus *half* that due to the reciprocating masses, as these are fully manifested only at each end of the stroke and vanish about the middle thereof.

Determination of Pressures

The actual pressures manifested are directly proportional to the weight of the parts in question, the square of the r.p.m. and the stroke. In comparing the two connecting rods, however, the speed of the engine may be neglected, as the comparison between the two rods at any engine speed will hold at any other. We have, then, the average loading of crankpin proportional to

$$\text{Stroke} \times \frac{\text{weight of reciprocating parts}}{2} + \text{weight of rotating parts.}$$

For the steel rod this becomes

$$5 \times \left(\frac{1.766}{2} + 2.34\right) = 16.1.$$

While for the aluminum rod the loading is proportional to

$$4\tfrac{1}{4} \times \left(\frac{2.49}{2} + 1.69\right) = 12.5.$$

The advantage obtained in reduction of big end bearing pressures by the use of aluminum connecting rods is thus clearly manifest, especially when it is noted that in each case aluminum pistons (incidentally of similar design) were used. The argument, however, goes much further than this, as the engine in which the steel rods are fitted is 3⅜ in. bore x 5 in. stroke, while that with the aluminum rods is 4⅛ in. bore x 4¼ in. stroke. The final result may be computed either in terms of cylinder capacity or of piston area. In the former the inertia effects of the steel rod are proportional to $\frac{16.1}{45} = 0.368$, while for the aluminum rod this "figure of merit" becomes $\frac{12.5}{55} = 0.228$.

Figured on the basis of piston area the comparison becomes $\frac{16.1}{8.9} = 1.81$ for the steel rod, and $\frac{12.5}{13.3} = 0.94$ for the aluminum rod.

These figures are sufficiently striking to justify attention, and would be even more remarkable if the engine with steel connecting rods was designed to reduce secondary unbalanced forces to the same extent by having the same ratio of connecting rod length to crank-throw as that in which the aluminum rods are used. This inherent advantage of the short stroke engine can, however, be thrown in and still leave the argument for the aluminum connecting rod in its above convincing state.

Comparative Tests

Summing up, as between two engines, one $3\frac{3}{8}$ x 5 in. and the other $4\frac{1}{8}$ x $4\frac{1}{4}$ in., each using aluminum pistons and both of really modern design, the inertia effects which determine the capacity of the engine to resist wear and tear of bearings are reduced by 38 per cent or 48 per cent by the use of aluminum connecting rods, depending upon whether the cylinder capacity or the piston area is used as a basis for comparison. If it is argued that in the case of the engine with steel rods the wear and tear is satisfactory from the user's point of view, the figures then show clearly the possibilities of reducing the size of the bearings, the overall length of the engine and the weight of material required for a given result.

In addition to the above analysis of bearing loading it may be of interest to compare the strength of the aluminum and steel rods. Considered as a strut the strength of a connecting rod is directly proportional to the moment of inertia of its cross section at the point of maximum stress (approximately midway between the ends), the modulus of elasticity of the material and inversely proportional to the square of its length. The student will recognize the above as the basis of Eulers' formula, which is used as a ready means of comparison for the reason that the relation of the length of automobile connecting rods to their cross section does not vary greatly in practice. The moments of inertia of the cross sections of the connecting rods are 0.024 and 0.090 in.^{4} units, for the steel and aluminum rods respectively.

The relative load carrying capacity is then

$$\frac{0.024 \times 30{,}000{,}000}{12.125^2} = 4900 \text{ for the steel connecting rod,}$$

$$\frac{0.090 \times 10{,}000{,}000}{11.625^2} = 6650 \text{ for the aluminum connecting rod,}$$

i.e., the relative strengths of the steel and aluminum rods are as 1 :1.36, the relative piston areas and total explosion pressure being as 1 : 1.5.

On this reckoning it will be seen that the aluminum rod is not proportionally so strong as the steel rod. On the other hand, the aluminum rod in question has been subject to most drastic running without a suspicion of failure, and from all practical points of view is well up to its job.

Complex Pressure Calculations

The truth is that the loading of a connecting rod is so complex that it is difficult to reduce it to calculation. If engines were run at full throttle continuously at low speeds the explosion pressure would be the determinant of the design. Just as the speed increases to that at which engines normally run, so do the inertia effects cancel out those of the fluid pressure, while at the very partial throttle required to run an automobile at, say, 30 m.p.h. the inertia effects completely overwhelm those of the explosion. Further, the compressive stresses set up by the explosion are not nearly so harmful as the alternating stress induced by inertia, so that the above discussion in respect of the explosion pressure is of not much more than academic interest.

In practice it is difficult or impossible to forge steel rods of sufficiently light section, and subsequent machining is necessary to obtain the best results in respect of strength and lightness. The steel rod, in fact, suffers from excessive strength and insufficient stiffness. Even if machining is resorted to in order to reduce the weight of the rod, the extent to which this can be done is practically limited to the shank of the rod, and the resultant effect is but small. For example, on the steel rod in question the reduction of the average section of the rod to 1/16 in. thickness instead of the average 7/64 in. aimed at in forging would reduce the weight by some 3 oz. only, i.e., about 6 per cent, an insignificant result compared to that easily attainable by the use of forged aluminum.

The general methods of manufacture applied to steel connecting rods are equally applicable to aluminum. In aluminum rods machining the shank to reduce weight may be dispensed with, as the consequent reduction of weight is negligible. Further, there is no necessity for bushing the small end of the rod, although such bushing may be desirable in the case of small bore engines where the wrist pin is necessarily short. Similarly with aluminum rods the same babbitted shells may be used as with steel rods, although this practice is regarded as mechanically deficient either with steel or aluminum rods.

The use of the babbitted shell necessitates increasing the total weight of the big end to compensate for the additional diameter of the big end bore necessitated by the shell. More important still, the heat generated by big end friction *and* that conducted down the rod from the hot region near the piston, has to be dissipated through two oil films, i.e., that between the babbitted shell and the crankpin itself, and that between the outside of the babbitted shell and the connecting rod big end proper. As the whole object of a bearing is to readily dissipate the heat generated by friction, it is difficult to see why its conductivity should be reduced by 50 per cent.

Direct Babbitting Favored

It may be argued that the advantage of the babbitted shell lies in its capacity for ready replacement. While this may be true, the percentage of bearing failures when babbitted shells are not used is so small as to make it more satisfactory and economical to replace the whole connecting rod. As in many other instances in automobile design, the provision made for replacement make the replacement necessary. On the above grounds the use of direct babbitted connecting rods is strongly urged. From the manufacturing point of view there is no more difficulty than in babbitting a bronze shell and there is the manufacturing economy obtained by dispensing with the shell.

Successful methods of babbitting aluminum connecting rods have been developed both from the point of view of a complete technical solution of the problem and of rapid economical manufacture.

The results of these methods are such that the babbitt in a connecting rod can only be removed by melting or laborious chipping. There is a definite metallic fusion between the aluminum and the babbitt which it is practically impossible to obtain with steel or bronze.

OWNERS registering passenger cars in the Province of Ontario, Canada, are required to give their occupation in addition to the other information commonly asked. This practice makes it possible to compile figures giving ownership of cars by occupations, thus furnishing interesting and valuable information for manufacturers from a sales standpoint. State motor vehicle departments in the United States could well add this question to their registration blank requirements.

Testing Spiral Bevel Gears in Manufacture

Character of tooth bearing and silence of operation determined by recently developed machine. Handles all sizes of motor vehicle gears. Special attention given to rapid work.

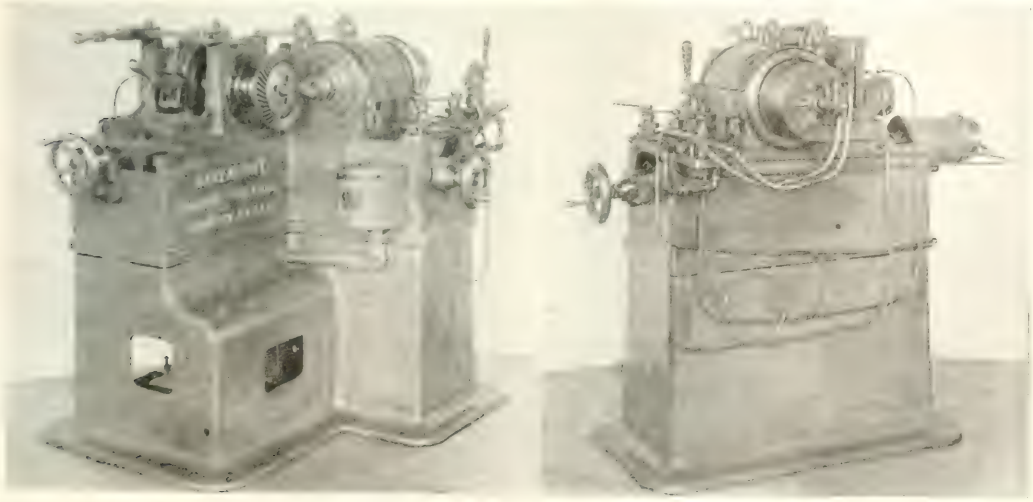
IN the manufacture of spiral bevel gears it is desirable to test for character of tooth bearing and silent operation and to determine the center distances which insure the best tooth bearing and the quietest operation. For this purpose a shop testing machine has been developed by the Davenport Machine Tool Co., Inc.

In the design of this machine special attention was paid to rigidity of frame construction and to rapid operation. There are two headstocks for holding the gear spindles, and these have large bearing surfaces on the bed and a deep dovetail slide with a taper gib extending the entire length of the slide. In addition, provision is made for tightly clamping the headstock to the bed by means of bolts passing through the headstock into blocks in T slots in the bed. These bolts are placed as close as possible to the bearing, the object being to make the headstock and bed practically one piece during the test.

Owing to the fact that in the use of the testing machine there is usually but little need for changing the position of the left hand headstock, on which the crown gear is mounted, this is clamped down by a lever secured to one of the hold-down bolts, with an adjustable connection to the second bolt in order to insure equal tightening of both in one operation. The right hand headstock is moved quite a distance each time a pinion or gear is changed for testing, and in order to make quick operation possible, a compressed air device is provided. A cylinder is mounted on the back side of the machine which moves the slide a fixed distance, and after the slide has been drawn back and the pinion changed, the new pinion is brought into mesh with the crown gear in exactly the same position as the previous one, or it can be adjusted to any other position, as the operator may desire. This adjustment is made by means of the hand wheel with graduated dial located underneath the right hand headstock.

Getting Quick Adjustments

As the right hand headstock has to be moved many times a day, provision is made for clamping it by means of an air cylinder, and the machine is also fitted with an air chuck for quickly clamping the pinions. In the front view of the machine may be seen three valves which serve the following purposes: The first is used for clamping the work in the spindle, the next for moving the slide until the pinion and gear mesh, and the third for clamping the headstock. A similar movement of these handles performs these operations in the proper sequence, while moving the handles in the opposite direction unclamps the headstock, moves back the slide and releases the pinion. Both spindles are mounted in large annular ball bearings



1—Davenport spiral bevel gear testing machine showing gears in position. 2—Another view of the gear testing machine plainly showing the three air valves (handles) by which it is controlled

at both ends, with an arrangement for keeping the oil in the bearings at a constant height.

The drive is by an electric motor mounted inside the base. A reversing switch is provided which permits of driving the spindles in both directions. Connections are made from the motor to the slide in such a manner that the belt tension is not affected as the slide moves back and forth. There is a band brake on the crown gear headstock, and the exhaust from the air cylinders is piped onto the band of this brake to keep it cool. However, if desired this brake may be cooled by water.

This machine will take gears of all sizes used in motor car work. It has a net weight of about 1500 lb. and occupies 4 ft. square floor space. The electric motor is of 3-hp. capacity and is furnished for operation on either direct or alternating current circuits.

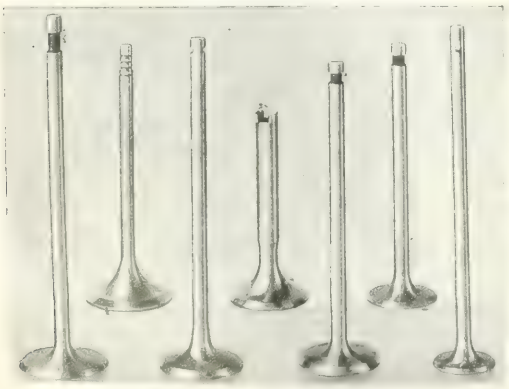
A New Material for Poppet Valves

FOR a considerable period in engine development the valve was the most delicate part. As compressions increased and combustion chamber temperatures went up, especially in aircraft engines, valve pitting and corrosion of the head and stem became more frequent. A great many papers and discussions on the subject have been given before engineering societies and printed in the technical press and during the past three or four years the trouble has noticeably decreased.

One of the newer valve materials, about which nothing has appeared in the public print so far is known as Thompson Silcrome. This is a chromium-silicon alloy of a composition designed to develop to the fullest extent the heat-resisting qualities of the two elements and at the same time give a material that can be machined accurately on a commercial basis.

The properties which are sought in any valve material are resistance to corrosion at high temperature (burning), resistance to wear on guide, resistance to wear or deformation at bottom of stem, absence of air-hardening qualities at working temperatures, ease of forming seat, lightness, easy action on cast-iron valve seat, ability to form in one piece, non-warping qualities and stainless qualities. Thompson Silcrome, when considered with respect to these different requirements, offers a good illustration of the progress in valve materials in recent years.

The manufacturers state that the alloy can be melted under the oxy-acetylene cutting flame, but that it cannot be cut or burned. They further state that when the alloy is heated to a temperature of 1500 deg. Fahr. a thin protective coating is formed which is non-porous, tough and firmly adherent to the steel, and has a similar protective action to that of the layer of oxide which forms on aluminum. This coating is exceedingly thin as may be judged by the fact that a piece of bar stock of the material when exposed to the action of pure oxygen at 1650 deg. Fahr. for 8 hours shows a layer of protecting material less than one-thousandth inch thick. It is claimed that even under conditions of artificial leakage Silcrome retains a characteristic bronze color and does not show signs of oxidation.



Thompson Silcrome valves. Manufactured in one piece, of silicon-chromium alloy

A quality which is developed in this material and which, the makers state, has been of particular value in reducing wear on the guide, is that in service the stem develops a highly polished, non-porous surface layer. The thickness of this layer is inappreciable and when examined under the microscope a structure similar to that of martensite is revealed. It is claimed that this surface has less tendency to wear away the bearing surface of the cast iron guide than hardened steel, and also tends to prevent sticking. This surface hardening, of course, is of advantage also in preventing wear on the bottom of the stem.

Permits Use of Lighter Springs

According to the Steel Products Co., Thompson Silcrome cannot be air-hardened under 1750 deg. Fahr., and does not change its grain size up to 2000 deg. Fahr., hence the circumferential cracks, which with some materials start on the exposed portion of the stem above the guide and frequently cause fatigue fracture, are eliminated. As far as seating qualities are concerned, the same surface-hardening process which takes place on the stem and at the end thereof also affects the seat. From the standpoint of lightness, a saving of 13 to 2½ per cent is claimed, as compared with other materials used for valves. This would permit of the use of lighter springs and result in a general reduction of inertia strains throughout the valve mechanism.

The valves are manufactured in one piece by the Steel Products Co. Aside from the resulting decreased cost of production, this has the advantage that it permits of finishing the junction between the steam and head to a smooth curve, providing the best passage for the gases. This is impossible with cast iron, which cannot be turned down to a feather edge without breaking.

The chromium content of Thompson Silcrome is near the stainless range, but unlike some of the high chromium steels, Silcrome is hard enough to meet the requirements for valve material. The physical qualities as given by the manufacturers are as follows: In the annealed state Silcrome has a scleroscope hardness of 40-43 and a Brinell hardness of 265-275. It will not air-harden below 1750 deg. Fahr. Its natural hardness, which is of the same order as that of the cast iron of the valve seat, is retained under extreme heat conditions. The tensile strength is approximately 180,000 lb. per sq. in. and the elastic limit when cold is 130,000 lb. per sq. in. The reduction of area is 27 per cent and the heat conductivity apparently the same as that of normal steels. Its coefficient of expansion is 0.000007033 per deg. Fahr.

Dealer Education Major Merchandising Problem Before Manufacturers

Little effective, constructive work accomplished so far. Factory traveling men needed who can help dealer solve administrative, as well as selling, problems. Distributors must help instead of patronize. Trade-in allowances often due to car builder's policy.

By James Dalton

"WHAT are you doing to help your dealers become real merchandisers?"

If this question were asked the motor vehicle manufacturers of the country, few of the answers would show much really constructive efforts up to this time. Some companies are making earnest efforts to build up the caliber and morale of their sales organizations, but comparatively little effective work has been accomplished so far.

The great majority of dealers are left to shift for themselves. A small minority are abundantly able to do it but the rest are just "muddling through." They have had little merchandising education, they have only the most rudimentary knowledge of financing, and they are not familiar with cost systems. A good many seem to think you are talking about the roof when you refer to "overhead."

Competition for capable dealers is exceedingly keen and will become increasingly so as demand for dealers becomes more insistent and supply remains practically stationary. The big production companies are showing a strong tendency to expand their dealer forces, and this is making serious inroads on the staffs of a good many of the smaller concerns. Every company wants efficient dealers, but those which build lines easy to sell have the least difficulty in getting them. It would seem, therefore, that those with smaller production should be the ones to pioneer in dealer education.

As the situation stands to-day the chief point of contact between the factory and the dealer is the traveling sales representative. Theoretically he helps the man on the sales firing line solve his problems and promote his business, but practically he does little except try to sell the dealer more cars than he wants. His chief object in life seems to be to make the dealer in Oscaloosa absorb the quota assigned to him by the factory sales manager. It may mean bankruptcy to the dealer to do it, because he will have to do ruinous trading, but if the factory gets the money the average traveler figures it will not be difficult to get another dealer for that little town in the sticks.

IT is a serious question whether this constant effort on the part of the big production companies to force sales, and thereby permit of capacity output, will be good business in the long run. The man who sells the cars contends that no factory can continue prosperous unless the dealers are prosperous and a lot of substantial dealers are going broke. In almost every case they attribute their failure to their losses on hectic trading undertaken to meet the insistent demands of the factory to take more cars. A good many of the new cars they have disposed of have been only half sold, and a car half sold is worse than none. A considerable number have been bought on time by persons who couldn't afford them and will find their way into the glutted used car market.

The used car is a very real and serious problem and it is high time the factories did something constructive to solve it. They cannot be held entirely responsible if the dealer pays twice as much as it is worth for a used car, but a good share of the blame is theirs if they have been hounding the dealer to take more cars and threatening to transfer his franchise if he failed to do so. Trading is an individual problem for every dealer, but he never can solve it so long as he is straining every nerve to make sales, and the only way he can make them is to give a more liberal trading allowance than his neighbors.

THE answer to the used car question and most of the other problems with which the average dealer is afflicted is horse sense and knowledge of the primary elements of merchandising. Comparatively few dealers ever have been engaged in any other line of merchandising. They have "picked up" most of what they know.

If they are to be successful merchants they must learn sound merchandising. Granting that this is true, who is going to teach them? The logical source of this information would seem to be the factory. The logical method of imparting it would be through the traveler. The chief difficulty is that the traveler doesn't know. He is primarily a salesman and he knows comparatively little of dealer problems.

It would appear, therefore, that one of the first steps to take would be to give the traveler some schooling in the problems of merchandising from the point of view of the retailer. This would require the expenditure of considerable effort and money, but the results would be worth the cost.

If the dealer could look to the traveler for advice and assistance his visits would be as welcome as those of an angel, even if he did try to sell cars at wholesale. His sales efforts would be more or less incidental, for as the dealer learned sound business principles and methods his sales would increase. He would look to the traveler for something more than a "bawling out" because he had failed to get rid of enough cars. His friendship for the

factory would increase and there would be developed an invaluable spirit of co-operation.

Assuming that the traveler provides the most practical machinery for extending help to the dealer, the next question is how to get the right type of men as traveling sales representatives and how to educate them as to dealer needs.

FACTORY sales managers do not hesitate to admit that they have much difficulty in obtaining men of the right type, especially now that traveling forces are being rapidly expanded. They seem to feel that the men who could do the work most efficiently can make more money doing something else. There seems to be considerable difference of opinion as to whether travelers should be on a straight salary basis, salary and commission, or commission entirely. That, obviously, is something each factory must determine for itself and each must figure the personnel question out for itself.

There seems to be a strong swing of sentiment in the factories toward retail selling schools in some form or other, not only to train travelers but to educate dealers and distributors. Ideas along this line are not in any sense uniform and they appear to be more or less nebulous.

One outstanding company in the middle price field contemplates establishment of what it will call a "sales planning department." The planning will relate to sales at retail and it will be designed primarily to help dealers. The first step, however, will be to familiarize travelers with dealer problems and the best means of solving them. For travelers an intensive course of study will be given at the factory, and for the dealers it will be largely a correspondence course with occasional "lectures" by the travelers when they are qualified to give them.

It is planned to obtain from many sources the data which will be used in what might be called the text books. The subjects considered will include various phases of selling, such as the correct method of keeping prospect files; cost accounting and finances; service, used cars, etc.

All the information gathered on any of these subjects will be tabulated and analyzed and an attempt made to arrive at some standard solution of common problems which are likely to come up in the experience of any dealer. Data will be collected from a variety of sources but chiefly from the dealers themselves. All of them may be asked, for example, to explain their service system, including the volume and profits. These reports will be analyzed to determine whether they have any points in common, and a foundation thus will be laid upon which to assemble an answer which will present a composite picture of the best service system.

Naturally, it would require considerable time to assemble all the data needed on even the common problems alone and revision would be necessary as better methods were worked out; but travelers already on the staff could study the information as it was accumulated and put themselves almost immediately into a position to answer intelligently some of the questions asked by dealers. When all the problems common to dealers were worked out, new men added to the staff could assimilate the course before they took the road.

This company does not propose to wait until it has answers to several questions before it begins to pass the information on to the dealers and it does not propose to confine its educational efforts to the work done by travelers. The preliminary plans call for the preparation of helpful bulletins at frequent intervals. One of them might discuss, for instance, the advantages of the flat rate system for service, another the various plans evolved for coping with trading evils, and still another might be devoted to prospect files.

It is believed that if the dealer studied these bulletins carefully he would derive from them much information which would help him in his own business. The practical application could be worked out for him by the traveler who covered his territory.

To make the plan effective some system of checking would be necessary to keep track of the amount of time devoted to the work by the dealer and the traveler. One might serve as a check against the other. A traveler could soon determine whether a dealer was getting as much as he should out of the factory effort, and a dealer who was honestly trying to help himself would have a legitimate cause for complaint if the traveler covering his territory did not give him a reasonable amount of assistance.

In all the plans contemplated for dealer education, the distributer figures prominently. The factories feel, and with reason, that a man who is a good enough merchandiser to justify his retention as a wholesaler should be able to give practical assistance to the dealers under his jurisdiction in getting around the difficulties which confront them. Here again, however, the assumption is theoretical and does not always work out in practice. There are a good many distributers who seem perfectly content to take their discount of the cars sold by the dealers under them and who make small effort to help those dealers increase their sales.

Factories feel that some distributers do not get around their territory frequently enough, that they do not give enough attention to scientific sales analyses, that they do not scrutinize closely enough the trading methods and service systems of their dealers. It undoubtedly is true that a distributer of the right type can be of very great assistance to his dealers.

ONE important point to be borne in mind is that if the distributer is to be of any practical assistance to the dealer he must assume the proper attitude. He cannot be helpful if he is condescending and patronizing. He must make the dealer feel that he wants to be a real friend, and he must be able to make the dealer talk frankly of the problems which are troubling him.

The distributer who drives up to the dealer's store with

MOST manufacturers agree upon the necessity of "educating the dealer." Few successful experiments in dealer education have been accomplished, however, thus far.

Factory schools for traveling men are contemplated by certain companies. They feel that the factory sales representative is the chief contact point with the dealer organization and that he must be equipped to assist the dealer in solving administrative and selling problems. Few traveling men are capable of giving such aid at the present time. Too many of them are salesmen without much knowledge of administrative matters.

This article points out the chief difficulties being met in trying to educate the dealer and gives some constructive suggestions for meeting them.

a 6-in. cigar in the corner of his mouth, and then strides in haughtily with his forefingers caught in the arm holes of his vest and his chest thrown out, is not going to get very far in winning the dealer's confidence. The dealer is more likely to say to himself:

"Oh, ———! What's the use trying to get any advice out of this bird? He would just laugh at me anyway if I told him about that leak in the service station or that ornery cuss down the row who's out-trading me."

Education Through Traveler and Distributor

It probably is safe to say that all the factory plans under consideration for the training and education of dealers are based on the traveler and the distributer. If they are to be successful, as has been stated before, the actual work must be done by the right type of man. Capturing enough of them to go 'round will be the big job.

At least one company contemplates a series of actual class room conferences at which the dealers in given territories will be brought together for instruction by experts in their common problems. The man who is formulating this plan knows the dealer's problems from the ground up. When asked the other day what was the greatest thing a manufacturer could do to help his dealers, he replied:

"Establish retail selling schools."

There probably is not a factory in the country which is entirely satisfied with the work being done by its travelers. Most of them are frankly uncertain about what to do to remedy the situation. They are convinced their traveling sales representatives are not giving the dealer organizations as much practical help as they should. Some travelers are honestly trying but many of them seem indifferent. The ones who have the knowledge which enables them to give sound advice are jewels.

If careful study is given to the results achieved by two travelers of equal selling ability, one of whom is able to give practical aid to the dealer and one of whom isn't, it will be found that sales will run materially higher in the territory covered by the real dealer helper unless it has been hit by an earthquake, devastated by fire or struck by a business calamity.

Working forward from this accepted fact, it is not difficult to visualize the importance of educating travelers so they will be able to educate dealers. The same is almost as true of distributers.

Standard 28-Passenger Bus Placed on Market

A NEW bus known as model A-K has been placed on the market by the Standard Motor Truck Company. It seats 28 passengers exclusive of the operator. The wheelbase is 190 in. and Sewell cushion wheels are fitted 36 x 5 in. front and 36 x 5 in. dual in the rear. Regular equipment calls for semi-pneumatic tires.

Standard units are used for the assembly. The engine is a Continental model L-4. Other units include an Eisemann magneto, model G-4; Stromberg carbureter, Brown-Lipe clutch and transmission, Spicer joints, Timken bus type front and rear axles and Gemmer steering gear. A 7-in. frame is used with a kick-up over the rear axle.

Springs are semi-elliptic all around. Front springs are 46 in. long and 3 in. wide; rear 58 in. long and 3 in. wide.

The selective-sliding, gear type transmission is located amidship supported in the chassis at three points to two cross members.

The bus is a one-man operated type with entrance forward so that passengers must pass by the operator. Equipment includes an exhaust heating system, buzzer passenger signaling system and lighting equipment.

THE Bureau of Standards has recently conducted an investigation to determine the cause of excessive wear of exhaust valve seats on engines of a certain type. After numerous experiments it was found that the difficulty was due to the high temperature attained by the metal.

When the valve and seat were heated to a high temperature by a reducing flame, the wear of the seats was sufficiently rapid to amply explain the difficulty. After this probable cause of the trouble was determined, it was found that the cooling of the valve seats which showed the greatest wear was somewhat defective, thus permitting them to attain an excessive temperature under conditions which often occur in practice.



Standard model A-K bus has well known units in assembly. Wheelbase is 190 in. and 36 x 5 in. tires are used all around

American Exports of Cars, Trucks and Tires for

COUNTRIES	GASOLINE PASSENGER CARS						GASOLINE TRUCKS						PARTS
	Up to $800		$800 to $2000		$2000 and over		Up to 1 ton incl.		Over 1 to 2½ tons		Over 2½ tons		
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	Value
Europe													
Austria													
Azores and Madeira Islands	1	$414											$725
Belgium	334	89,377	11	$14,031			460	$106,557					34,314
Bulgaria													
Czechoslovakia	4	1,285											350
Denmark	19	10,080	7	9,149	1	$2,689			1	$1,350			45,564
Finland													320
France	2	1,010	8	9,502	1	3,500							386,738
Germany			1	1,000	2	5,358							50
Gibraltar			3	2,971									45
Greece	3	1,070	3	2,700									1,164
Hungary	3	1,243											
Iceland and Faroe Islands													489
Italy	4	2,539	1	915									6,195
Malta, Gozo and Cyprus Islands	3	1,741	2	1,821			2	808					722
Netherlands	38	21,499	36	39,152	2	5,033							13,077
Norway	5	3,135	23	20,899									8,807
Poland and Danzig													
Portugal	1	758	3	4,416									5,970
Russia in Europe							10	5,700					20
Spain	124	53,057	111	131,304	15	36,978	20	4,687					84,921
Sweden	44	32,814	44	49,054	1	2,378			6	7,850			22,329
Switzerland	7	4,184	5	7,938	2	5,355							1,800
Turkey in Europe			2	2,759									1,931
Ukraine													
England	454	223,457	48	54,853	4	10,609			57	42,315			267,851
Scotland			2	1,788									771
Ireland			1	900									9,393
Yugoslavia, Albania, etc.													936
North and South America													
Bermuda													23
British Honduras													443
Canada	184	103,342	328	374,838	60	162,340	47	35,310	48	66,154	11	$27,198	1,359,414
Costa Rica													540
Guatemala													1,328
Honduras			2	3,372							1	3,800	1,084
Nicaragua													322
Panama	10	6,334	5	6,965									3,321
Salvador	1	335	6	7,704	1	3,500							1,657
Mexico	587	240,731	197	212,059	8	22,686	41	15,188	9	13,347	5	14,558	81,042
Newfoundland and Labrador													947
Barbados	2	828											1,881
Jamaica	20	9,921	9	10,223			6	2,424					2,629
Trinidad and Tobago	1	735					3	2,857	1	1,493			6,429
Other British West Indies	12	5,637	2	3,400			1	344			1	8,000	1,970
Cuba	159	53,438	37	46,152	13	36,988	58	15,056	4	3,157			80,861
Dominican Republic	23	8,333							2	4,248			9,793
Dutch West Indies	2	848	1	1,207									567
French West Indies	1	414											2,183
Haiti	7	3,110					3	1,212	2	2,528			1,831
United States													
Virgin Islands of U. S.													287
Argentina	118	83,049	67	76,169	5	17,911	1	1,129			1	3,600	343,539
Bolivia	2	708					6	2,408					2,979
Brazil	180	72,995	109	115,363	7	16,052							44,984
Chile	10	3,040	7	8,538			24	8,416	2	4,248			11,132
Colombia	12	4,887	5	5,521			2	1,865					6,969
Ecuador													428
British Guiana	5	2,370					1	358					1,525
Dutch Guiana	6	3,020											113
French Guiana													121
Paraguay													
Peru	13	6,910	2	1,668									6,404
Uruguay			6	6,639	2	5,356	2	993					3,480
Venezuela	34	16,990	23	28,190	3	10,472	5	2,020					5,971
Asia													
Aden									1	1,400			12
Armenia and Kurdistan													
Ceylon	12	7,608							2	2,782			2,121
China	2	500	16	17,821	2	5,017			1	2,810			2,683
Chosen	2	1,013											561
Kwantung	52	10,500			1	2,709							214
British India	99	64,647	18	17,701	1	2,146			7	8,415			32,240
Straits Settlements	19	11,023	7	8,074									7,284
Other British East Indies													94
Java and Madura	29	22,608	16	16,145									7,881
Other Dutch East Indies			1	1,283									962
French Indo China													65
Hejaz, Arabia and Mesopotamia													1,091
Hongkong			15	15,453	4	13,506							2,408
Japan	91	36,527	10	12,858			157	63,746	85	46,386	11	46,575	47,293
Palestine and Syria	168	71,915	21	25,598					1	1,000			8,595
Philippine Islands	11	7,850	1	950	1	2,500							7,043
Greece in Asia													38
Turkey in Asia													20
Siam	4	2,040	4	3,908									133
Oceania													
Australia	591	354,962	426	463,161	16	43,653	91	69,907	26	30,690			94,409
New Zealand	132	95,291	68	77,919	1	2,167	4	5,931	20	22,748	3	9,811	27,723
Other British Oceania													451
French Oceania	1	525	1	1,525									1,060
Other Oceania													
Africa													
Belgian Congo	6	1,958					1	800					34,130
British West Africa			2	2,284			4	4,460	5	5,712			6,473
British South Africa	117	85,638	112	110,970			3	3,645	1	1,080	3	13,260	38,628
British East Africa	8	4,655	7	8,044									5,602
Canary Islands	11	5,136	6	5,818			11	4,724					5,385
Algeria and Tunis	1	358					2	728					1,579
Other French Africa	2	627					6	2,424					1,981
Egypt	29	11,946	3	2,965									5,070
Morocco	30	13,274					6	2,424					1,498
Portuguese East Africa													100
Other Portuguese Africa													220
Spanish Africa			6	8,117					1	1,080			560
Total	3,852	$1,889,240	1,857	$2,064,754	153	$418,903	957	$366,121	282	$270,893	36	$126,805	$3,226,764

September, 1922 — Canadian Exports

ELECTRIC PASSENGER CARS AND TRUCKS		TIRES						PASSENGER CARS		MOTOR TRUCKS		PARTS	COUNTRIES
		Casings		Solid		Inner							
No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	Value	
													Europe
		100	$1,587			100	$100						Austria
													Azores and Madeira Islands
		861	13,633			539	1,048	12	$9,717				Belgium
		25	180			114	255						Bulgaria
													Czechoslovakia
		656	7,523	38	$898	325	633	7	7,472			$119	Denmark
		57	1,467	8	178	42	100						Finland
		5,465	52,552			50	85						France
		4	106			602	1,202						Germany
		14	351										Gibraltar
		240	3,323	16	720	140	186					181	Greece
													Hungary
		117	1,517			110	159						Iceland and Faroe Islands
		191	2,979			60	111	2	2,272				Italy
		98	1,036			168	347	2	945			32	Malta, Gozo and Cyprus Islands
		768	14,931	6	128	1,074	2,283	8	3,438			98	Netherlands
		436	8,368	27	1,122	517	1,069	4	3,945			283	Norway
		261	4,152			280	509						Poland and Danzig
		931	12,472	94	2,795	424	783						Portugal
								1	1,068				Russia in Europe
		898	18,575	142	3,450	1,586	3,737	38	40,251			395	Spain
		2,670	41,860	31	1,457	2,409	5,523	21	17,222			394	Sweden
		204	2,220			140	231	4	3,908			52	Switzerland
		265	3,383			130	168					198	Turkey in Europe
						13,365	21,233						Ukraine
		24,945	208,139	591	11,696	35	33	597	471,348	3	$5,000	72,564	England
		241	1,811			575	786						Scotland
		595	5,080			278	687						Ireland
		304	6,772										Yugoslavia, Albania, etc.
													North and South America
													Bermuda
													British Honduras
1	$2,500	2,564	39,028	294	10,499	2,864	5,824						Canada
		24	549	36	371	34	71	4	3,475				Costa Rica
		187	3,919			104	256	1	1,160			50	Guatemala
		71	2,006	16	728	80	158					30	Honduras
		35	686			52	134						Nicaragua
		358	5,948	30	788	558	995						Panama
		32	868	2	84	57	128						Salvador
		6,474	76,683	146	3,751	5,237	11,071	9	9,457				Mexico
		92	1,555			258	430					263	Newfoundland and Labrador
		153	2,017	2	63	47	99						Barbados
		553	13,024	45	1,502	412	386						Jamaica
		424	4,839	6	327	85	226						Trinidad and Tobago
		187	1,613			185	332	7	5,335			369	Other British West Indies
		11,634	120,580	1,112	28,063	7,792	12,251	5	5,960				Cuba
		988	13,884	102	1,654	1,254	3,011						Dominican Republic
		101	1,093			119	223						Dutch West Indies
		342	3,666	4	57	234	373						French West Indies
		240	3,083			340	557						Haiti
								14	5,520	1	314	20,478	United States
		51	587			182	365						Virgin Islands of U. S.
		7,581	88,591	79	1,638	7,909	11,264	97	85,462			1,394	Argentina
		256	4,974			172	404						Bolivia
		6,083	59,797	81	2,134	4,282	5,725	32	25,211			640	Brazil
		1,955	30,271			1,556	3,229					66	Chile
		493	7,442	22	534	536	1,131	5	4,088			175	Colombia
		94	1,520			38	96						Ecuador
		315	3,363			225	368	4	2,690				British Guiana
		30	284			20	73						Dutch Guiana
		4	77			2	3						French Guiana
		170	1,092										Paraguay
		824	12,797	43	1,235	512	1,043						Peru
		252	3,710			580	747	13	6,599				Uruguay
		963	11,815	18	355	1,545	2,745	8	5,265				Venezuela
													Asia
		250	2,164			165	213	2	868			33	Aden
													Armenia and Kurdistan
								33	12,468			150	Ceylon
		140	2,076			235	357	5	5,488			444	China
													Chosen
		1	30										Kwantung
		363	4,530	86	1,977	278	488	216	91,303			5,708	British India
		155	1,819			115	206	37	12,545				Straits Settlements
						100	160						Other British East Indies
		103	11,388	132	4,146	350	572						Java and Madura
		169	1,543					7	4,300			1,995	Other Dutch East Indies
													French Indo China
		270	2,598			220	412						Hejaz, Arabia and Mesopotamia
								14	15,176				Hongkong
	4,408	266	5,956	184	7,571	56	163	30	20,120			8	Japan
		2,303	28,411			1,552	3,036	4	3,977				Palestine and Syria
		2,800	35,428	110	2,535	2,957	4,814						Philippine Islands
													Greece in Asia
													Turkey in Asia
		20	199							5	2,170		Siam
													Oceania
		2,680	47,[illegible]	337	9,432	1,095	2,207	1,037	495,740	161	75,723	60,508	Australia
		2,[illegible]	48,[illegible]	168	5,128	1,497	3,286	258	137,228	60	26,040	1,407	New Zealand
		11	1[illegible]			23	64						Other British Oceania
		23	2[illegible]	2	43	10	14						French Oceania
		78	770			36	57						Other Oceania
													Africa
		662	4,786			410	928						Belgian Congo
		7,084	77,292	10	1,084	2,109	5,070	390	188,732	1	1,372	703	British West Africa
		902	6,903			152	236			38	18,024	19,183	British South Africa
		791	9,977	52	1,523	461	880	4	1,885	5	2,170	72	British East Africa
		43	389										Canary Islands
		124	1,813			96	246						Algeria and Tunis
		744	7,854			351	602	4	2,920			120	Other French Africa
		104	1,615	47	1,561			3	2,745				Egypt
													Morocco
													Portuguese East Africa
													Other Portuguese Africa
		270	2,748	34	1,670	235	482						Spanish Africa
4	$6,908	107,457	$1,241,360	4,186	$112,897	72,858	$129,481	2,939	$1,716,563	274	$131,413	$188,265	



More Views on Automotive Electric Equipment

Proposed Standards for Electrical Units Continue to Bring Forth Comments from Prominent Men of the Industry

Editor, AUTOMOTIVE INDUSTRIES:

There is no question but that the standardization of electric starting, lighting and ignition systems, suggested in the tentative program outlined by the Automotive Electric Association on Sept. 1, account of which was published in a recent issue of AUTOMOTIVE INDUSTRIES, offers great opportunity for the accomplishment of much good.

It cannot be expected that a finished plan can be laid down in the beginning but, with a series of generators and starting motors provided for known conditions as a nucleus, a careful analysis of the demand for further capacities should serve as a guide and if conservatively followed will soon result in a complete and successful specification covering the entire field.

No doubt, the individual will at times demand special results of unusual character but, with a series of equipments of varying size and speed providing a range of carefully selected performances, it should be possible to choose a combination capable at least of approximating the most exacting requirements.

After all, good design is largely a matter of compromise and the advantages of standardization are so great and of such monetary value as to justify a slight modification of the ideal, resulting in the product of a given industry being fundamentally uniform in proportions and construction effecting interchangeability and general results obtained.

If the policy back of a standardization movement is sound, as in this case, it should receive the complete support of everyone interested. The manufacturers of electric starting, lighting and ignition systems are obviously in the best position to decide what parts of this equipment can be made uniform and to outline a specification of performance which will meet general requirements in the broadest sense.

Manufacturer's Cooperation Needed

The members of the Automotive Electric Association will know the importance of bringing the motor car manufacturer or user of this apparatus into the conference to the fullest extent. It is one thing to set up a standard and another thing to make practical application of it. The manufacturer appreciates that the setting up of a standard does not mean an attempt to influence him to the extent of an immediate, inconvenient and expensive change of policy, but that a standard is set as a desirable possibility to be adopted when the opportunity next presents itself.

If my understanding is correct, that the Society of Automotive Engineers is co-operating with the Automotive Electric Association in this work and if it is the intention to use the machinery of the S. A. E. for recording and putting the standards before the trade, it is as it should be, for the S. A. E. has had many years of experience and has perfected the channels through which to handle this sort of work. It would be too bad, in my estimation, to duplicate where coordination will further strengthen an already existing medium of recognized merit and accelerate the time when this work will be of practical value.

The pioneer work of establishing mounting dimensions for the electric units in question has been done by the S. A. E. during the past few years, so it is the natural thing to follow this movement already started, but under the guidance of the actual manufacturer.

Emphasize Value of Standardization

A. D. T. Libby, president of the Automotive Electric Association and formerly chairman of the Electrical Equipment Division of the S. A. E., states the case most clearly in that concerted and systematic effort should be exerted in the direction of greater appreciation in influential quarters of the great general advantage of highly standardized products. In the intelligent conduct of business, so far as standardization is concerned, the engineer, production department, the executive and the purchasing agent must work together in determining those policies which alone can result in proper economy and in adequate service to the public.

The present S. A. E. standards and recommended practice relating to the installation of electric motors and generators on gasoline cars are:

Generator flange-mounting, for gear or chain drive.
Generator bracket-mounting.
Starting-motor flange-mounting, and
Starting-motor sleeve-mounting, for outboard installations.

If there is any question as to the practicability of these standards as they exist, they should be modified or discontinued. If they are inadequate, they should be expanded but, surely, there is a great need for uniformity of electrical apparatus from the standpoint of performance, installation and service.

The development of this work could not be in better hands and, with the co-operation of the S. A. E. and the enthusiastic support of the industry back of it, it is

bound to react substantially to the advantage of the manufacturers and users of automotive vehicles.

G. W. DUNHAM, Savage Arms Corp.

Editor, AUTOMOTIVE INDUSTRIES:

While I am not thoroughly familiar with many of the details of standardization, yet I am heartily in sympathy with the general proposition for the reason that standardization means cheaper but better goods.

The new standards proposed by the Standardization Committee of the Automotive Electric Association would seem to me to be along the proper line as they would tend to put competition between the manufacturers of electrical equipment on a uniform basis.

I understand that many of the S. A. E. mounting dimensions for electrical generators and motors are not widely used. This is unfortunate and it seems to me there ought to be a remedy and no doubt the Standards Committee of the A. E. A., in co-operation with the S. A. E. and car and engine builders, with the support of journals like your own, will finally arrive at a solution of the problems involved.

M. W. BARTLETT, Splitdorf Electrical Co.

Danger in Standardization

Editor, AUTOMOTIVE INDUSTRIES:

The proposed standardization program for electric generators, as I see it, will be quite a difficult task.

As far as generator characteristics are concerned, what is good for one generator should apply to all; however, they do not and I do not believe six styles will cover these variations.

Regarding mountings, just as long as automotive engineering is active, different locations for generators will call for different designs, not only for mounting but for other dimensions as well. I might add here that I personally feel that too much standardization is a bad thing because there is a tendency on the part of some designers to use some piece of standard apparatus, actually sacrificing good design, cost, etc., to avoid a slight tool cost.

To my way of thinking, standardization should apply to "standard parts," not to units that are being developed every day. Starting, lighting and ignition have the same field for future development as the gasoline engine; this cannot be said of the lock washer. Hence, my understanding of a standard part.

B. H. ANIBAL, Peerless Motor Car Co.

Another View on Electrical Standards

Editor, AUTOMOTIVE INDUSTRIES:

With regard to standardization of starting and lighting equipment, we have designed all our new models to take the standard S. A. E. flange type mountings for both starter and motor generator. We have also made provision for starter on both sides of motor.

We supply four-cylinder engines to the truck, tractor and industrial fields and have discouraged the use of generators and starters while they were in the development stage. We still discourage the use of these units except where they are absolutely necessary and of undeniable value in service. We do this in the interest of simplicity and maintenance.

Our old models were not originally designed to take starter and generator, and while we were working out of them into the new models it took practically 75 per cent of our chief draftsman's time to work out suitable applications of the many varieties, designs, models and makes of starters which have appeared in the market and been specified by our customers.

The great lack of starter and generator standards and dimensions has been the cause of so much inconvenience and loss to us that we refused to apply some models to our motors and discouraged the applications of many models in sheer self-defense.

We feel that the standards proposed by the Automotive Electric Association are excellent and adequate for the large part of the motor car and truck field.

We have a call for a larger generator to handle 10-15 (60-100) watt lamps so that contractors can work at night. This demand, which is limited at this time, will grow, but is not great enough to be taken into account in this standards work.

We have provided a one and one-half engine speed connection for all our generators, having found that our service calls for considerable slow-speed work.

We feel very gratified to learn of the efforts you are making and can assure you it will result in an immense value to you. In behalf of our organization, we wish to thank you for your efforts and to assure the Automotive Electric Association and the Standards Division of the Society of Automotive Engineers of our hearty approval and co-operation.

H. L. HORNING, Waukesha Motor Co.

Improvements Suggested

Editor, AUTOMOTIVE INDUSTRIES:

Regarding the subject of standardization of electric generators, we beg to offer the following on proposed standard No. 3:

We are of the opinion that the proposed generator speed is satisfactory, but the output is too high for the average truck and when used for bus service some arrangement should be made to cut the generator output during the daylight hours in order to protect the battery.

Its maximum amperage of 15 is in excess of the requirements of the average truck. Eight to 10 amperes is sufficient inasmuch as most of the running is during the day and a small amount of current is required for starting and lighting.

Electrical equipment for trucks necessitates rugged generator construction and, due to continuous hard service requirements, we would suggest conservative rating for this class of equipment.

M. E. TOEPEL, Mack Trucks, Inc.

Relation Between Torque and B.M.E.P.

IT is well known that for any given engine one and the same curve may be used to represent the torque and the brake mean effective pressure, if two scales are provided, and it is therefore obvious that there must be some simple relation between these two factors. This relation, however, depends upon the piston displacement of the engine. It is given by the equation:

$$\frac{T}{D} = \frac{\text{b.m.e.p.}}{150.8}$$

where T is the torque in lb.-ft.;
D, the piston displacement in cu. in.;
b.m.e.p., the brake mean effective pressure in lb. per sq. in.

Editor's Note: The above equation was worked out at the request of a correspondent.

Cut Selling Costs by Closer Study of Methods

Competition tends to raise prices by increasing expense of marketing products. Jobbers and dealers called upon to store large quantities of material. Turnover not rapid enough. Advertising should be directed to specific group.

By Harry Tipper

THE effect of competition upon the price to be charged to the user, or consumer, has not been sufficiently studied in connection with marketing plans. The economist and business man have been content to believe that greater competition will bring prices down in the struggle to secure a large share of the market and that this effect would lead to a greater efficiency.

Despite that tendency, the cost of competition operates to increase prices, because of its large additions to the cost of marketing and distribution, and the relation these bear to the total cost. This is particularly true of accessories, smaller parts, etc., and the thousand and one items sold through jobbers and dealers to the individual car owner.

The manufacturing cost of an article, raw material, labor and capital, used in getting the goods to the factory door, packed and ready for shipment, may be $1. The user of the article pays $4. What does the $3 represent? It consists of transportation, handling, warehousing, stocking, selling, advertising, delivering costs and profits,—as the production capacity increases, and more and more manufacturers come into the field intent on getting a share of the business.

Each concern develops activities calculated to give to its products widespread distribution as far reaching as can be developed. Each attempts, by all possible methods, to secure an outlet through every jobber and every retailer. At the same time the increasing flood of product adds to the number of jobbers so that more jobbers are similarly competing for the business of the retailer, by all methods which promise results.

Retailing Costs Mount

Similarly, the growth in the business itself attracts men into the field of retailing. These retailers are competing for the trade of the individual consumer. The manufacturer begins to complain of the cost of distributing his goods. At the same time the new concern —entering the field—talks emphatically of the difficulty of getting a bearing.

Many times new concerns will attempt new methods of getting the goods distributed in order to escape the difficulties imposed in the attempt to do something through the regular channels. This increasing competition has the effect of adding to the service the manufacturer will render his customer so that he may get or insure his share of the market. For instance, several concerns have furnished men to go out with the jobber's salesmen, make canvass on the proposition they handle and study conditions. This is done for no other purpose than to insure and foster sales. Branch stores, special retail agencies, additional sales promotion work, and other items are considered as to their effect upon the marketing of the product. Advertising, sales promotion, sales and other efforts directed at marketing are used more voluminously for the same reasons.

Cost of Getting Orders Eats Profits

The jobber is pressed to add more and more articles to his catalog, to his stock, and to the work of his sales force. The retailer is implored to stock a larger variety and the user is importuned in a thousand ways to spend his small purchasing power through a multitude of different suggestions. The retailer, in order to offer the maximum possible service to the user, enlarges his stock or changes it as the pressure for his business grows. The jobber carries a larger line in order to give quick service to his retailers and the rate of flow is slower because of the variety of product to be moved.

The purchasing agent of a large jobbing house calculated, from curiosity, the amount of time and money spent by various salesmen in trying to get the order for a small bill of goods he had to buy. He carefully kept count of the salesmen he interviewed on the matter, the number of times they saw him, the telephone calls, the special visits, etc. When he tabulated the results, he was astonished to observe that the actual cost to the various manufacturers together amounted to a sum very close to the actual value of the order.

This was an extreme case, but it serves to illustrate the effect of competition upon market cost. Supposing the replacement market for mirrors represents 3,000,000 for 1922. This number may be increased somewhat by the pressure of selling effort, but not very greatly. All the curves of business development indicate that pressure on the seller does not increase the consumption very rapidly over the general average expected increase. There are fifty-four manufacturers competing for this business and their capacity to produce these mirrors is

10 per cent above the expected market. Under such circumstances, the efforts of all these manufacturers will be intensified very materially. Every possible means will be employed to divert the market from Smith to Jones, because Jones cannot hope to keep his factory at 100 per cent unless he does that very thing. On the other hand, Smith resists any such process and so more money is spent all along the line to get the pressure upon the trade and user.

The greatest additions to cost, however, arise from the slower turnover in the stock of the jobber and dealer from the large selection of articles stored and handled by these concerns. The basement of many a wholesale house is filled with the unsalable commodities that are carried on inventory until the interest on investment has eaten up the whole price. Quick-moving articles in the retail establishment are frequently obliged to carry the burden for articles which remain in stock for long periods.

Not long ago I was able to sit down with a retailer and consider his entire stock requirements. After a thorough inventory, and analysis, we decided that 30 per cent of the stock should be eliminated and ordered as required; 10 per cent more should be cut down 60 per cent and 10 per cent more should be cut down about 30 per cent. This move promised to release about 40 per cent of the capital tied up in stock and increase the turnover of the capital from 3 to 5.5 per year. It also permitted releasing a space large enough to carry the bins and tools for the service station requirements and transferred one man from the supply to the service end, enabling the retailer to do with one less in number of help.

Visible Wastes Can Be Corrected

This case was probably unusual, but there is a great deal of waste resulting from the marketing cost of competition running all through the business. Of course, there is little use in referring to this increasing cost of service competitive pressure in marketing unless suggestions are made as to remedies.

There are some visible wastes which can be mentioned and which may be governed so that they accumulate a considerable total of saving in the aggregate. The most efficient production plant I have been in for years has made a 30 per cent difference in its cost by shaving ¼ of 1 per cent here and ½ of 1 per cent there, through a study of the processes and material.

If the marketing problem is similarly considered there are a number of items which can be successfully changed to a small extent and to the advantage of the entire cost of putting the article into the hands of the user. A good deal can be done by a careful selection of desirable distribution to promote, not on the basis of number of dealers only, but on the basis of the type of dealer and the amount of promotion work to be done. This, of course, is dependent upon a thorough territorial analysis which will enable the manufacturer to determine his operations in each territory in accordance with the possibilities of business. It will also permit him to arrange his marketing plans so that the expense of marketing bears a more exact relation to the possibilities.

In the automotive field there are a good many types of retailers, and these different retailers vary greatly in their capacity to buy accessories and parts in their needs and in the possibilities to develop business from them. Very few manufacturers in this field have a sufficiently large volume to demand a complete distribution through all types of retailers.

The majority of manufacturers of accessories and of similar products are able to take only a small proportion of the business individually, and should select their methods of marketing and advertising so that the pressure of marketing work would be concentrated upon a number of retailers of value to the manufacturer and of a type which will pay him to do business with them.

This may mean that the method of selling used in one territory should not be applied to another territory without modification. It may mean that the methods of advertising should be changed. It is more likely to mean, however, that the material used in the sales work and the advertising work will be changed so that the individual piece of material will more easily represent the value which it should have in order to do efficient work. The manufacturer in his marketing work should approach the question as the engineer has approached production. The engineer knows that each operation must be studied separately and made more efficient by separate consideration. The competition in marketing is more costly than it need be because individual operation has not been examined and there is a tendency for various manufacturers in the same field to use the same methods and the same operations in working out the methods.

For instance, it is quite usual for the various manufacturers dealing with a product to advance practically the same claims in regard to the usefulness of the product in their advertising and selling work. Frequently it would be possible to use the name of any other manufacturer in the group as a signature for the advertisement or as the concern represented by the salesman making the claims.

This is sufficiently true to offer an immediate opportunity for decrease in marketing costs in the more accurate planning of the solicitation work and the advertising copy. All through the only possible decrease in efficiency and reduction in marketing cost will come from the more effective use of the usual methods of marketing and the examination of an individual case or two, and probably the most effectual way to consider the possibilities of increased efficiency in this respect.

The tendency of competition to increase the cost of marketing is too definite and continual a matter to be neglected in the consideration of marketing operations. This tendency to increase marketing costs must be offset by increased marketing efficiency of operations. Most of the men who have considered this subject are looking for some special way by which the marketing costs can be cut through some radical stroke or some unusual consideration. This is not likely to happen. The men who successfully accomplish the marketing of products by increasing the efficiency of their marketing operations will do it by making a slight increase in the value of efficiency of each method and each operation from the sales solicitation to the advertising copy, so that these differences accumulate into a total large enough to be of advantage.

J. R. COLEMAN has been appointed a Subdivision of one to review information obtained by the Society of Automotive Engineers on power takeoff shaft ends and to submit a report to the Truck Division of the Standards Committee.

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Babson Gives Good Advice

ROGER BABSON is a professional economist. His predictions do not always come true, as evidenced by some of those he has made about the automotive industry, but he is a shrewd observer and a keen student of business practices. He made one statement in an address in New York the other day which has a lot of meat in it for the automotive manufacturer.

"We have applied all that science and human ingenuity have contributed to production," he said, "but we have let distribution look out for itself. The result is that our manufacturing cost has been cut to a fraction of what it was fifty years ago, but the percentage cost of distribution is more than it was fifty years ago. We should begin at once to give more support to the retailer."

Motor vehicle producers can tell very definitely just what their manufacturing costs are, but it is doubtful if many of them have an equally accurate knowledge of their distribution costs. It is a subject they could study with profit to themselves and to their dealers.

The sales machinery which has been established is cumbersome and expensive. The companies which will win in the long swing will be those which are most successful in cutting down their marketing costs.

Charging Free Service to Production

WE have recently received two letters from well-qualified judges expressing the view that a few cents saved in production often results in several dollars cost in service for which the owner of the vehicle usually pays. This is not a new thought. It has often been given expression in these columns. It is generally conceded that low upkeep cost is an exceedingly important factor in influencing sales and that there are no problems before the industry more important than service. If this be true the importance of greater care in production, especially in those factors which directly affect the need for service, cannot be too often or too forcibly expressed.

One of our correspondents now makes the interesting and pertinent suggestion that the large manufacturer charge all free service work directly against the production department. This department might not be overly enthusiastic about this suggestion, but who will deny that it would be just? Certain it is that the more careless the production department becomes the more free service is demanded by the purchaser of its product.

The same observer says "probably the average standard of workmanship to-day on essential things, such as ring fits, accuracy of cylinder bores and so on, is lower than it ever has been." This is a severe indictment, but the observer in question is not accustomed to exaggerate and has had opportunity to judge in the matter through long association with the industry. Whether his view is literally correct or not, it is unquestionably true that many poorly fitted units are daily placed in users' hands. They reflect no credit upon the manufacturers, are certain to give trouble, make dissatisfied users and generally aggravate the service problem, which is none too free from complication already, as numerous makers can testify.

It is the old situation in which an ounce of prevention is worth a pound of cure. Cutting off a dollar in production cost is a commendable thing provided the finished article is as good and as easily serviced as before, but "saving" a dollar at the expense of a dissatisfied user is a mighty poor investment.

Free service costs many makers a tidy sum annually, yet instances have been known in which the same troubles due to faulty design or careless production methods have been allowed to continue indefinitely piling up trouble for the service and sales departments with the production department steadily refusing to mend its ways.

Supplementing Railroad Service with Trucks

IT has long been the contention of the automotive industry that railroads should supplement their service by the use of motor vehicles. The carriers have been slow to grasp this point of view, but they are getting it. Some of them are finding it profitable, especially in the passenger-carrying field.

The electric roads were equally reluctant to admit the advantages of buses, but it is significant that more buses have been sold to traction companies in 1922 than in any other year and perhaps as many as in all other years combined. This field has become a profitable one for truck manufacturers.

Progress almost as great, proportionately, has been made this year by companies making rail cars propelled by automotive power plants.

Evidently steam and electric carriers are coming to see the value of motor vehicles as adjuncts to their normal service.

In view of these facts, the paper read by W. H. Lyford, vice-president and general counsel of the Chicago & Eastern Illinois Railroad, before the National Highway Education Conference, at Washington, assumes added importance.

Probably no man in the country has made a more careful study of the subject, and for that reason his conclusions are especially important. They will be respected by other railroad executives. Briefly stated these conclusions are:

That railroads should use trucks to provide a store door delivery and pick up service for the delivery and collection of freight in congested centers.

That railroads should abandon unprofitable branch lines and serve the territory they traverse with trucks.

Lyford does not contend that this traffic belongs exclusively to the carriers, but merely that they unquestionably will get the business if the service they render is superior to that given by any one else. Even a man in the trucking business himself can scarcely find fault with this point of view.

Lyford points out that the cartage service he proposes already is successfully in operation in other countries and he is firmly convinced that it can be adopted with profit in the United States.

In all probability the proposals made by this long headed and broad visioned railroad man eventually will be made effective, but it will take time. The cumulative effect will be little short of revolutionary.

One result will be a tremendous saving to the carriers in terminal expenses. They will not need huge freight depots and much of their equipment which is now used for storage, by the payment of demurrage charges, will be released for more profitable and more essential service. A new system of warehousing would spring up immediately, for Lyford contends that all the roads would need in the way of terminal storage facilities would be long covered sheds to protect freight from the elements.

Collection and delivery of freight would be expedited by the use of trucks and shippers would be better served. In this work he believes the railroads should pool their interests. Operating independently they might find it unprofitable but working together they could make money on it.

Lyford also admits that railroads would not suffer seriously by surrendering to trucks short haul l.c.l. freight. He probably feels, however, that this work also might be undertaken profitably by the railroads themselves. It would release for other work much of the 20 per cent of their equipment which is now being used to return only 4 per cent of their total revenue.

Automotive executives should find much of interest to them in the abstract of Lyford's address printed in AUTOMOTIVE INDUSTRIES of Nov. 2. Really extended use of motor vehicles by the railroads to supplement their service may be some distance in the future, but it is surely coming.

The revolutionizing of this phase of transportation will bring new and constantly expanding markets for the wide-awake motor vehicle manufacturers. They are the ones who logically should provide the equipment. They can get the bulk of the business if they go after it and if they keep step with the most advanced thought in the way of design, quality and price. If they don't, they are likely to lose a good share of it to companies now manufacturing railroad rolling stock and who are more thoroughly familiar with the carriers' peculiar point of view.

Factories Hampered By Lack of Bodies

Many Plants Have Enough Orders to Maintain High Production Programs

NEW YORK, Nov. 13—Although the major automobile producing plants have entered November with sufficient orders to justify production close to the high schedules of the earlier months of the year they are being seriously hampered by inability to get enough bodies for the enclosed type of car, around which output now centers. Because of this scarcity some makers, with orders far in advance, have found it necessary to curtail their program sharply. This situation probably will not recur once the additional body plants now under construction are in operation, but for the present it is the greatest obstacle to sustained production.

The demand for closed cars far exceeded the anticipations of the makers and found most of the body builders not equipped to meet it. Orders are being taken care of as rapidly as the equipment permits, with shipments regulated solely by the available transportation facilities.

Transportation More Difficult

The transportation situation has grown more serious, enforcing the greater use of driveaways to deliver finished cars. This, however, has not brought relief to dealers at a distance from producing centers. Not only are freight cars scarce but congestion is great and locomotive power insufficient. A further aggravation is that fewer boats are available for shipments as the cold weather sweeps over the lake district.

The problem of the industry continues to revolve about the question of getting material and delivering cars and not so much around the question of sales. It is to be expected, however, that sales will drop off this month but not to the level of last November when output was down to a figure approximately 120,000. The fact that November is a short month and includes a holiday will be a further reason for failure to reach the mark attained in October.

Business with parts makers is good, with indications of a continuance of satisfactory conditions for months to come. Collections show no falling off from previous weeks.

Recognition given to the motor bus by municipal governments and railway executives has resulted in a pro-

(*Continued on page* 1004)

Business in Brief

NEW YORK, Nov. 15—Trade and manufacture are about the best since the late spring of 1920. A rapid rise in prices of textiles and their raw materials has given rise to talk as to the effect on the ultimate consumer of this steady climb. There has been a general increase in price level of all commodities with an accompanying rise in sales and output.

There has been a little freer movement of cars, and this has helped the farmer to cash in on his crops. The car shortage, however, remains the greatest in history.

Car loadings for the week ending Oct. 28 were 1,014,480, showing a gain for the week of 10,721. With one exception this was the largest weekly loading in the country's history. The increase was again in merchandise and miscellaneous.

The prospects for winter wheat crops are good. Farmers complain of labor shortage for husking the corn crop. Wheat exports from this country and Canada were the second largest of the year.

Pig iron production gained 29 per cent over the previous month. Steel approached the October, 1920, output. Building construction gained all over the country. Mail-order and chain-store sales increased 28 per cent over September.

Coal output gained slightly over the previous week. Production of bituminous approximated 10,700,000 and that of anthracite 1,800,000 tons.

Bank clearings fell off 15.7 per cent, but it was a holiday week. Stocks and bonds were irregular. Results of the election were not regarded as disturbing, although causing market irregularity for the moment. Money continued firm.

End May Come to Harley Trusteeship This Month

SPRINGFIELD, MASS., Nov. 14—Plans are maturing to the end of terminating the trusteeship of the Harley Co. before the end of this month. This may entail a re-organization of the concern. Conferences at present look to a compromise between A. W. Morris and associates and the Hendee Manufacturing Co., which has been desirous of regaining control of the property through foreclosure proceedings.

It is believed now that the drop-forging department of the plant will be in operation some time in December for the manufacture of forgings for automobile and motorcycle parts.

New Company Formed to Continue Simplex

Buys Plant and Assets from Mercer Motors—Capitalized at $500,000

NEW YORK, Nov. 13—The Crane-Simplex Co. of New York, Inc., with a factory in Long Island City and executive headquarters at 115 Broadway, has purchased from the Mercer Motors Co. the plant and assets of the old Simplex Automobile Co. and has resumed the manufacture of the Crane-Simplex, discontinued in 1917, when the Government took over the plant for carrying on war work.

The new company, which is capitalized at $500,000, all preferred stock, will confine itself to the manufacture of the chassis only, which will list at $10,000, and which will be essentially the old Simplex with a six-cylinder engine with 4.375-in. bore and 6.25-in. stroke and a wheelbase of 143.5 in.

Plans 100 Chassis Yearly

It is planned to make 100 chassis a year and the output for the next five years has been taken by a selling organization, the Crane-Simplex Distributing Co., 200 West 59th Street, New York City. In addition, the new company controls the Jephson-Scott body plant at East Orange, N. J., formerly Quinby, and if a customer wishes it a Jephson-Scott body will be fitted, although that is not compulsory.

Officials of the manufacturing end of the Crane-Simplex company include L. R. Ayer, treasurer of Lawrence Chamberlain & Co., a financial house at 115 Broadway, who has been elected president; J. H. Bawden, who has been with the Mercer company for the past 12 years, vice-president and general manager; Harvey B. Clark, who has been identified with Simplex since 1905, treasurer; Frederick H. Brand, also a Simplex veteran, assistant treasurer, and W. B. Sheahy of the law firm of Breed, Abbott & Morgan, secretary.

Takes Over Crane Company

The organization has also taken over the Crane Motor Car Co., which has been affiliated with Simplex, although H. M. Crane is not identified with the proposition. This arrangement carries with it the Crane overhead 4 x 6 engine, which will be developed by Bawden for future use, although it will not be used in the Simplex now being manufactured. Service on all Simplex cars manufactured since 1906 will be given by the new company.

After the manufacture of the Simplex was discontinued in 1917 the Government held possession for two years, using the plant for building Hispano-Suiza engines. In 1919 Mercer Motors Co. of Trenton, N. J., bought the assets, and when Mercer severed connections with Hare's Motors it took the Simplex assets with it.

Earl Quits; Company Will Be Reorganized

Resignation Follows His Failure to Get Additional Support from Bankers

DETROIT, Nov. 13—The resignation of Clarence A. Earl as president and general manager of Earl Motors, Inc., formerly the Briscoe Motors Corp., Jackson, effective Oct. 31, has been accepted by the board of directors, and steps preliminary to a reorganization of the personnel and finances of the company will be taken at a meeting of the board this week. Earl's resignation followed a period of plant inactivity extending back several months.

Financing undertaken by Earl in the spring of 1922 was only partly completed, and after a period of good business up to Sept. 1, the company again found itself in need of funds.

Since September the company has been operating on a basis approximating 100 cars a month, far below the output necessary to keep it on an earning basis. Attempts by Earl to raise support necessary to place the company in a satisfactory earning position were fruitless with the bankers opposed to him. In this position there remained nothing for Earl to do but resign, and the resignation was accepted at a meeting in New York.

Big Task Faced Earl

Earl joined Briscoe in 1921, following his resignation as executive vice-president of Willys-Overland. The name of the company and of its product was changed in the fall to Earl Motors, making the Earl car. Taking over the company Earl faced the task of liquidating a heavy inventory which was practically wiped out this spring when the last of the Briscoe models were disposed of.

As it stands to-day the company is cleared of inventory and has a good dealer organization but is short of working capital. It is declared that this now will be provided by the bankers with an entirely new organization. George C. Scobie, vice-president and treasurer, has been in Chicago during the week working with bankers on plans for the reorganization. The plant temporarily is under his direction.

The troubles of Earl and the Earl company were augmented this spring by the fall of the Fort Dearborn Bank, Chicago, which had been the financial backer of the company, and instrumental in bringing Earl with the company. Following his resignation, Earl gave up his apartment in Jackson, and with Mrs. Earl has gone to Virginia with Mr. and Mrs. W. R. Reynolds, where he will take several months' rest before undertaking a new connection in the industry.

PERFECTION TIRE RECEIVER

WILMINGTON, DEL., Nov. 11 — Charles C. Keedy has been appointed receiver for the Perfection Tire & Rubber Co., a Delaware corporation having its principal offices in Fort Madison, Iowa. The petitioner is the Nemours Trading Co.

Next Year Will Prove to Be One of Best in History of Motor Truck Branch of Industry

By FRED J. FISHER,

Sales Manager of the Standard Motors Co.

Detroit, Nov. 10.

IMPROVED conditions in the truck business are becoming more evident as the year advances and the next three or four months should witness a definite turn for the better. I am looking for 1923 to be one of the best years we have had and am confident that the next five years will be a period of increasing prosperity for the well-financed manufacturer and dealer.

Business in the large Eastern cities and on the Coast is already resulting in a large volume of sales in all classes of trucks, particularly the lighter ones. This better business is attracting to truck merchandising and distribution the type of dealer and business man who can provide ample capitalization for his company, and lack of just such distributive sources has been the truck industry's most serious handicap in recent years.

With soundly financed companies, dealers will receive the proper financial co-operation from banks. Except in the larger cities of the country there have been few truck dealers organized on a basis that would warrant bankers in extending to them required credit accommodations. Men with capital have not seen fit to engage in the truck business up to this time, but with promise of steady returns on their investments this condition will be overcome.

Shortage of railroad equipment is creating new demand for truck operation all the time. Much of the business in trucks to-day is due to the inability of railroad companies to meet shipping requirements and manufacturers and business houses of all descriptions are compelled to use trucks to maintain operations. Many manufacturers to-day are unable to make long distance deliveries because of the rail car shortage, but are doing almost normal localized business through use of trucks.

With better roads and more of them from year to year, the cost of truck operation will be greatly reduced and the radius of operations will be extended. Business houses and manufacturers now using trucks because of rail conditions will continue to use them. Hundreds of trucks which have been lying idle for the past year or more are again in service and are being worked to a point where they will soon have to be replaced.

Building operations in cities have been responsible for the coming into use of hundreds of trucks which had been taken in trades and which have been tying up dealer capital. With the many operations which must be undertaken in all parts of the country in the near future I look for plenty of work for all trucks and believe there will be some little difficulty in meeting demands. Farmers have been economizing at the expense of trucks and other necessary equipment which they will have to have, and their coming into the market will be a large source of business.

Without the European markets to take the surplus of American crops the farmer is unable to get the best prices for his products but European conditions will be improved in 1923.

Stockholders Must Raise $250,000 to Save Comet

DECATUR, ILL., Nov. 15—The sum of $250,000 must be raised by the stockholders of the Comet Automobile Co. if the proposed re-organization plans are to be carried out, according to the latest developments in the receivership. If this money can be raised, the indebtedness will be paid and there will be working capital to warrant resumption of production. If the money is not provided, there is danger of losing the assets.

The proposition has been presented to the stockholders for their consideration.

Judge Baldwin has issued a permanent injunction, restraining the Farmers State Bank & Trust Co. from disposing of the $250,000 in bonds held by it as security.

Republic Receivership Covers Claim of Banks

DETROIT, Nov. 13—The receivership of the Republic Motor Truck Co. has been extended to cover a claim of $2,500,000 filed by the Bankers Trust Co. of New York and the Guardian Savings & Trust Co. of Cleveland. The claim is secured by a mortgage held by the company, covering plants, factory, machines and equipment at Alma and some real estate at Euclid, Ohio. The mortgage is declared to be in default and foreclosure sale is sought.

Security Trust Co. of Detroit, the receiver, has been authorized to issue $100,000 in receiver certificates to maintain continued operation of the plant.

R & V INCREASING FORCE

EAST MOLINE, ILL., Nov. 16—The R & V Knight Motor Co., manufacturer of the R & V Knight four and six-cylinder cars, is gradually increasing its force in preparation for greater production.

Court Comes to Aid of Gramm-Bernstein

Appoints Receiver to Protect Interests While Reorganization Is Under Way

CLEVELAND, Nov. 13—The United States District Court at Toledo has appointed E. G. Kirby, Toledo banker, who is connected with the Commerce Guaranty Trust & Savings Co., receiver for the Gramm-Bernstein Motor Truck Co., at Lima, in order to protect the interests of stockholders, creditors and dealers. Through the appointment of the receiver, the company plant will be operated under the protection of the court. This will prevent a forced sale and the property being sold at a sacrifice. The assets of the corporation are placed at $2,500,000 and the liabilities at $1,600,000.

After being appointed, Kirby visited Lima, went over the assets of the corporation and deputized B. A. Gramm and Max Bernstein as manager of the property.

Suits Filed at Lima

The appointment of the receiver was precipitated by suits filed against the company in Lima. In the event judgments had been obtained in them, the property would have been sold at public auction and a loss entailed, according to H. O. Bentley, attorney.

Gramm and Bernstein will continue operating the plant until a reorganization, which is under way, is perfected. Approximately 95 per cent of the creditors have assented to the reorganization scheme as outlined by the larger creditors. This will permit the operation of the plant and the gradual paying off of debts. The five per cent of the creditors not assenting to the plan have started suit in Lima.

Shafer Informs Dealers

A. E. Shafer, general sales manager, in a letter to dealers says:

The severe depression, with its accompanying deflation, made it necessary for us, in common with many others, to write off large shrinkages in inventory and for other causes to get back to bed rock manufacturing conditions for the future. We are nevertheless pleased to say, with that done, our balance sheet still shows substantial figures on the right side of the ledger.

We have realized that to put ourselves in the most favorable position to seek and secure the large volume of truck business now plainly in sight for next year and beyond, it would be necessary to effect a financial reorganization. Plans for doing that have been under way for some time and had progressed so favorably that fully 95 per cent of our creditors have assented. There was a small minority who, seeking special advantages for themselves, were inclined to act "the dog in the manger," willing and ready to upset the plans of the big majority.

Desiring to proceed to the earliest consummation of our plans, we yesterday invoked the United States Court to grant a friendly receiver in equity for the company, so as to preserve the interests of all, and with that done we now feel that we can work out our plans in the least time and without interference of any kind.

We wish to assure you that all departments of manufacturing, sales, service, advertising, etc., will operate uninterruptedly as before to the end that we may be able to complete all of our plans at the very earliest date, for a larger and stronger company. We bespeak your continued hearty co-operation and support.

The Gramm-Bernstein Motor Truck Co. is one of the pioneers of the industry, dating its beginning in 1901, when B. A. Gramm built a one-cylinder truck. In 1912 the concern had grown to considerable proportions and became the Gramm-Bernstein Co., a name later changed to the present title. Its plant, located at Lima, covers 241,000 sq. ft. of floor space, there being 10 buildings on the 9½-acre tract occupied by the company. It has a capacity of 4000 heavy duty trucks per year.

Of the authorized $5,000,000 capital stock $2,302,482 is outstanding. The company's balance sheet as of Dec. 31, 1921, shows the land, plant and equipment valued at $1,131,563; good will, patents, trade marks, etc., at $429,103; notes and cash receivable, $625,834; inventories, $1,807,414; deferred charges, $42,342; cash, $8,104. In the way of liabilities there were: capital stock, $2,302,482; 7 per cent serial gold notes, $450,000; notes payable, $941,267; accounts payable, $167,544; taxes accrued, $39,774; due officers, $18,644; reserve for interest, $21,463; dealers' deposits, $21,094; surplus, $91,092; total, $4,044,360.

Officers of the company are: Max Bernstein, president and treasurer; B. A. Gramm, vice-president and general manager; H. O. Bentley, secretary; Willard J. Gramm, chief engineer, and A E. Shafer, sales manager.

APPREHENSION PAST OVER FUEL SUPPLY

WASHINGTON, Nov. 13—Continued improvement in conditions relating to fuel supply has made unnecessary the continuance of the surveys and reports which the United States Chamber of Commerce has been collecting to co-operate with the Federal fuel distribution agency, according to the president of that body, Julius H. Barnes.

He declares that the downward movement of prices and the increase in available supplies have removed the necessity for apprehension over the winter's fuel supply.

FORD TO EXPAND IN CHINA

WASHINGTON, Nov. 13—According to reports reaching the Department of Commerce, Henry Ford contemplates extensive manufacturing operations in China. It is said that Joseph Baille, Ford's personal representative there, has declared that technical training for 100 Chinese boys has been undertaken by Ford.

$2,115,828 Earned by Packard in Year

First Six Months Showed Loss—All Directors and Officers Re-elected

DETROIT, Nov. 13—Re-electing all its old directors and officers, stockholders of the Packard Motor Car Co., at their annual meeting, received the yearly report of the company showing net profits for the fiscal year of $2,115,828 on factory sales of $38,000,000. The earnings were all in the last six months, the first six showing a loss. Net current assets are seven and one-half times the current liabilities. The total assets are five times the total liabilities, including the company's outstanding bonds.

Cash and marketable securities are $16,288,689, sufficient to retire the remaining $7,400,000 outstanding 8 per cent bonds. Inventories have been reduced $7,500,000.

President Alvan Macauley, in a statement to the stockholders, said:

The company prepared during the depression for better times by improving its working personnel, decreasing its inventories, improving its facilities and developing a new product, with the result that we now are producing cars and trucks at the rate of 1800 a month. Our program calls for a production of approximately 2250 a month, commencing in December. This is the greatest output in the company's history and it is being accomplished with a smaller organization and a much reduced inventory.

Cash Position Improved

The general balance sheets show total assets of $56,308,090, a reduction of about $2,400,000 from last year, principally represented by the reduced inventory. The company's cash position has improved by almost six million. The surplus of $17,004,438 represents an increase of about $11,000,000. Current and accrued liabilities have been increased about $6,000,000, and reserve for contingencies has been cut from $2,500,000 to $750,000. Debentures outstanding have been reduced $2,453,000. No change has been made in preferred stock outstanding which totals $14,789,800. Total common stock is $11,885,100.

The stockholders' lists show 1555 holders of common and 3828 preferred.

NEW DEPARTURE AT MERIDEN

MERIDEN, CONN., Nov. 13—The $2,000,000 branch plant of the New Departure Manufacturing Co., which because of general business conditions has been idle since it came into the possession of the company, was put into production to-day, with a few hundred men employed.

It is expected that it will not be long before the whole of the annular ball bearing department now housed in the Bristol plant will be moved here and give employment to 3000.

Hinkley Adopts New Merchandising Idea

Will Sell Engines Direct to Truck Owners on Basis of Replacements

DETROIT, Nov. 13—Selling engines direct to fleet owners and individual truckmen on a replacement basis is the new merchandising idea adopted by Hinkley Motors, Inc., of Ecorse, Mich., maker of Hinkley heavy-duty automotive engines.

Figuring that any good heavy-duty truck should wear out at least three engines, the Hinkley company plans to furnish new engines to the truck owner direct to replace the worn-out power plant. This does not apply wholly to trucks originally powered by Hinkley, either, for by a new system of motor support, a Hinkley installation can be made in any truck of the front-radiator type regardless of the depth of the frame.

Another feature claimed for this idea is that owners of Hinkley-motored trucks can economize through being able to trade in their worn-out engines as part payment for a rebuilt engine, thus saving time usually lost in an overhaul as well as saving money.

Seventeen truck manufacturers who now are using Hinkley engines as standard equipment are reported to have indorsed the idea, and in preparation for carrying it out, the Hinkley company has appointed the following replacement plan distributors: Buffalo, Standard Welding & Manufacturing Co., 1156 Main Street; New York City, Gorey Automotive Parts Co., 354 West 50th Street; Pittsburgh, Parts Engineering Co., 3371 Bigelow Boulevard; Detroit, MacEwan & Sharley, 3169 East Jefferson Avenue.

Kissel Plans Projects to Increase Capacity

MILWAUKEE, Nov. 13—The Kissel Motor Car Co. of Hartford, Wis., which is erecting and equipping a new steam generating plant costing $150,000, is preparing to initiate several other projects to provide larger capacity because of the inroads made upon its reserve manufacturing facilities by a constantly enlarging distribution organization.

The program will be put into effect now that the demand for motor vehicles for the transportation of freight as well as passengers is approaching that settled condition when there will be a continuous steady demand for cars, necessitating a dependable source of supply fully equal to the increased buying demands, officials of the Kissel company said.

While recent price reductions by some makers had a tendency to create an unsettled condition in the industry, the Kissel company has been only slightly affected. The fact that new distributors and dealers are of their own accord seeking new franchises indicates a belief that the buying of motor cars is rapidly getting to a known basis. In addition, the majority of new distributors and dealers are those already equipped with facilities and organizations to become active representatives immediately.

OWNER'S OPINION ASKED ON MODELS

NEW YORK, Nov. 13—J. C. Long, secretary of the educational committee of the National Automobile Chamber of Commerce, is sending out a questionnaire to 20,000 owners, asking them concerning their next purchase.

Long wants to know if they will buy an open or a closed car and why their preference. It is expected that this will bring replies that will be of great help to manufacturers in trying to anticipate the body demands for the coming season.

Nash Doubles Milwaukee Capacity in Three Years

MILWAUKEE, Nov. 13—"More than $20,000,000 worth of products have been shipped out of the four-cylinder Nash passenger car works since this industry was established in Milwaukee less than three years ago," said Ben W. Twyman, general manager of the division, in a talk before the Tripoli Shriners' Luncheon Club Friday noon.

He said further:

Ground was broken just three years ago. To-day we are rushing to completion additions which will double the original capacity. By March 1 we will be employing about 1800 men, against 1000 at present. In addition, there is being built adjacent to these works a new LaFayette plant which will employ from 800 to 1000 more.

Our four-cylinder production now is at the rate of 75 cars a day, and yet we are not able to fill all demands promptly. You may ask, where do all these cars go? When one considers that the Nash organization embraces 2000 or more dealers in nearly every country on the globe, our present output means that each can get on the average of less than one car a month.

It is a pretty poor dealer who can't sell that many—our Nash dealers are obliged to turn down several times that many cars each month due to our inability to make as many as they can sell. When we get to a schedule of 125 or 150 a day about March 1 it will mean that our 2000 dealers will be able to get on an average of only two a month.

FORD ADDITION IN CANADA

DETROIT, Nov. 13—Ford Motor Co. of Canada, Ltd., is advertising for bids for the construction of the first large building to be added to the Border City's plant. Building operations will start immediately following the awarding of contracts. The first building will be 1000 x 588 ft. A machine shop and tool shop are to follow, the first 288 x 688, the other 75 x 200. The building program calls for $6,000,000 expenditures in three years.

Ternstedt Now Able to Increase Output

Completion of New Buildings Gives It 300,000 Sq. Ft. More Floor Space

DETROIT, Nov. 14—The Ternstedt Manufacturing Co., builders of body hardware and metal stampings exclusively for automobile manufacturers, has completed the construction of three new buildings which will add about 300,000 sq. ft. of floor space to its former half million, and will give it capacity for practically double its former output. The company declares that its expansion was required by the certainty of greatly increased automotive activity in 1923 and the immediately following years.

The largest of the new buildings will be given over exclusively to the manufacture of window regulators for closed cars. It is essentially typical of the company's faith in the future of the closed car and an increase in the percentage of closed cars is look for in 1923 over 1922, probably as great as this year exceeded the best previous years. This building will cover an entire block and contain 125,000 sq. ft. of floor space.

New Administration Building

Building number 8, second of the new structures, contains 140,000 sq. ft. of space and will house the enameling, sash and windshield departments, tube rolling mills and polishing and plating departments. The third new building will be used for administrative purposes and contain all general and executive offices and the engineering and experimental departments. It contains 35,000 sq. ft. All three will be in complete operation by the first of the year.

The immediate effect of the expansion will be to relieve the congestion of manufacturing in all departments, practically all of which are doubled. The company will now have double its former foundry and storage space, the latter being especially important at this time owing to uncertainty of freight movement.

The company will have 500 stamping presses with a daily steel consumption of 100 to 150 tons.

Continue Standards Effort

With its expansion, the company will continue its efforts toward standardization of automobile hardware work in which it has made extensive progress in the past two years. By reason of its specialization and large facilities, it has been enabled to hold to several types a sufficient variety of hardware to care for the needs of cars in every price class in the industry. In the past year a new line of door locks and curtain rollers has been developed.

The company is directing its policy toward the sale of its hardware in sets, so that inventory of its customers may be held strictly in balance at all times. A large percentage of its business is now being placed on a set basis.

Trucks Saved Nation During Rail Crisis

Julius H. Barnes Says Their Volume of Haulage Prevented General Collapse

DETROIT, Nov. 11—If the 2,600,000,000 tons transported by railroads in the last year had not been supplemented by the 1,400,000,000 tons carried by motor vehicles, there probably would have been an utter collapse in the United States, Julius H. Barnes, president of the Chamber of Commerce of the United States and of the Transcontinental Development Co., said in an address at the Board of Commerce meeting here this week.

The situation in transportation has been clearly saved by the motor industry and public highways, he said. In the field of motor transport the play of natural law of supply and demand has saved the day. The advantage of the motor transport with its flexibility of delivery and its elasticity of road service is clearly apparent, he said, as long as the public highways afford road beds free and open to its operation.

Road Development Important

It certainly is true, he stated, that part of the railway channels of to-day never would have been built in competition with the more liquid motor transport, if that transport had then been in existence. This suggests again, he said, the vast potentiality of the motor industry in those sections of the world where vast tonnage is to-day awaiting only reasonable access to market. He cited Russia, Asia, Africa and South America as waiting only highways for development and prosperity.

Smaller growth in agricultural population in the last twenty years was taken by Barnes as a favorable omen in that it showed greater efficiency and the use of machinery rather than of man power. In this time the general increase in population of 40 per cent has found only a four per cent gain in agricultural sections, he said, but the products of farm have increased 50 per cent and the number of farms 13 per cent.

Lack of Transportation, Farm Drawback

The only drawback to the prosperity of the farmer, Barnes declared, is the lack of proper transportation facilities, and for this, he said, the farmer has only himself to blame. Agricultural policy toward the railroads has always been one of forcing for lower rates, thus undermining earning power and destroying credit, Barnes said. Resultant failure in proper expansion of equipment costs the grain farmers of the Middle West one to two million dollars each day of marketing.

Later in the day Barnes was the guest of C. S. Mott, vice-president of General Motors, at a dinner attended by many leading automotive executives.

Among those attending were Alvan Macauley, president of Packard; F. J. Haynes, president of Dodge Brothers; A. T. Waterfall, vice-president of Dodge Brothers; William R. Wilson, president, Maxwell; A. P. Sloan, Jr., vice-president, General Motors; Fred J. Fisher, president, Fisher Body Corp.; H. H. Bassett, president of Buick; A. B. C. Hardy, president of Olds; G. H. Hannum, president, Oakland; W. L. Day, president, General Motors Truck; W. S. Knudsen, vice-president, Chevrolet; C. F. Kettering, president General Motors Research Corp.; Norval A. Hawkins, General Motors; E. T. Strong, sales manager, Buick; A. H. Swayne, vice-president, General Motors; B. G. Koether, vice-president, Hyatt Roller Bearing, and W. C. Boynton, General Motors.

S. A. E. NUMBER CODE MAY REACH ALL STEEL

WASHINGTON, Nov. 13—A conference to consider the desirability of providing a system of designating qualities or kinds of steels by code numbers has been called by the American Engineering Standards Committee at the request of the United States Bureau of Standards. The conference will be held in the Department of Commerce Building Dec. 6.

This conference will attempt to determine the desirability of applying a uniform numbering system to forging steels, casting steels, structural steels, including plates, tool steels or other steels not so classified.

The Society of Automotive Engineers already has formulated a system now in wide use, applying to the steels used in automotive practice, and there has been considerable discussion as to the advisability of applying such a system more generally.

Road in South Increases Its Motor Rail Service

BIRMINGHAM, ALA., Nov. 14—According to an announcement by President John T. Cochrane, the Alabama, Tennessee & Northern Railroad will shortly increase its motor car service, having purchased additional equipment for this purpose.

About the first of May the road put its first rail car in operation on its lines from York south. The service has proved so popular that the corporation has found it advantageous to increase it. The new service is expected to be in operation by the end of November.

The A. T. & N. is a road of about 200 miles in length and serves one of the richest portions of Alabama. Cochrane has notified the patrons that no steam trains will be annulled and that the motor car service, which he considers faster and more satisfactory, will be in addition to the other service of the road.

Wherever motor cars have been placed in service by the roads in the South, they have become immensely popular.

Milk Shippers Hear Fenn Argue Trucks

In Annual Meeting They Are Told of Plans for Motor Transportation

SPRINGFIELD, MASS., Nov. 14—At the annual meeting of the National Milk Producers' Federation here, the question of improving facilities of distribution and cutting transportation costs occupied a prominent place in the discussions. This side of the dairyman's business has become an acute problem, it was explained, because of the rising costs of production and the uphill battle for better railroad rates.

Frederick W. Fenn, secretary of the motor truck committee of the National Automobile Chamber of Commerce, spoke on the importance of motor transport in milk distribution.

Motor truck service may be made available to the farmers throughout a given territory, he stated, either by carrying the product in horse-drawn vehicles or small trucks to pick-up points, or by a joint arrangement which may consist simply of a single farmer making the deliveries for a group, enabling the rest to be engaged in other work at home or through a co-operative association.

On Co-operative Basis

In the latter event, he said, the capital required should be furnished by persons whose product is handled, the individual investment being proportioned to individual use of the facilities. A reasonable interest charge should be set against operating expenses, aside from which the service should be at cost. In determining the method in a given instance, the different factors should be carefully considered, he said, one of these being the laws governing co-operative associations, which vary in different States.

As the means of promoting efficiency and profit in moving milk with motor trucks, he mentioned, first, the equipping of the trucks with glass-lined thermos tanks, which secures a lower acidity test, better temperature, freedom from churning, no appreciable shrinkage, less ice per gallon, elimination of storage capacity before pasteurization and a large saving of labor.

Trailers Would Assist

The moving of milk by truck may be further facilitated, he explained, by the introduction of trailers with tanks mounted on them and equipped with solid rubber tires eight inches in diameter front and rear.

An essential to successful operation, he added, lies in the use of an accurate cost accounting system, enabling a perpetual inventory to be kept with the costs arranged under two separate heads, fixed and variable; the first to comprise such items as charges for retiring investment, interest, insurance, etc., and

(*Continued on page* 1005)

Oil Classification Agreement Reached

Conference at Washington Discusses Specifications of S. A. E. Committee

WASHINGTON, Nov. 13 — Members of the Society of Automotive Engineers, the Government Interdepartmental Petroleum Specifications Committee and representatives of the American Petroleum Institute joined here to-day in discussing specifications for engine lubricating oils prepared by the Lubricants Division of the S. A. E. Standards Committee with a view to reconciling these with present Government specifications.

Most of the discussion dealt with the classification of oils in respect to viscosity and the temperature at which this viscosity should be measured.

The S. A. E. and A. P. I. representatives finally agreed to the following classification based on viscosities at 130 deg. Fahr.:

No. 15	Light	150*	at 100 deg. Fahr.
No. 20	Light	200	at 100 deg. Fahr.
No. 30	Medium	300	at 100 deg. Fahr.
No. 40	Medium	400	at 100 deg. Fahr.
No. 50	Heavy	500	at 100 deg. Fahr.
No. 60	Heavy	60	at 210 deg. Fahr.
No. 80	Extra Heavy	80*	at 210 deg. Fahr.
No. 95	Extra Heavy	95	at 210 deg. Fahr.
No. 115	Extra Heavy	115	at 210 deg. Fahr.

*Saybolt seconds.

It was the sense of the meeting that acidity and emulsion tests of engine oils are of such questionable value as indicating the value of the lubricant that they should not be included in specifications.

Oil men who attended the meeting favored an increase in carbon residue allowable in Conradson test, but a motion to this effect was voted down by automotive and Government representatives.

Federal Revision Approved

WASHINGTON, Nov. 11—The Interdepartmental Petroleum Specifications Committee has announced that its latest revision of the Federal specifications for petroleum products was approved by the Federal Specifications Board on Oct. 31.

The outstanding changes in regard to motor gasoline provide that the initial boiling point shall be lowered from 140 to 131 deg. Fahr., and the 90 per cent point raised from 374 to 392 deg. Fahr. When the specification for motor gasoline was last amended in 1919, it was hoped that the specification would be satisfactory for at least two years. It has actually been in effect three years, and improvements in the refinery practise in this period have indicated that the specification could be modified to advantage. This has accordingly been done.

The specification for domestic aviation gasoline has been modified to allow the use of cracked gasoline in cases where the material is to be used within three months. A few minor changes have been made in some other specifications.

The specifications in force previous to Oct. 31 are given in Technical Paper 305 of the Bureau of Mines, and the methods adopted by the committee for testing petroleum products in Technical Paper 298. It is planned to publish the revised specifications, together with the testing methods, as Technical Paper No. 323, which will be issued by the Bureau of Mines as soon as possible.

OAKLAND SENDS CARS EAST, USING EXPRESS

PONTIAC, MICH., Nov. 13—Oakland Motor Car Co. shipped several carloads of closed models into the New York territory last week by express to overcome delays occasioned by freight movement in getting cars into buyers' hands. The company reports it is the first express shipment of cars in two years. The Oakland company now is in full production of its closed models and regular shipping schedules are starting at once.

S. A. E. and Service Men Will Hold Joint Meeting

NEW YORK, Nov. 11—A joint meeting of the Society of Automotive Engineers and the Automotive Service Association of New York will be held in this city on Feb. 1. Each organization will be represented by one or more speakers and the meeting will be more or less in the from of a debate, the subject being "Does factory engineering organization and practice give full consideration to service station progress?"

While the final plans have not been worked out for the meeting, it is understood that J. Willard Lord, service manager of the Harrolds Motor Car Co., Pierce-Arrow distributor in the Metropolitan territory, will lead the discussion for the service men.

Indiana Holds Meeting

INDIANAPOLIS, Nov. 14—The Indiana Section of the Society of Automotive Engineers held its November meeting and dinner, with Fred E. Moskovics, vice-president of Nordyke & Marmon Co., as the speaker.

Moskovics discussed the value the service department can render the engineers by keeping tab on the cars, their results and the suggestions and complaints of the motorists.

Schlesinger to Speak in Chicago

CHICAGO, Nov. 11—Dr. H. I. Schlesinger, professor of chemistry at the University of Chicago, will address the Midwest Section of the Society of Automotive Engineers Nov. 24, 7:30 p.m., at the Monadnock Building. His subject will be "Reaction Velocity and Catalysis."

Engineers Consider Proposed Air Code

Tentative Draft Expected Next Year—Aircraft Committee to Be Continued

WASHINGTON, Nov. 14—Representatives of the Society of Automotive Engineers participated in the conferences of the Aircraft Safety Code Committee, held at the Bureau of Standards. The provisions of the proposed code were discussed, and plans made for continuation of the work of the general committee. It is expected that a tentative draft of the code will be ready early next year.

There are five sub-committees, dealing respectively with airplane structures, engines, equipment and maintenance, lighter-than-air craft, traffic rules, signals, licensing of pilots, landing fields, etc. The committee is sponsored by the Bureau of Standards and the Society of Automotive Engineers. It is representative of all the important organizations in the country interested in aircraft.

Archibald Black, Garden City, Long Island, is chairman of the sub-committee on equipment and maintenance, representing the S. A. E.; R. H. Upson, Aircraft Development Corp., General Motors Building, Detroit, is chairman of the sub-committee on lighter-than-air craft, and George K. Mead, Wright Aeronautical Corp., Paterson, N. J., is chairman of the sub-committee on bureau plans representing the S. A. E.

Hardy, President of Olds, Addresses Reo Executives

LANSING, MICH., Nov. 13—A. B. C. Hardy, president of the Olds Motor Works, spoke last week to the Accelerator Club, composed of executives of the Reo Motor Car Co., on economic phases of factory administration. This is the first time the club has had as its speaker the president of a competing company.

Last month was the second largest October Olds has had. During the month, 414 cars were shipped to San Francisco, and this number would have been exceeded but for freight car congestion and oversale of closed models. New York took 248 cars, and 360 unfilled orders were reported carried over. Wholesale sales in the Minneapolis territory doubled sales for the same months in the past two years.

DUESENBERG LOSES APPEAL

WASHINGTON, Nov. 13—Duesenberg Motors Corp. lost in the Supreme Court of the United States its appeal from the Court of Claims award for damages under the war-time contracts, the Court of Claims being sustained. Claims aggregating about $1,400,000 against the United States for breach of contract and delaying the corporation in its manufacture of motor engines, and preventing its making its profits were involved.

Milwaukee Maintains Pace of Last Month

Experiences Difficulty in Delivering Closed Cars Because of Body Shortage

MILWAUKEE, Nov. 13—Production schedules of passenger car manufacturers in this district not only are maintaining the October rate, but in most instances factories are finding it a struggle to make deliveries on closed car orders from distributors and dealers. The call for open cars has encountered some of the expected let-down which the late fall season always has brought, but it still is surprising how well this demand is being sustained.

Despite the acute railroad freight situation as it affects supplies of materials and shipment of finished products, it appears that the main problem of passenger car factories at this time is in the body shops. Enclosed bodies are at a higher premium right now than they were at any time this year. Provision being made by all factories and by the body concerns here have not reached the stage where appreciable relief has been effected.

More Facilities Next Year

In most cases the additional facilities will not be available until after Jan. 1, because construction and equipment work was late in getting under way, inasmuch as the imperative need did not demonstrate itself until mid-year, or if it did, manufacturers were conservative and delayed such undertakings until absolutely certain that the new capacity would be occupied for a reasonable length of time.

Engine shops, manufacturers of frames, transmissions, gears, axles, etc., are keeping busy, and it is significant that output is going into hands of vehicle manufacturers as quickly as transportation means make it possible. In the case of makers of automotive equipment, jobbers are active buyers on the basis of an excellent fall demand from retailers, while car factors are absorbing an output equal to that of October, and in most cases slightly in excess of the September average, which manifested Ford effect.

Steps to Relieve Car Shortage

The railroad transportation situation, admittedly serious and acute, presents the grave prospect of the usual winter operating difficulties coming to be superimposed on the handicaps of car and locomotive shortage mainly responsible for the existing condition. A peremptory order was issued a few days ago by the Wisconsin Railroad Commission to all roads operating in the State to take immediate steps to relieve the car shortage by repair of rolling stock now standing idle and unfit for use. Daily reports are demanded of the results of the car repair work, distribution of empties, etc.

The Milwaukee Association of Commerce has appointed a special committee of five traffic and five railroad men which is issuing bulletins urging all members to load to capacity, unload promptly and in the case of less than carlots, to call for freight at railroad depots to avoid congestion. James Angove, traffic manager, Harley-Davidson Motor Co., is a member of the committee.

Retail Situation in Milwaukee

A demand for closed cars which the majority of dealers are not able to meet promptly is keeping on a straight line the trend of retail sales, notwithstanding the decline in open car sales. Not all dealers are so fortunate as others, and reports concerning current demand are more conflicting, but in a general way trade is far above expectations.

PEDESTRIANS TO TOE LINE IN NEW YORK

NEW YORK, Nov. 14—The Bureau of Public Safety, the newest branch of the New York Police Department, has been put into commission under the direction of Special Deputy Police Commissioner, Barron Collier, with Marcus Dow as the working head of the bureau. Dow was director of safety for the New York Central Railroad for 10 years and also is president of the National Safety Council, which has 3500 industries, employing 7,000,000 men, in its membership.

Dow will start out to educate the public as to the dangers of traffic and one of the first steps to be taken will be to install paths painted in white lines at crossings to prevent "jay walking." Dow also believes motorists need educating and he will insist that they start more slowly at crossings following the go-ahead signal of the traffic officer. He believes many accidents are caused in the rush of drivers to get up to speed in a short distance.

Rainbow Tire to Start By Manufacturing Tubes

COLUMBUS, Nov. 14—The Rainbow Tire & Rubber Co., which was incorporated during the World War with an authorized capital of $1,000,000, soon will start operations in its new factory at Delaware, Ohio. Charles Ross is president, M. J. Bergin, vice-president and secretary, and C. A. Morrison is treasurer.

Production of automobile tubes exclusively will be started about March, 1923. These tubes are known as the "Truss," as trusses are made throughout the center. They are both vacuum and suction and are made in halves.

New presses and heaters, as well as mills and curing machines will be installed in the factory to build the tubes.

122 Cu. In. Is Limit for 1923 Grand Prix

Maximum Weight of 1410 Pounds Without Fuel Provided in French Rules

PARIS, Nov. 7 (*by mail*)—A maximum piston displacement of 122 inches, a minimum weight of 1410 pounds without oil or gasoline, a tail limited to 49 inches beyond the rear axle, and a distance of 500 miles, are the main features of the official 1923 French Grand Prix rules just announced.

The event is open to all but ex-enemy nations, the number of cars per firm being five, and the entry fee 5000 francs per car, which must be filed before the end of the year. By paying double fees entries can be placed with the Sporting Commission of the Automobile Club of France until Feb. 29, 1923.

The French Grand Prix will be held on a road course during the first fortnight of July, the exact date to be selected after the course has been decided on. Candidates for the national French race are Lyons, which offers a subsidy of 300,000 francs; Strasbourg, which had the race last year; Touraine, and the district of Rambouillet, near Paris.

A fuel consumption race will be held over the same course on the day following the 122 cubic inch speed contest.

Officials of Birmingham Want Indictment Quashed

WASHINGTON, Nov. 14—Eleven officials of the Birmingham No-Axle Motor Corp. filed a motion in the United States District Court asking that the indictment brought against them be quashed.

The officials are charged with conspiracy to defraud by the use of the mails in the sale of several hundred thousand dollars' worth of stock.

They contend that the indictments fail to charge the commission of a crime under the laws of the District of Columbia and do not contain sufficient facts to apprise the defendants of the charge they are to meet. They also claim that the indictments do not show a conspiracy against the United States, and that they fail to allege sufficient facts to constitute in law a scheme or artifice to defraud or to obtain money by false pretenses in the sale of the motor stock.

OGREN INCREASES CAPITAL

MILWAUKEE, Nov. 13—An increase in authorized capitalization from $500,000 to $1,000,000 is one of the final steps taken by the Ogren Motor Car Co. in a general reorganization program. The company was established about five years ago and manufactures the Ogren Six, a custom-built car. Fred G. Smith, formerly of Cleveland, one of the original stockholders, has been made president and general manager.

Men of the Industry and What They Are Doing

Edwards Is Cole Factory Head

Announcement has been made of the appointment of H. J. Edwards as second vice-president and factory manager of the Cole Motor Car Co., Indianapolis. He has been connected with the automotive industry since 1898, when he served as assistant to Elmer A. Sperry, at that time builder of the Sperry electric cars and batteries at Cleveland. Edwards joined the organization of the Cleveland Automobile Co. in 1901 as superintendent and engineer, and later was made assistant to Robert Jardine at the Royal Motor Car Co., Cleveland, manufacturer of the Royal Tourist. In 1905 he became affiliated with the Dayton Motor Car Co., manufacturer of the Stoddard-Dayton, as factory superintendent and engineer, subsequently becoming vice-president and general manager. After the company was absorbed by the United States Motor Co., Edwards moved to New York and was in charge of the engineering of all the affiliated companies, until 1912 when he organized the Edwards Motor Car Co. in New York, building the Edwards-Knight. This firm was taken over by the Willys-Overland Co. in 1914 and moved to Elyria, Ohio. Edwards was given complete charge as manager and engineer of that plant, where all the engines for the Willys-Knight cars were produced. He served in that capacity for eight years.

Amos Appointed by Dodge

H. M. Robbins, director of foreign sales of Dodge Brothers announces the appointment of Frank B. Amos to direct the Dodge Brothers foreign advertising and sales promotion. For five years Amos was foreign advertising manager of the Studebaker Corp., later was with the American Exporter of New York City, and more recently served as vice-president and general sales manager of the Lalley Light Corp. of Detroit.

Finnegan Changes in Canada

W. E. Finnegan has resigned as director of sales of the Ruggles Motor Truck Co., London, Ont., and has joined the Beaver Truck Corp. in a similar capacity. Finnegan is an outstanding figure in the automotive sales and advertising field. In his capacity as director of sales for the Beaver Truck Corp. he will direct the sales effort in the export as well as in the domestic field.

Webster Returns from Europe

William M. Webster, commissioner of the Automotive Equipment Association, has returned after a four months' vacation tour of Europe and Asia. One of the features of the trip which he most likes to relate to his friends was the opportunity to play golf on some of the best courses in northern Scotland. Another thrill which he recalls with pleasure was provided by an airplane flight from London to Paris. His memories of passport and customs regulations are not so pleasant. He crossed international boundaries 17 times. At first he was able to keep his copious supply of good American cigars with him by paying duties which soon amounted to more than the original purchase price, but when he went into Germany they were taken from him.

Hemenway Back to Moline Foundry

Harold Hemenway, for many years prominent in the Moline factory district, but lately with the Peoria Malleable Iron Co., is returning to the Moline Foundry Co. as superintendent and director. The work of the superintendent has been in charge of S. S. Hoffman, president. The change does not indicate extensive expansion, it is explained, but will lighten the duties of the present plant personnel.

Hyatt Advances Woods

Walter H. Woods has been appointed sales engineer of the motor bearings division of the Hyatt Roller Bearing Co. in the Detroit district. He has been connected with Hyatt in engineering and sales capacities for four years in several parts of the country.

Chester Succeeds Thiers

John I. Chester has been advanced from vice-president to the position of president of the N. R. Allen's Sons Co., Kenosha, Wis., one of the largest tanneries of the Central Leather Co. group. He succeeds Edward C. Thiers, who resigned because of advanced age and moved to California. Chester began work in the Allen tannery as a currier less than 20 years ago. He learned his trade in Scotland, coming to America when 21 years of age.

Young with Lancaster Steel

Lancaster Steel Products Corp. has added to its organization R. M. Young, who takes over the Philadelphia territory, with offices in the Franklin Trust Building. As district sales manager, Young's territory will include New Jersey, north to and including Trenton; Pennsylvania, excepting the northwestern portion; Maryland, Delaware and West Virginia. Young comes to his new post from a large mechanical specialty company, for which he was assistant manager in the Philadelphia district.

Steenstrup in California

Peter S. Steenstrup, at one time vice-president and general manager of the General Motors Export Co., has located in San Francisco as district sales manager of the Buick Motor Co., with headquarters in the Balfour Building.

Rickenbacker Home Nov. 27

E. V. Rickenbacker, vice-president of the Rickenbacker Motor Car Co., who has been in Europe for the past two months, is returning on the Olympic, which is expected to dock in New York on Nov. 27.

Link-Belt Promotes Sayers

W. W. Sayers of the Link-Belt Co. has been promoted to the position of chief engineer of the company's Philadelphia works and eastern operations. For many years Sayers represented the company in Chicago territory in the lines related to power house machinery, coal storage, pack carriers, crushers, etc.

Paul M. Lockwood Appointed

Paul M. Lockwood has become general sales manager of the automotive division of the Rossendale-Reddaway Belting & Hose Co., with mills in Newark, N. J., and general sales offices in the Woolworth Building, New York. He was formerly with the Lockwood Manufacturing Co., Kansas City.

Chevrolet Regional Head

D. S. Eddins has been appointed regional manager of the Atlantic coast region comprising the following zones: Tarrytown, N. Y. (including the New England district), Buffalo, Pittsburgh, Baltimore and Atlanta. He will supervise all sales and operations and all matters pertaining to sales, and will have charge of all distribution of production from Tarrytown and Buffalo plants. Headquarters of the new regional manager will be at Tarrytown.

Milburn Has New Plan for Buying on Time

TOLEDO, Nov. 13—Announcement of a time payment plan has just been made by the Milburn Wagon Co., manufacturer of Milburn electric trucks. One plan embraces payments over a 12 months' period, the second, payments over 21 months. Substantially all other details of both plans are the same.

The first payment is made when the order is signed, and amounts to 10 per cent of the total purchase price; the next payment is made on delivery of the truck, and amounts to 15 per cent of the purchase price; freight and war tax being paid at this time. This leaves a balance of 75 per cent which is divided into equal monthly installments, and either is spread over the 12 or 21 months.

Interest at 6 per cent per annum on unpaid balance is charged, plus an amount varying from $75 to $220 to cover the cost of time-financing and insurance, the difference being due to the size of truck and length of time credit is required.

A. E. A. Is Not Likely to Close Show Again

Compromise Probably Will Be Effected So as to Admit Non-Members

CHICAGO, Nov. 15—It seems certain that the Automotive Equipment Association is holding this week its first and last closed show. The manufacturer members are practically unanimous in favor of admitting non-member jobbers to next year's business exhibit, while the jobber members are about as strongly opposed. The jobbers, however, have come forward with a plan for a show closed to non-members, with the exception that outside jobbers approved by the board of directors may be admitted as guests. It is expected that this compromise will be adopted before the convention, being held coincidentally with the show, adjourns at the end of the week.

The jobbers started the movement for the closed show this year with the claim that the large attendance of non-members made it impossible for manufacturers and their representatives to give the jobber members proper attention in their own show. The manufacturers on the other hand argued that, in view of the cost of exhibiting, they should have the right to invite non-member jobbers to see their exhibits.

Doors Will Be Opened

Next year's show probably will have exhibit space limited to members as at present, but the doors will be opened to jobbers as suggested by members and approved by the directors.

The exhibit this year, though a closed show and having a smaller attendance than the three previous exhibits, is producing business. Actual orders and prospects indicated in the interest shown by jobbers and their buyers in the many new and already tried products exhibited have indicated a bright outlook for 1923 in the equipment business.

The convention will elect officers Friday. The nominees are Nelson H. Oliver, Metal Specialties Manufacturing Co., Chicago, for president; W. E. Wissler, Herring Motor Co., Des Moines, for vice-president; E. V. Hennecke, Moto-Meter Co., Long Island City, chairman of the board of directors.

More than 500 delegates and 1000 manufacturers' and jobbers' representatives are in attendance.

MONROE BODY PLANT BURNS

DETROIT, Nov. 15—The plant of the Monroe Body Co., Ludington, Mich., manufacturing commercial bodies for Durant subsidiaries, was destroyed by fire this week with a loss of $150,000.

CONTINENTAL CALLS IN STOCK

DETROIT, Nov. 16—The Continental Motors Corp. has issued a call for all its outstanding preferred stock, estimated at about $2,100,700, to be redeemed Jan. 15 at $1.07 and accrued interest. The retirement of this stock is part of a plan formulated when stockholders authorized an increase in common stock from 1,500,000 shares at $10 par to 3,000,000 shares no par.

Ford to Build St. Louis Plant Costing $5,000,000

ST. LOUIS, Nov. 15—Construction of a new Ford plant in St. Louis to cost approximately $5,000,000 is projected for next year, according to a statement made by Henry Ford in Detroit.

Ford said that the new plant, which will be five times as large as the present Ford assembly plant here, would be built primarily for assembly, but would have facilities for expansion into the manufacture of parts. The plans as drawn contemplate a main plant, one story high, 1500 feet long by 300 feet wide. Auxiliary plants for wood working and production of certain parts are contemplated. The plant as at present planned would employ about 1200 men.

Two sites are said to be under consideration. One is a 30 acre tract on the Mississippi River in St. Louis proper and the other is in East St. Louis.

Stockholders to Consider Dissolving Ohio Tractor

COLUMBUS, Nov. 14—The Ohio Tractor Co., which has been manufacturing farm tractors in a large plant here, may soon be dissolved if the plans of the officials are carried out. The concern was reorganized about three years ago, and the name changed from the Columbus Tractor Co.

The company developed and put on the market the "Farm Boy" tractor, which had fairly good sales for a while. A meeting of the stockholders has been called for Nov. 29, to discuss the matter of dissolving, and sentiment appears to be favorable to the proposition. Fred A. Miller, is president; W. D. Singleton, vice-president, and W. F. Garrett, secretary and treasurer.

MOTORS MORTGAGE RECEIVER

PITTSBURGH, Nov. 16—The Real Estate Trust Co. of Pittsburgh has been appointed ancillary receiver of the Motors Mortgage Corp. of Delaware, which is engaged in lending money in financing automobile sales. The corporation has a capital stock of $15,000,000. It is stated that on Oct. 31 last, the assets amounted to $2,474,772 and liabilities, $6,686,220.

NEW AUBURN LIGHT SIX

AUBURN, IND., Nov. 17—The Auburn Automobile Co. will shortly bring out a new light six model. It will be smaller than the present six-cylinder model, which will be continued. The new model will be furnished with both open and closed bodies.

Service Bodies Get Convention Approval

Speakers at Meeting in Chicago Testify to Value of Local Association

CHICAGO, Nov. 15—Local service associations received a splendid recognition of their value to the industry on the second day of the Factory Service Managers' Convention, held at the La-Salle Hotel, when the delegates went on record as unanimously endorsing them.

The entire second day was devoted to the cause of the service association, the program being opened with a three-corner discussion, Alexander Johnston, editor of *Motor*, representing the interest of the owner; Eugene Silver, Cole distributor in Chicago, representing the dealer, and B. B. Bachman, chief engineer of the Autocar Co., representing the factory.

Johnston cited the great number of letters from car owners received by his publication asking for service information and of the great number of complaints of overcharge on the part of garages and stations. He came out in favor of flat rates as a means of giving the owner definite information in advance on service charges, and said that he believed that the formation of service organizations would help greatly in eliminating injustices to car owners.

Instances of Help Cited

Silver told of the great benefit the local association had been to Chicago dealers, and cited several discoveries made by service managers at the first meeting. They found for one thing that they were losing much accident and fire insurance business because those who underbid them were buying their own worn out parts that they had sold for junk and using them. They also found that they were being victimized by alley repair shops that bought genuine parts from them and later returned pirate parts for refund, so that the authorized dealers were actually carrying pirate parts in their own stock bins.

Bachmann told of the constant work of the engineering department to build a vehicle that would not only sell, but would continue to give good service after it was sold, and said that, beside the designing engineer, there was room for two other kinds of engineers, production and service. He believes that service associations can do much to assist in servicing the owner properly through co-operation.

Other Subjects Discussed

After a formal report of the service committee on the first day of the convention, brief addresses were made followed by discussions on the saving of transportation costs by shipping parts in carload lots, the separation of taxable and non-taxable parts, parts discounts to independents, the proper boxing of parts for shipment to save expense, etc.

Dealers Meet Schwab at Stutz Gathering

Hear, Also, of Eight New Body Styles That Will Form Speedway Four Series

INDIANAPOLIS, Nov. 13—Stutz distributors gathered here this week to receive an announcement of a new Stutz series and meet Charles M. Schwab, now in control of the company. Plans for the coming year were outlined, and the distributors were told that retail sales have not varied more than 1 per cent from factory production during the current year and that they have increased more than 200 per cent in 1922 over previous years. Orders on hand for the remainder of the fall and winter months indicate an unusually flourishing condition for this period.

The new line announced is to be known as the Stutz Speedway Four series, and while no chassis changes have been made, there are eight new body models in the line, which includes a seven-passenger phaeton, a four-passenger sportster, a de luxe Bearcat roadster, seven and four-passenger California type models, a coupé and a five-passenger custom-built sport-sedan. Prices range from $2,450 for the standard roadster to $4,550 on the custom-built job, not much change from the old line. The new models are listed as follows:

Model	Price
7-pass Phaeton	$2,640
4-pass. Sportster	2,790
2-pass. Roadster	2,450
De Luxe Bearcat Roadster	2,760
7-pass., California top	3,015
4-pass., California top	3,165
4-pass. Coupe	3,490
5-pass. Sportsedan	4,450

New Models Supplement Regular Line of Davis

RICHMOND, IND., Nov. 14—The Geo. W. Davis Motor Car Co. announces a new phaeton, model 70 which is mounted on the 71 chassis. The body is finished in royal blue with brown Spanish leather upholstery. The radiator is nickel plated and the equipment includes disk wheels, military steps, skirt fenders and a one-piece windshield. The price is $1,195.

Other models in the line for 1923 are the Legionaire, a 4-passenger sport model, $1,495; a coupe, $1,795; and Californian, a car with a year round top. These are in addition to the regular line models.

VELIE PLANS FEW CHANGES

MOLINE, ILL., Nov. 16—Daily production of between 30 and 40 cars is being continued by the Velie Motors Corp. About 30 per cent of this output is closed cars. Officials of the company state that they expect to continue indefinitely production of the present models.

The Velie-built engine which they have been using about a year has given unusual satisfaction, they say, and they have worked out comfortable and well-appearing body designs which they expect to continue. The only changes likely to be made are minor refinements, it is stated.

Dorris Adds Pasadena to 1923 Body Styles

ST. LOUIS, MO., Nov. 14—The Dorris Motor Car Co. has added the Pasadena to its line of body styles for 1923. The new body is mounted on the standard chassis and is a four-passenger sport type. A trunk is mounted on an aluminum rack attached to the frame at the rear of the car, together with a tire carrier for two tires.

Stock colors for the new model are Holland blue, maroon and gun metal gray. A three-quarter inch body molding extends over the hood to the radiator. The upholstery is leather. The top is made of unlined Burbank material with natural wood bows with nickel fittings.

The instrument board is black walnut. A ventilator placed in the cowl is easily controlled from the dash. The windshield stanchions are bronze, nickel plated. Regular equipment is artillery wheels with 33 x 5 in. cord tires. The 12 in. barrel headlights, radiator shell and bumper are all finished in nickel.

Peerless Bringing Out Roadster Coupe, $3,300

CLEVELAND, Nov. 13 — Peerless Motor Car Co. has added a new body to the line, this a two-passenger roadster coupe to sell for $3,300. The rear and rear side panels are covered with a weather proof top material, and the interior is finished in motor cloth of a neutral shade. The cover on the rear deck lifts high and free and the storage compartment holds a good sized trunk or several suitcases.

Standard equipment includes electric rear signal, cowl ventilator, engine driven tire pump and Moto-Meter.

REVERE MOTORS SOLD

INDIANAPOLIS, Nov. 15 — Revere Motors was sold at judicial sale yesterday for $52,000 to a reorganization committee. Henry A. Kraut of Logansport is trustee for the proposed reorganized company. Adolph Munson of Logansport, C. H. Barnes of Chicago and Kraut represented the stockholders. Later they petitioned for a court order, asking that the receiver make out a deed to the buyer. This was the only bid for the plant.

PICCARD-PICTET SOLD

PARIS, Nov. 8 *(by mail)*—The Piccard-Pictet automobile factory at Geneva, idle since the firm went into bankruptcy, has just been sold by auction to a newly formed company, which intends to use it for the construction of the new Lancia "frameless" car. The factory changed hands at six million Swiss francs.

Expects Driveaways to Aid This Winter

Feat of Banner Year Should Be Duplicated, James S. Marvin Declares

NEW YORK, Nov. 13—"Given average favorable winter weather and road conditions, the automobile industry can deliver from one-third to one-half its output over the road," says James S. Marvin, head of the traffic division of the National Automobile Chamber of Commerce, discussing the present transportation problems and the future outlook for getting cars to dealers.

He says:

The railroad situation right now is unchanged but then we have been favored by good weather. Let a few good old fashioned blizzards come along and see the difference. The railroads are doing fairly well but they are not improving and we are liable to have a change of weather at any time. I think, however, that we will be able to meet the traffic emergencies and I am looking to driveaways to help materially.

Many Driveaways in 1920

In our record year, 1920, when we made 2,205,197 cars, our manufacturers delivered 470,867 over the roads. Even in the so-called bad winter months of January and February, we kept up a rapid pace, showing 29,283 in January and 43,719 in February.

If we could do this two years ago, how much easier will it be this winter, for since 1920 there have been miles and miles of improved highways opened up and, in addition, the various States have got busy in the matter of snow removal and our roads this winter are going to be able to give us service in consequence.

We are not disturbed by the closing of navigation, for the number of automobiles delivered by boats has been small when compared with the monthly production. Not more than 8000 cars a month are shipped by boats even at busy times.

Open and Closed King Cars Reduced in Price

DETROIT, Nov. 13—Reduction of $300 on the open models, $200 on the coupe and $150 on the sedan are announced by the King Car Corp. The new list is as follows:

	Old Price	New Price
Roadster	$1,795	$1,495
5-pass. Phaeton	1,795	1,495
4-pass. Sport	1,795	1,495
Coupe	2,400	2,200
Sedan, Regular	2,550	2,400

NEW MODEL OF INDIAN

SPRINGFIELD, MASS., Nov. 15—The Hendee Manufacturing Co. announces a new model of the Indian motorcycle, the Indian Big Chief. This is of 74 cu. in. piston displacement, designed to meet a demand for a super-power, high-speed cycle for use with sidecar. It embodies the same principles as the original Chief of 64 cu. in. and sells for $345, f.o.b. Springfield.

Each Month of Year Shows Tractor Gain

Federal Bank of Cleveland Says Prospects for 1923 Are Even Brighter

CLEVELAND, Nov. 15—Every month in 1922 so far has shown a substantial increase in tractor sales over the corresponding months of 1921, declares the Cleveland Federal Reserve Bank in its Monthly Business Review. Next year looks even better, and production for 1923 is starting with schedules much larger than those of the last two years.

The bank says:

The most hopeful phase of the tractor situation at present is the buying attitude of the farmer. While, broadly speaking, farm products are still out of line in exchange value for the products of other industries, the farmer is looking optimistically to 1923. In fact the farmers are more optimistic than retail dealers, who, despite the business now being done with farmers, are ordering quite conservatively and cautiously. The most notable improvements in business are from the sections of the country where crops have been best. Probably the South is the most productive of business now, while the poorest section is that where wheat predominates.

There has been some slight restriction of shipments from factories because production has been curtailed by shortage of labor.

Most of the tractor and implement companies have announced prices for 1923 trade. These average about the same as those which have prevailed for the last two or three months. In the new price lines guarantees against any declines prior to June 1, 1923, are quite general. One of the larger companies, however, is soliciting business under a price-less contract.

The Review then says:

"The atmosphere surrounding the industry is the most hopeful in many months. There are indications that the gradual improvement evident during the last few months will continue throughout the winter and that the selling season of 1923 will find the industry fully recovered from its adversity."

Rubber Association Asks Closer Touch with British

NEW YORK, Nov. 13—Following the meeting of the special committee of the Rubber Association of America, called to consider the cablegram from the Rubber Growers' Association of London, which asked that an international discussion of the restriction act be postponed until the effect of restricted production of crude rubber on the entire industry can be determined, Chairman H. Stuart Hotchkiss sent the following cable to the British:

The invitation extended to the Rubber Growers' Association to send a committee to the United States is prompted by a sincere desire for a better, broader and more sympathetic understanding between growers and manufacturers. We regret that our invitation is not accepted now, as we feel that the good of the industry requires a closer contact and we believe that if your members have the opportunity of meeting our manufacturers here we both would secure a broader vision than would be possible should we send a committee to London.

In reply to your inquiry as to the probable American consumption in 1923 we could upon receipt of advices from you as to the probable range of prices under the restriction act arrive at a closer estimate of the probable consumption.

While apparently nothing has been accomplished by this interchange of cablegrams, it is felt in rubber circles here that this is but a preliminary skirmish that will lead ultimately to the desired conference as soon as both sides have an opportunity to study the workings of the restriction act.

52,840,135 Transported by Fifth Avenue Coach

NEW YORK, Nov. 13—The annual report of the Fifth Avenue Coach Co. has been given out by the Transit Commission, showing that 52,840,135 passengers were carried at a ten-cent fare during the year ended June 30. This is an increase of 1,748,770 over the previous year.

Advertising and miscellaneous income totaled $94,949, an increase of $19,756 over the previous year. Receipts from livery service fell off $3,156 to $11,451. Total income was $5,390,414, or $191,478 more than last year.

Operating expenses were $3,710,753, or an increase of $200,230. Taxes rose $13,710 to $610,358. The net income was $1,069,302, an increase of $22,462.

Number of buses in operation is set at 296, the number of employees 1407 and the salary and wage account as $2,616,893, or an increase of $199,962.

Tire Exports to Mexico Will Show Gain Over 1921

MEXICO CITY, MEXICO, Nov. 10—Automobile tires to the value of more than $1,000,000 were imported from the United States during the first ten months of the present calendar year, according to unofficial figures made public here.

It is estimated that the value of tires imported from that country during the year 1922 will amount to approximately $1,500,000, as compared with $1,346,645 for the year 1921 and $1,438,777 for the year 1920.

In Mexico City there has been a failure or two of the plants that were originally engaged in manufacturing tires, but the industry is now believed to have passed the experimental stage. The fact that raw rubber is obtained from the wild guayule shrub which grows profusely in the more altitudinous parts of Northern Mexico and that this product enters into the manufacture of automobile tires is looked upon as an important advantage to tire makers here.

It is explained that but for the enormous business which is done in smuggling tires into Mexico from the United States the customs figures would show much larger imports. It is asserted that the value of smuggled tires amounts to several hundred thousand dollars a year.

Body Demand Forces Factory Expansion

When Work Is Completed Baker R. & L. Co. Will Produce 50 Bodies Daily

CLEVELAND, Nov. 14—The Baker R & L Co. is enlarging its factory one-third to one-half in order to take care of increasing demands for its products.

Work is in progress, and when it is completed the capacity of the company will be 50 completely finished bodies daily. The kiln and mill departments are being added to.

The announcement of the additions to the factory followed the annual meeting of the stockholders, at which it was stated the company had sufficient orders on its books now to keep the factories going at capacity well into the spring.

Dividends at the rate of 7 per cent on the preferred and 4 per cent on the common stock were declared for the year. Earnings in the last six months have been more than sufficient to pay both disbursements. The company is free of indebtedness.

F. W. Treadway was elected president; E. J. Bartlett, first vice-president and general manager; E. J. Stahl, second vice-president; W. C. Fischer, treasurer, and W. P. Southard, secretary. The following directors were chosen: F. W. Treadway, E. J. Bartlett, E. J. Stahl, W. D. Fischer, D. Z. Norton, J. H. Wade, F. R. White, John R. Raible and John A. Kling.

An industrial lift truck, a new product, has met with hearty support, it was reported. By means of it a load may be lifted 72 inches.

Factories Hampered by Lack of Bodies

(Continued from page 994)

nounced increase in production of this type of vehicle. The truck industry, in general, while not making rapid strides, is going forward at a steady pace and bringing the production factories to a higher scale of operations.

The low mark in tire output for the year was reached during October, but production is increasing slightly and will continue to advance with the object in view of not only building up finished goods inventories but preparing for the spring demand. Advices from London on crude rubber restriction have allayed somewhat the fear that it will mean ultimately an increased cost of tires. Nevertheless, there is an undercurrent of feeling that with rubber output restricted and being quoted higher than heretofore and with advances made in the price of cotton used in tire fabric the price of the finished tire must be affected

Rice Returns Home After Foreign Trip

Discussed Tariff, Conferred with G. M. Representatives and Visited Shows

NEW YORK, Nov. 15—H. H. Rice, president of the Cadillac Motor Car Co., and also treasurer of the National Automobile Chamber of Commerce, returned on the Majestic from a long European trip, during which he visited both the French and English shows, held conferences with General Motors foreign representatives and distributors and discussed the American tariff with some of the foreign car manufacturers.

Returning with him were E. W. Seaholm, Cadillac engineer; E. A. DeWaters, Buick engineer, and C. R. Short of the General Motors Research Department. R. S. McLaughlin, head of General Motors Canadian plants, who was in the party, followed on another steamer.

Tariff Discussed Abroad

In speaking of his trip, Rice said:

Our new tariff was a matter of great interest abroad and the subject of considerable discussion. I found sentiment divided but it would seem to me that we are making progress and that it is possible that a uniform tariff will prevail eventually. I noted in Paris several newspaper articles advocating that the French government take action and reduce the French duty in accordance with the American.

Our duty provides for 25 per cent with those countries reciprocating. It works automatically in that when a car manufacturing nation meets our 25 per cent duty we give the same rates. The President of the United States does not have to take any formal action. At the present time Belgium, Spain and Switzerland are below the 25 per cent. England charges 33⅓ per cent and France 45.

I found both shows interesting indeed. From an engineering viewpoint Paris probably was the better because there many chassis were shown while the English ran more to displays of finished vehicles. Another phase was that for the first time since the war the engineers had a chance to show the new things upon which they have been working.

Taxes Force Small Cars

In England they are turning to the smaller models because of taxation. The British, I find, feel that the government should change the horsepower tax and I believe they would be only too glad to accept a gasoline tax in its place. Manufacturers would rather have it because of the sales resistance which develops with a horsepower tax where the full amount has to be paid at once. With two or three cents a gallon gasoline tax, the owner does not seem to feel it so much and this sales resistance is reduced.

While gasoline plays so important a part in the British motorist's life, still I find that the English engineers have not paid so much attention to carburetion as we have over here. In the first place they get better gasoline because of the high price of motor fuel over there and then again the English will permit an engine to run long enough to warm up before starting whereas over here we expect it to start functioning properly almost immediately.

There were General Motors dinners held during the French and English shows, which were attended by our distributors. Lots of enthusiasm was displayed at these affairs and the business outlook was declared excellent.

Creditors Wish Receiver to Continue Syra-Cord

SYRACUSE, N. Y., Nov. 14—Creditors of the Syracuse Rubber Co., which recently went into the hands of a receiver, will make every effort to save the firm by reorganization. E. A. Pam of Fred Stern & Co. of New York has been appointed chairman of a creditors' committee to take up reorganization projects. Other members of the committee are Adolphe Ernest of Thornett & Fehr, New York City; F. C. Chamberlin of the William Whitman Co. of Coston, and J. W. Clark of the Jenks Spinning Co. of Pawtucket, R. I. The combined claims of these concerns exceed $100,000.

Approximately $250,000 additional capital will be necessary to effect a reorganization, the creditors believe, for the company's liabilities amount to about $450,000, with assets of $360,000. None of the creditors is said to favor liquidation of the company, and a petition will be sent to Federal Judge Cooper asking permission for the receiver, William F. Raferty, to continue the business.

Milk Shippers Hear Fenn Argue Trucks

(*Continued from page* 998)

the second, such items as cost of oil, gasoline, tires, parts, repairs, etc.

Another big saving factor, he said, is to be found in standardization, securing mechanical units, spare parts and supplies that can be interchangeable. This enables purchases to be made in quantities, promotes labor saving and helps to develop a trained personnel, capable of giving the same efficient service wherever the standardization practice is in force. This systematic practice should be extended to periodical inspection of all equipment and daily reports rendered to the person in charge of inspections.

Answering the contention that the motor trucks should pay more in taxes for the support of highways, Fenn stated that motor cars and trucks are now paying $350,000,000 yearly to the Government for this object, or about one-half of the total maintenance cost.

UNION TRUCK TO BE SOLD

DETROIT, Nov. 15—Property of the Union Motor Truck Co. of Bay City will be sold by the referee in bankruptcy on Dec. 12. The plan of the former stockholders to reorganize was abandoned when it was shown that one-fifth of the $100,000 raised would be required to pay the fees of trustees and receiver and court costs.

Month Runs Strong in New York Trade

Slump in Open Car Sales Offset by Good Demand for Closed Models

NEW YORK, Nov. 14—There is little evidence of a seasonal slump in passenger car sales in the metropolitan district. Present indications are that sales for November will closely approximate the totals for October. Open car sales have undergone a seasonal slump, but the strong demand for closed models has counterbalanced any losses from this reason.

In some lines closed car sales are being materially hampered by the inability of dealers to get cars from the factory. Open cars, in most cases, are available for immediate delivery, although dealers do not expect to start stocking for spring delivery until next month or perhaps not before January.

Closed Cars Most in Demand

In the low and medium-price classes there has been no noticeable slump. Closed cars represent about three-quarters of the sales. In the higher price ranges there has been some falling off in sales, but, at that, the volume is satisfactory for this season of the year.

The monthly sales analysis published by Sherlock & Arnold shows that in the low and medium-price ranges October sales were less than 2 per cent behind September, and in the high-price class sales during October were about 30 per cent ahead of September. Total sales for all price classes in October were greater than in September. As compared with October, 1921, October of this year shows an increase of about 30 per cent.

A summary of registrations for the first ten months of the year is as follows:

	Medium and Low Price	High Price
January	2,014	283
February	2,230	273
March	6,352	632
April	8,428	862
May	8,467	961
June	8,203	865
July	7,816	678
August	5,921	516
September	4,592	511
October	4,518	665
Total	58,541	6,246

HIGH PRICE CARS SELLING

DETROIT, Nov. 14—Verne E. Burnett, advertising manager of the Cadillac Motor Car Co., following a trip through New England and the Middle Atlantic States, reports sales of better priced automobiles in that territory to be running high. Conditions were quiet in some cities, he said, but in others dealers were having the largest business they have ever had. A large number of medium-price car owners are graduating into the better priced car class, he said.

Dort Tours Country and Speeds Up Plant

Company Executives Convinced of Soundness of General Demand for Cars

FLINT, Nov. 14—That the problem of the automobile industry in 1923 will be one of production and not one of selling is the conviction of Dort executives who have completed tours to distributing points throughout the country, and who during Dort Introductory Week met hundreds of dealers in all sections.

J. Dallas Dort, president of the company, visited the chief distributing points in the East. John D. Mansfield, general sales manager, and Sam C. Mitchell, special sales representative, had an itinerary that included the larger cities of the Middle West and Northwest, while Wesley Buck, Dort sales engineer, was routed through the Far West.

That the executives were convinced of the soundness of the country's automobile demand and its permanency is indicated by the fact that immediately after their arrival in Flint plans went forward for steadily increasing production in the Dort factories at Flint and Kalamazoo.

Minerva, Citroen Become Identified with New Mors

PARIS, Nov. 4 (*by mail*)—Minerva and Citroen interests are to be found in the reorganized Mors Automobile Co., with a capital of 5,000,000 francs. The managing directors are Andre Citroen, Sylvain De Jong, of the Belgian Minerva Co., and Gustave Clement-Bayard.

The Mors company is building two types of cars in its Paris factory, with Knight sleeve valve engines produced by the Belgian Minerva Co. By reason of this arrangement Minerva cars will be marketed in France and its colonies by the Mors company, thus avoiding the 45 per cent import duty against foreign cars.

Motor Vehicle Looms Big in Russian Development

NEW YORK, Nov. 13—The following excerpt of a dispatch from Berlin outlining trade conditions in Russia is published in a recent issue of the Foreign Trade supplement of the London Times, copies of which have just reached this city:

A development which also deserves close observation is the growth of Russian motor transport services, which the cooperative services are making great efforts to extend. Though railway traffic is improving slightly, it is unequal to the requirements and the automobile is beginning to play an important part in the general transport of the country.

Some inquiries from the Russian cooperative associations have been reported by New York exporters of automotive equipment, and there, likewise, has been some effort on the part of Finnish merchants to interest American automotive exporters on proposals to make shipments of cars, trucks and accessories into Russia through Finland. Little actual business, however, is believed to have developed, although several manufacturers and exporters are closely watching the turn of events in Russia with the hope that trading may ultimately develop, perhaps on a large scale.

FINANCIAL NOTES

Wisconsin Cylinder Foundry Co. of Racine, Wis., has increased its capitalization from $50,000 to $75,000, for the purpose of building and equipping plant extensions needed to handle the rapidly increasing volume of orders for gas engine cylinder castings. The concern specialized in cylinder castings for high grade motor car power units and has been operating at maximum capacity for many months.

Keystone Tire & Rubber Co. reports net sales of $543,955 for the six months ending June 30 and a deficit of $161,385 after all charges and other deductions. The profit and loss deficit on June 30 amounted to $1,629,514.

Prairie du Chien (Wis.) Tool Co., maker of wrenches, tools and hardware specialties, has increased its capital stock from $50,000 to $100,000, in order to finance the enlargement of its plant and production.

J. I. Case Threshing Machine Co. has declared the regular quarterly dividend of $1.75 a share on the preferred stock, payable Jan. 1 to stockholders of record Dec. 11.

Willys Corp. has just paid creditors 40 per cent of all its indebtedness. It is expected that another substantial dividend will be paid at an early date.

Wright Aeronautical Corp. reports net sales of $497,487 and net profits, after taxes, of $118,943 for the quarter ending Sept. 30.

Stewart-Warner Speedometer Corp. has called a special directors meeting to declare an extra cash dividend.

Timken Detroit Axle Co. has declared a stock dividend of 150 per cent.

New Specifications Rule Purchases by Government

NEW YORK, Nov. 16—The American Engineering Standards Committee announces that an agreement has been reached with the Federal Specification Board which will make it possible for various industries to co-operate with the board in the formulation of specifications for material purchased by the Government.

By bringing these specifications into close agreement with commercial practice, it is expected that the price paid by the Government will be materially decreased in most cases. Among the specifications already adopted by the Federal Board, which will be reviewed and possibly revised within a year, are those covering petroleum products and tires, both solid and pneumatic, as well as inner tubes.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Last week rates for call loans ranged between 5 per cent and 6 per cent, as compared with 4½ per cent and 6 per cent in the preceding week. The calling of funds by interior banks seemed to be the principal factor in the tendency toward firmness. The same general trend was shown in the time money market. The rate for all maturities from sixty days to six months advanced from 5 to 5½ per cent, as compared with 4¾ to 5 per cent. The market in general was comparatively quiet. The prime commercial rate was 4½ per cent to 4¾ per cent, as compared with 4½ per cent in the preceding week.

The number of business failures, 1078 in October, was smaller, with the exception of February, than for any month this year to date. Liabilities involved, $34,647,000, constituted the smallest amount for any month since June, 1921.

The unfilled orders on the books of the United States Steel Corp., as of Oct. 31, totaled 6,902,287 tons, which represents an increase for the month of 210,680 tons. The forward business now on the books of the corporation is the largest amount reported since February of last year.

Pig iron output for October totaled 2,637,844 tons, a gain of 29 per cent over September's output, and was the largest monthly output since December, 1920.

A favorable factor in the general business situation is found in the car loadings for the week ended Oct. 28, 1922, which totaled 1,014,480 cars, the largest amount loaded for any week, except the one ended Oct. 15, 1920, in the history of American railroads. It was also the second consecutive week that car loadings have exceeded the million mark.

The Federal Reserve statement as of Nov. 8 showed an increase of $2,706,000 in gold reserves, but a decrease of $463,000 in total reserves. Bills on hand increased $50,646,000, and total earning assets increased $36,927,000. Total deposits decreased $51,560,000.

BARLEY EXPORT CORP. FORMED

NEW YORK, Nov. 15—The Barley-Roamer Export Corp., with offices in the Fisk Building, 250 West 57th Street, has been organized to handle the export sales of the Roamer and the new Barley light six lines. H. A. Reed, formerly of the Robertson-Cole Co., is president of the new concern. Reed will continue to direct the export sales of Kelly-Springfield tires.

BRYAN TO EXPAND

FORT WAYNE, IND., Nov. 14—On account of the increasing interest being taken in the development of the Bryan light steam tractor, the Bryan Harvester Co., Inc., of Peru, Ind., is considering the erection of another plant, and this city is being seriously considered as a site.

INDUSTRIAL NOTES

J. L. Austin Manufacturing Co., Milwaukee, established within the past year to manufacture tool grinders and other shop specialties, will relocate in Menomonee Falls, Wis. The president and general manager is J. L. Austin, formerly with the Luther Grinder Manufacturing Co., Milwaukee. C. A. Reuter, formerly production man with the T. L. Smith Co., concrete mixers, is secretary and treasurer. A. Waecker, until recently with the Chain Belt Co., is works manager. William Bennett is vice-president and sales manager.

Col-O-Hi Battery Co. has been capitalized in Columbus for $100,000 to manufacture storage, starting and lighting batteries. The concern has been in business for about a year as a part of the business of the Ohio Tractor Co. Incorporators are H. S. Ballard, Hanby R. Jones, R. H. O'Brien, R. E. Rathmell and W. J. Ford. Organization has been effected by the election of W. H. Hoagland as president, Clarence Wilcox, secretary and J. D. Saley, general manager.

Westinghouse Electric & Manufacturing Co. continues to run strong on automotive equipment. The feeder shops are running full night and day shifts and the regular machine department of the automotive division is working overtime. Sales through the dealers have run heavy for the past six months, and new orders received recently from the Hupp, Gardner, Anderson and other manufacturing companies contribute to keep up production volume.

Hoyt Metal Co. of St. Louis, has secured the manufacturing and sales rights for Radiated bearings by arrangement with Radiated Bearings, Inc. of Chicago. The outstanding feature of the Radiated bearing consists in the provision of radiating members formed integral with or attached to the bearing proper. Louis E. Clarke and James B. Watson have been appointed to assist in introducing the bearings to the industry.

W. M. Simpson, president and general manager of the Knoxville, Tenn., branch of the One Heat Tire Co., of South Bend, Ind., which now has under construction at Knoxville a branch plant for the manufacture of tires, advises that machinery is being installed and operations will begin in the plant the early part of December. The principal product of the Knoxville plant will be a cord tire.

Morrison Metal Stamping Co. has been formed in Jackson to produce stampings for automobiles and wheels. Plans for the erection of a factory are now under way. The company is incorporated for $250,000. G. E. Morrison, for 12 years in the metal stamping business in Cleveland, is head of the new organization. Plant operation will start in January.

H. M. Jerome, formerly sales manager of the B. L. Schmidt Co., of Davenport, Iowa, has purchased the Norman Piston Ring Corp. of Peoria Heights, Ill., and will erect a factory at Battendorf, near Davenport. He will be president of the new company. The company manufactures the Norman piston ring.

B. L. Schmidt Co. of Davenport, Iowa, has changed its name to Micro Machine Co. H. H. Yerk has been appointed sales manager to succeed H. M. Jerome. The company manufactures the Micro internal grinder.

GOVERNMENT OFFERS TO REVISE MAIL LIST

WASHINGTON, Nov. 13—Sales managers, advertising managers and other department chiefs in the automotive industry who use the United States mails in their campaigns can profit by the Government's latest offer to correct and revise their mailing lists for 60 cents an hour.

This offer is made by order of Postmaster-General Work, who sees great economic waste in the use of antiquated mailing lists by business concerns sending out advertising matter and circular letters. Besides the delays undergone by the postal machinery in handling and re-handling vast quantities of this class of mail, which is incorrectly addressed in most instances, the loss suffered by large users of mail runs into thousands of dollars annually.

Ruckstell Axle Plant, at Berkeley, Cal., making a two-speed axle for Fords, has found its growing business demands larger space, and is increasing the size of the factory to nearly double its present capacity.

G. M. Directors Declare Special Common Dividend

NEW YORK, Nov. 16—At a meeting of the directors of the General Motors Corp. held to day a special dividend of 50 cents a share was declared to common stockholders of record at the close of business Nov. 27, 1922, payable on Dec. 20, 1922, out of this year's earnings.

The net earnings of the corporation for the calendar year 1922 after deducting all charges, including depreciation and Federal taxes, it is estimated, will be in excess of $55,000,009. Accordingly, after providing for dividends on the preferred and debenture stock and the dividend of 50 cents per share which has been declared on the common, the corporation will be enabled to carry to surplus an amount in excess of $40,000,000 at the end of the year.

The corporation has materially fortified its position and the outlook for the year 1923 is considered entirely satisfactory. It was decided, nevertheless, to take no action at this time in the direction of placing the common stock on a regular quarterly dividend basis, the directors being of the opinion that, however encouraging the outlook appears to be, the consideration of the question of resuming regular dividends on the common stock should be deferred until the results and capital requirements of future operations can be satisfactorily ascertained.

PHILADELPHIA TRADE ACTIVE

PHILADELPHIA, Nov. 11—Automobile distributers and dealers here report an active trade for the week just ended, with demand principally for closed cars.

METAL MARKETS

The one really bright spot in the steel markets continues to be the demand from the automotive industries. It is in the specialty products, such as alloy steels, cold-drawn steel bars, strip steel, bands, full-finished automobile sheets, etc., that the steady quota of absorption by the automotive industries is most impressive, this perhaps all the more so as none of the tonnages involved in individual orders and shipments is abnormally heavy. It is because the automotive industries as a whole furnish sustenance to the steel producers at a time of the year when demand from other steel consuming industries tapers off sharply that the importance of the automotive industries as a highly profitable outlet for the products of the steel mills stands out all the more emphatically.

On the whole, however, new business coming forward is so light that it has no effect on prices. The nearer we come to the end of the year and the beginning of a new one, the more eagerly steel consumers look for concrete action with reference to prices so that they can formulate their own plans and map out at least a tentative buying policy. Conditions in the steel industry, however, are such that those who set the pace must needs grope their way. Unless production can be materially increased, the recent bulge in costs operates against the possibility of downward readjustment of prices with a view to encouraging enlarged demand. At the present time there is no indication that consuming demand will broaden of itself.

In fact, the relatively heavy production of steel ingots in October can by no means be interpreted to signify correspondingly heavy consumption. It is fair to assume that steel stocks or surplus have become a factor that must be reckoned with. There remains but one possibility as to the future course of the steel market for consideration—price advances. These may be forced on the steel market by untoward circumstances, but, if so, they will only be a makeshift. The leaders of the steel industry recognize that a return to really normal conditions is only possible on the basis of further deflation, but such deflation waits upon the restoration of equitable conditions in the labor market and other factors beyond the steel industry's control.

Pig Iron.—It looks as though the only obstacle in the way of further declines was the lack of transactions by which to gauge the shrinkage in values.

Aluminum.—It is current gossip in the market that the domestic producer began to quote aluminum ingots 1c. a pound higher on November 1, bringing the price to 22c. for 98 @ 99 per cent and 23c. for 99 per cent pure virgin metal. This facilitates competition by importers and a very large business in British, French and Swiss metal is said to have been done in the last few days. When it comes to sheets, however, the situation is different. The demand is far in excess of the domestic rolling capacity, but the high duty precludes importation on anything like a worth while scale. The domestic producer considers its prices and price policy a private affair, but from consumers it is learned that regular customers are being given every possible consideration.

Copper.—Easy conditions prevail in the market for raw copper but wrought copper products are firm.

Calendar

SHOWS

Dec. 2-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8 - 13 — New York, Second National Automobile Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Nov. 3 - 11 — London (Olympia), Automobile Show.

Nov. 9 - 19 — Buenos Aires, Argentina, Annual Exhibition. Automovil Club Argentino.

Nov. 29-Dec. 4—London (Olympia), Cycle and Motorcycle Show. British Cycle Motors, The Tower, Warwick Road, Coventry.

Dec. 15 - Jan. 2 — Paris, Aeronautical Salon, Grand Palace. Chambre Syndicale des Industries Aeronautiques, 9 Rue Anatole de la Forge.

Jan. 13-24 — Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

May - July, 1923 — Gothenburg, Sweden. International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

RACES

May 10 — Berlin - Grunewald, German Grand Prix.

CONVENTIONS

Dec. 6-8—St. Louis, Third Annual Meeting of the American Petroleum Institute, Hotel Statler.

Jan. 15-19—Chicago, Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show.

Jan. 29 - 31 — Chicago, Annual Meeting, Automobile Electric Service Association, Congress Hotel.

S. A. E. MEETINGS

Metropolitan Section

Dec. 14 — Speaker, Charles P. Grimes, Research Engineer, H. H. Franklin Manufacturing Co.; Subject, Air Cooling in Automotive Engines.

March 15—Speaker, William P. Kennedy, President, Kennedy Engineering Corp.; Subject, Trolley Buses and Flexible Vehicles for Street Railway Service.

April 19—Speaker, Edw. E. La Schum, General Superintendent, Motor Vehicle Equipment, American Railway Express Co.; Subject, Engineering Features of Fleet Operation.

May 17—Speaker, F. P. Gilligan, Secretary, Henry Souther Engineering Co., Subject, Metallic Materials for Automotive Work.

Other Meetings

Jan. 9 - 12 — New York, Annual Meeting.

Jan. 31 — Chicago Meeting and Dinner of the Society at the Congress Hotel.

Britain Gets Lower Tariff from Spain

WASHINGTON, Nov. 14—Sharp reduction in tariff duties on automobiles, chassis, accessories, motorcycles and tires shipped into Spain are provided in a commercial treaty ratified between Great Britain and Spain, according to a cablegram received by the Department of Commerce from Commercial Attaché Charles H. Cunningham, Madrid.

Great Britain has agreed to admit free of duty from Spain for three years, the term of the treaty, Spanish mineral ore, along with other products, and Spain has agreed to a minimum importation of 750,000 tons of pit coal at a duty of 4 pesetas per ton instead of the regular second-column duty of 7.50 pesetas.

It is understood that the reductions in the Spanish duties are to be extended also to similar products from other countries having a most-favored-nation status with Spain and, inasmuch as this includes the United States, it is to be expected that the automotive industries in this country will share in the benefits of such a treaty through ratification.

How Reductions Stand

Among reductions below the second column provided in the British-Spanish treaty are the following:

Reduction of 5 to 10 per cent: Accessories for cycles and motorcycles.

Reductions of 15 to 20 per cent: Automobiles, chassis with engine and complete automobiles of a value of more than 40,000 pesetas.

Reduction of more than 20,000: Internal combustion engines, driven by gas fuel and those driven by light liquid fuel (gasoline, alcohol, etc.), except such with more than two cylinders and weighing more than 1000 kilos (except articles previously specified); motorcycles with or without sidecar or special body for carrying goods.

Reduction of 10 per cent below second column: Automobiles, chassis with engine and complete automobiles of a value not exceeding 20,000 pesetas.

Reduction of 15 per cent: Automobiles, chassis with engine and complete automobiles of over 20,000 to 40,000 pesetas; motor and electric trucks; vehicles and trucks for carrying goods, motor buses, motor tank wagons and charabancs and framework with engine for trucks.

Other reductions include inner-tubes from 8 pesetas to 5.5 pesetas per kilo; outer tire covers, from 6 pesetas to 4 pesetas, and solid tires for carriages from 3.50 pesetas to 2.25 pesetas.

New Air Body Represents America Internationally

NEW YORK, Nov. 13—At the annual meeting of the Aero Club of America last night, the international representation with the Federation Aeronautique Internationale was turned over to the newly formed National Aeronautical Association, headed by Howard E. Coffin, thus making the association the official representative of aviation in America in all international affairs. The records of the recent aviation meet in Detroit were approved and will be forwarded to Europe for the approval of the F. A. I.

The affairs of the Aero Club were considerably clarified at the meeting. Court injunction had restrained Henry Woodhouse from attending or from attempting to hold an annual meeting of the club himself.

DISCREDIT PLANE STORY

WASHINGTON, Nov. 13—The "graft ring" story published in a New York daily paper which alleged that the Government is paying high prices for planes that are mechanically weak and cause fatalities among the Government flyers originated with Henry Woodhouse, former secretary of the Aero Club of America, the National Aeronautic Association alleges.

Woodhouse, N. A. A. officials claim, has no authority to speak for that organization.

Southeast in Best Condition in Years

ATLANTA, Nov. 14—According to the monthly business review of the Federal Reserve Bank of Atlanta, covering general conditions in the sixth district, which comprises the group of southeastern States, tractor and farm implement sales the past five months have increased steadily each month, with the exception of September as compared with August, the lack of gain then being due to the strike situation.

Each of the past five months, the report shows, has witnessed a considerable increase over the corresponding months of a year ago, with the outlook now for a steady volume of sales until next spring at least.

Recent big increases in cotton prices are having the result of increasing not only tractor and implement sales, but automobile and truck sales as well over the entire South, the bank's report shows. It is based on questionnaires filled out by the larger distributors in all southeastern States, including Atlanta, Birmingham and New Orleans.

That the manufacturers are looking forward to continued good business is indicated in reports from lumber mills that ash demand from the automobile trade has as yet experienced no abatement, and is in greater volume now than at any time this year.

Financially, the bank's report states, the Southeast is in better condition than it has been for years, due largely to the prosperous year experienced by agriculture.

GREENFIELD OUTLOOK BRIGHT

GREENFIELD, MASS., Nov. 15—At the meeting of the G. T. D. Engineering Club, President F. H. Payne of the Greenfield Tap & Die Corp. stated that prospects for the concern's business were bright and that the payroll, now numbering 940 employees, would soon exceed 1000.

AUTOMOTIVE INDUSTRIES
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"What's Wrong With the Truck Industry?"

Vital problems must be faced courageously and solved. Among most menacing are ruinous trading allowances and outlandish credit terms. Small assemblers must circumscribe markets and stop seeking national distribution or failure is possible.

By James Dalton

"WHAT'S the matter with the truck industry?" A lot of tired business men are asking themselves this question. In fact, they don't have to ask it of themselves. It haunts them by day and it gives them nightmares when they're asleep.

There are a good many things the matter with it, but none of them are incurable. The manufacturing is well done. There is a long list of companies making commercial vehicles of almost equal value in construction, design, durability and economy of operation.

Nothing is wrong with American trucks simply as trucks.

Most of the evils which have arisen in the industry have to do with distribution. The most immediately menacing are cut throat trading with ruinous allowances for used vehicles and ridiculous credit arrangements.

Another is the attempt of small companies which should be local assemblers to get national distribution. Such concerns cannot hope to compete successfully on a national basis with those which are strong financially and have built up strong, country-wide distributive organizations.

Anyone who attempts to plumb the truck market finds it bottomless. There is no such thing as a saturation point. There are none too many companies in the field to-day if they operate along sane lines.

Illustrations are potent in pointing morals. There is one company in Chicago which tottered on the verge of insolvency for months after the depression began because it was spread out too thin and was trying to cover the entire country. It began to concentrate its sales efforts in its own immediate territory and is now doing a splendid business.

THERE probably are many others in the same position. It is conceivable that the time will come when all of them will be strong enough to expand their sales organizations and meet competition in a broader field.

There are few towns in which there are not too many truck dealers. Few of them are doing any business and still fewer are making any money. Most of them are utterly unable to compete with the stronger concerns. Apparently the only method of competition known to them is the trading allowance. On this basis they are helpless. They seem to take it

for granted, also, that commercial vehicles can be sold only on a time basis.

The story is told of one dealer in a good-sized town who really had sold a truck. He took his contract and sundry other documents over to the prospect and told him that if he would sign on the dotted line all the preliminaries could be cleaned up in a day or so and he could get his truck.

"But why can't I just pay you the cash and get it over with without all that trouble," complained the prospect.

AFTER the dealer had been revived with a pail of cold water, the deal was closed. He had overlooked entirely the possibility that there is such a thing as selling a truck for cash. Dealers of this type just run around in circles and trade their heads off, financially speaking.

Suicidal trading allowances and failure to understand the rudiments of real truck merchandising are chiefly responsible for the sadly heavy mortality among commercial vehicle dealers.

No attempt should be made, however, to lay all the fault at the door of the dealer. It can't be done successfully. If there is to be any real reform in the way of trading on a sane basis, it must begin with the manufacturers. If their sales organizations were informed emphatically that the factories were opposed to any trading system which did not permit a reasonable margin of profit for the dealers they would be taking a long step toward a real reform.

No individual dealer and even mighty few distributors can compete successfully with the factory branch when it comes to making sales on a trading basis. All truck manufacturers will join whole-heartedly in a chorus of loud lamentations when the subject of ruinous trading allowances is mentioned. Some of them will hold up their hands in holy horror and protest that they are not parties to such a nefarious practice. But you'll find when you get out on the firing line that if they really think that statement true, they are not familiar with the details of their business.

If the factories want trading done on a sane basis they had better end some of their own practices. They shouldn't blame the dealer. In a good many cases they are responsible.

Truck makers are alive to the evils within the industry and they talk about them whenever they get together. Various kinds of palliatives are proposed but a major operation is required. They are perfectly willing to have the operation performed on the other fellows but they don't want to submit themselves to the surgeon.

The fact remains, however, that this canker in the side of the industry must be removed before it can enjoy as healthy a growth as it should. It stunts the profits of the strongest companies and it ruins the weaker ones.

As the situation stands to-day, when the owner of a truck wants to buy a new one, he sells his old vehicle to the highest bidder and pays the balance on his own terms.

Trucks are sound, essential merchandise. They are honestly built and Baxter Street methods should not be employed in their sale. There should be something in the way of standardized second-hand values. It has been demonstrated in the passenger car field that it is possible to work out usable plans to put trading on a sensible basis and it can be done in handling trucks. When an offer for a used truck is made it should be on a "take-it-or-leave-it" basis.

When this offer is made there should be only one consideration in mind. That should be its sales value to the factory branch or the dealer. There may be some excuse for handling used trucks on a cost basis, but there can be none for handling them on a loss basis.

This is one of the problems which must be faced courageously sooner or later by all manufacturers. There is another of even greater importance to the small producers of assembled commercial vehicles.

That problem is the scope of the market they can cultivate with profit. This is a subject of vital import to the parts maker for these companies constitute the major part of his market in the truck field. There is a legitimate and profitable field for these small concerns, but it isn't to be found in seeking national distribution.

MOST of the evils which have arisen in the truck industry have to do with distribution.

The little fellows can't hope to compete on a national basis with those strong financially and with strong distributive organizations.

Parts makers are deeply interested in future policies of small assemblers. If local markets are cultivated intensively there are none too many in the field.

There is no saturation point for the truck market but fundamental errors must be righted before it can prosper as it should.

Parts makers are alive to the situation and they are taking it in hand just as they did in the passenger car field a year or so ago. They believe that at least a part of the answer is to be found by the establishment of chains of service stations at which these truck assemblers can obtain all the parts they require to turn out their vehicles. These stations also could service the trucks after they were sold. It would not be surprising if various groups of parts makers were to associate themselves in the near future to establish such chains of service stations. In fact, the plan is even now under serious consideration.

Parts manufacturers are interested not alone in original equipment but in replacements. As the use of motor vehicles expands, the replacement market will constitute an increasingly important part of their business. They are seeking new outlets for their goods, just as are the makers of cars and trucks, and just as legitimately.

THE companies from which the assembler buys his parts are in a position to indicate the policy which he should pursue. If they feel the assembler is risking his capital and success by seeking too wide distribution for his products they can force him to circumscribe his efforts by cutting off his credit unless he follows their advice. If he eventually becomes strong enough to justify the cultivation of a larger field they would be foolish not to assist him, for it would mean larger sales for them on a sound credit basis.

As soon as an assembler decides to cultivate a local field there will be a very sharp curtailment in his overhead expense and in the cost of his marketing efforts. He will not have to allow heavy discounts to distributors and dealers, for one thing. He will find himself able to compete with the larger companies in the way of prices and he can handle the trading problem for himself instead of having it handled for him by dealers.

The prices of trucks have not been reduced in proportion to those of passenger cars. This has been due in part to heavy marketing costs, resulting chiefly from expensive trades. Whenever prices come down the market expands and this is one of the points parts makers have in mind.

Definitely deciding upon a circumscribed market is not sufficient, however. A market is of no value unless it is intensively cultivated. Intensive cultivation does not mean running around in circles calling upon the users of your product or the products of your competitors and trying to get them to add to their equipment. Even if you are successful in this effort it almost inevitably will mean a trade.

Territory Must Be Studied

One new truck user is worth two old ones from the standpoint of the man selling commercial vehicles. New markets always are to be found if they are hunted diligently enough. When a company is localizing its sales efforts it can afford to study the problems of potential purchasers in that territory and sell them transportation.

There is a whale of a big field for trucks in vocational markets such as milk, packing house products and petroleum. There also is a very live and genuine market for buses. They can be sold both to independent operators and to local traction companies. Municipal governments almost always are in the market for trucks and so are contractors engaged in public works.

If a good customer of this kind can be found it would be much more sensible to sell him by making an attractive price and assuring good service than to lose money by making expensive trades. Granting long term credit is not a sin, either, provided the credit risk is good. There may be instances in which eighteen months is not too long, although it is a bad practice to give such terms.

There may be cases in which a company would do well to cultivate the farm market almost exclusively. Farmers are going to buy a lot of trucks, but they are going to demand a good price and good service. Their needs should be studied so they won't be induced to buy a three-ton vehicle when all they can use profitably is one of half that capacity.

These are some of the things that should be considered by the smaller assemblers who are trying to get too wide distribution for their products. There is no reason why they should give up in despair. Their production may look like a wart on a pickle compared with the total for the industry, but it may give them a very profitable business in their own neighborhood.

The truck industry can well afford to spend a lot of time and money on the study of various subjects, such as the importance to operators of keeping accurate records of operating costs. Such a system may mean the difference between a profit and a loss. Truck operators, as a rule, don't know any more about their operating costs than truck manufacturers know about their selling costs.

The sum total of the answers to all these questions constitutes the solution of the major problem of, "What's the matter with the truck industry?"

The answer isn't to be found, however, in discussion of such subjects as how long a term credits should cover and whether it is permissible in certain cases for a manufacturer to cut his list price in making a sale which promises many repeat orders on a profitable basis.

These things are merely symptomatic and don't begin to get to the root of evil. That is to be found, first, in cut throat trading and, second, in seeking national distribution when national distribution is not justified.

A Merit Factor Formula for Automotive Steels

HENRY CHANDLER, metallurgist of C. Harold Wills & Co., in a paper on The Steel Requirements of the Automotive Industry said that the adoption of a steel for commercial purposes is predicated upon two general questions—first, How will this steel adapt itself to the necessary manufacturing processes, and second, will the part, when made of this steel, withstand the forces, such as wear, breakages etc., that operate for its destruction? The answers to these questions are obtained through a survey of the mechanical characteristics of the metal.

The manufacture of certain individual parts has been developed into separate specialized industries, and there has been a corresponding development of special steels. This has been the case particularly with frames, fenders, cold headed bolts, disk wheels, bodies, etc. The needs of this group are met by standard carbon steels.

Another group of automotive parts calls for physical properties which are not attainable in carbon steels, and this necessitates the use of alloy steels. This group includes valves, ball bearings, magnets, armatures, hardened keys and the like. In the case of valves, for instance, it is necessary that the metal retain strength, hardness and toughness at high temperatures and withstand the corrosive and erosive effect of the products of combustion. To meet these requirements many special steels have been developed, such as high tungsten, silicon-chromium, cobalt-chromium and others.

Chandler distinguishes a third class of steels used in automotive construction, the steels used for the major parts such as the front axle and all the chief components of the power transmission train from the crankshaft back. The steels used for these parts, he says, may be truly called automotive steels.

Tests for Automotive Steels

The paper then discusses the various tests applied to these automotive steels to determine their suitability for particular purposes. Dynamic tests have been suggested, but the great complexity of the factors involved have limited the application of this test, and at the present time automotive manufacturers depend chiefly upon the results obtained from (1) tensile tests, (2) Brinell and scleroscope hardness tests, (3) impact tests and (4) thermal and metallographic investigations. Suitability of a steel for any particular purpose seldom depends upon any one particular characteristic, and therefore what is known as the merit factor has been evolved which depends upon a number of these characteristics. Mr. Chandler gives the following merit factor formula for automotive steels—

$$\frac{\text{Mean breaking strength} \times \text{elongation}}{\text{K} - \text{Reduction in area}}$$

where K is a constant. The factor, he says, represents the amount of work done upon the steel in causing it to fail, per unit of steel involved. The properties of steels can be varied within wide limits by changing the drawing temperature and this merit factor offers a means of determining most advantageous drawing temperature.

Automotive Equipment Association Compromises Closed Show Issue

Convention decides to limit next show to members and specially invited jobber guests. Merchandising campaign is given renewed support. "One Salesman, One Dealer, One Million Dollars" slogan for next selling effort. To co-operate with S.A.E. on standards work.

By Neal G. Adair
Editor Motor World

THE Automotive Equipment Association has gone through an experience of the kind that wrecks some associations and builds others. It has made the A. E. A. stronger than at any time in its history.

On the issue of the annual automotive equipment show —whether it should be an exposition by and for the industry or an exclusive meeting of manufacturer members' salesmen and jobber members' buyers—the manufacturer and jobber elements in the membership yielded for awhile to the biddings of selfishness, but finally worked out a compromise that will make next year's show a fairly representative trade event. Working out the compromise was one of the hardest tasks that ever confronted the association leaders, but they succeeded.

The A. E. A. held its seventh annual convention and its fourth annual business exhibit in the Chicago Coliseum, Nov. 13-17. The show was closed to all except members and their representatives under a ruling vigorously supported by jobber members, weakly opposed by manufacturer members and adopted at the last summer convention. The great majority of manufacturer members went into the convention determined that they would not exhibit in another closed show. They wanted a larger audience than the less than 200 jobbers in the 500 membership of the association. Jobber sentiment was not so clearly defined, though apparently a majority of the wholesalers felt that crowding of the show with outside jobbers deprived the member buyers of the attention to which they were entitled from the men in charge of the exhibits. The jobbers in great numbers clearly favored continuance of the closed show.

The convention opened menaced by the spectre of a deadlock which a vote, of course, would have broken because of the numerical superiority of the manufacturers on the membership roll. Such a vote would have been disastrous and it was a compromise, not a clear-cut open show vs. closed show issue, which came before the convention after many conferences among the leaders. The compromise keeps the show closed to non-member manufacturers. But non-member jobbers whose names are approved by the board of directors will be invited.

THE manufacturers were not willing to permit the sale of space to non-members should any be left after members' demands had been satisfied. There was little sentiment among the manufacturing element for an exhibit which might be called industry-wide. They felt that manufacturers desiring to show in this greatest equipment exposition should "get under the big tent" of A. E. A. membership. Many jobbers held a similar view regarding admission of non-member jobbers, but they stood unanimously by the compromise, which came from their side of the house, when the unyielding demand of the manufacturers for a show "open" for jobbers but "closed" for manufacturers became apparent.

Under the rule adopted, the 1923 exhibit, except for the exclusion of non-member manufacturers, will be a representative wholesale trade show. On the application of manufacturer members largely, no doubt, with some requests from the jobbing side, the A. E. A. directors will invite to the Coliseum from all parts of the country jobbers whose standards of business will pass approval.

This plan will do away with the exclusive feature which brought so much criticism upon this year's show. But it will not lift the exhibit to the high plane of an exposition of the automotive equipment industry, which can be accomplished by inviting not only reputable jobbers but high class manufacturers to participate.

THE A. E. A. is doing a constructive, unselfish work for the industry with its merchandising campaign. The movement aids the retailer while it promotes business for the manufacturer and jobber and inevitably non-member manufacturers and jobbers profit by it. The A. E. A. some day may see its show in the same light, using it not so much as a means of building membership and the individual businesses of its members, but as an agency for the promotion of the broader interests of the industry. Such a plan would make the exhibit a truly great wholesale show, one of the leading expositions of American business.

The adoption of the show compromise started the convention on a series of harmonious sessions which carried the A. E. A. to new heights of co-operative action. The merchandising campaign, leading constructive work of the association, was given renewed indorsement both by manufacturers and jobbers, promising a far broader and more aggressive activity in the next six months than at any time since the inauguration of the movement in the summer of 1921.

Association members agreed in large numbers to get actively into the merchandising campaign led by Ray

W. Sherman, broadening the market for the industry's products by assisting the retailer to realize more fully on the possibilities of service to his public with profit to himself.

The convention and show brought together the largest crowd ever assembled at an A. E. A. meeting. At one convention session the doorkeepers counted 1260 men, including a few more than 500 delegates representing the membership. In attendance at the convention and show—manufacturers, jobbers, manufacturers' sales managers and salesmen and jobbers' sales managers, salesmen and buyers—there were fully 1500 persons.

The show, too, set a new record. There were 215 exhibits as compared with less than 200 a year ago. They presented an inspiring array of the merchandise of the automotive equipment industry—garage equipment; including heavy machinery and the lighter tools; accessories for the car and truck, replacement items for all parts of the automobile and tools for resale to the motor vehicle driving public. Billions of dollars of plant investment, hundreds of millions of dollars of annual production were represented in the exhibits, many of them brilliant examples of show merchandising, and among the jobbers in attendance there were represented many more millions invested in facilities of distribution.

EVEN with the restricted attendance of jobbers under the closed show rule, the exhibit was a better business show than previous ones.

Smaller attendance gave a greater opportunity for conference between manufacturers and jobbers and their representatives, and the jobbers, because they had initiated the closed show decision, apparently went out of their way somewhat to listen to the sales talk of the exhibitors and, in some cases, to sign distribution contracts and place orders. The bulk of business done, however, and the interest shown by jobbers was not based on sentiment but on the confidence expressed by the majority of jobbers that the gains in business during the past few months are to be continued through 1923.

A few manufacturers complained of light patronage but just as many reported business written far in excess of last year and the bulk of the exhibitors united in terming the show the most successful the association has held.

The gathering of manufacturers and jobbers in Chicago, particularly the assembly of jobbers, gave an opportunity for an interesting check-up on trade conditions. Allowing for the normal seasonal decline, they are improving steadily in nearly all sections of the country. Some of the Rocky Mountain States and a section of the Southwest are still suffering from restricted credit, and jobber business has been poor because of dealers' inability to finance purchases either of shop equipment or accessories. In both sections recovery is now in progress. In other sections jobbers are still finding it necessary to ship some goods C. O. D. And some business is lost because dealers and garagemen will not buy under this requirement. Generally throughout the country, however, dealers are beginning to get results in "asking 'em to pay."

THE general run of jobbers at the convention had done to 30 per cent more business, in tonnage, this year than in the same period of 1921. This gives them a dollars and cents result about equal to last year's and in some cases considerably better. Purchases of garage equipment have been on the upgrade for several months.

The A. E. A. chose as its new president H. Oliver, general sales manager of the Metal Specialties Mfg. Co., Chicago. The new vice-president is William E. Wissler, head of the wholesale automotive equipment department of the Herring Motor Co. of Des Moines, a large automotive concern with a passenger-car dealership and other interests. The new chairman of the board of directors is Earl V. Hennecke, general sales manager of the Moto-Meter Co., Long Island City, N. Y.

THE outstanding accomplishments of the convention were the plans for intensifying the merchandising campaign, benefiting the retail as well as the manufacturing and jobbing divisions of the industry, the perpetuation of the annual business exhibit and the welding of the two elements of the A. E. A. membership into a more effective working unit.

Speakers outside the industry who addressed the convention were Judge James H. Wilkerson of the United States District Court in Chicago and William A. Durgin of the United States Department of Commerce. Wilkerson's address was a plea for universal respect of the law and Durgin gave an illustrated talk on elimination of waste and simplified practices which prompted the A. E. A. standardization committee to change its name to the committee on simplified practices and to make preliminary plans for co-operation with the Society of Automotive Engineers and other organizations for simplification of manufacturing practices in the equipment field.

The merchandising campaign, which has been in progress sixteen months, has had vigorous support by only a minority of manufacturer and jobber members. The majority have left the work to the merchandising department of the association. The campaign was given a new start by concurrence in recommendations of the department.

The merchandising director's recommendation to the jobber members was for a campaign to assist selected dealers in building up their automotive equipment business. He urged that every jobber's sales manager arrange with his salesmen to select one dealer each as a likely prospect for intensified assistance over a six months' period beginning Dec. 1. The salesman would pay special attention to this dealer's sales work, helping him to select seasonably salable merchandise, display and demonstrate and ask motorists to buy it. Sherman said that if 1000 of the 4000 salesmen with jobbing houses of the A. E. A. would carry out the plan suggested he believed the aggregate increase in business, on a basis of a $1,0000 minimum gain for each dealer, would be $1,000,000. He suggested as the slogan for the campaign, "One Salesman, One Dealer, One Million Dollars."

THE suggestion met with a hearty reception in the divisional meeting of jobbers. A majority of the sales managers present said they would put the plan in force in their organizations.

Sherman's talk to the manufacturers' divisional meeting was a request for the support of sales executives to emphasize to the retailer how he can make profits selling or using the manufacturer's product. He made a special plea that every manufacturer member of the association get out at least one advertisement and one piece of printed or illustrated matter in the next six months devoted exclusively to this idea. A showing of hands indicated that a number of manufacturers were prepared to heed the request.

It was decided to get out, late in 1923, a second edition of the Universal Catalog, describing the products of the manufacturer members of the association.

The next annual convention and show will be held Nov. 12-17, 1923, in Chicago, and the 1923 summer convention will be held June 25-July 1, at Dixville Notch, New Hampshire.

Sport Model Body Gains Fast in General Popularity

Standard phaeton loses position as all-purpose type with ascendency of closed car and joins special use class. Sport model fills gap. Many manufacturers bring out such cars this fall.

By George J. Mercer

A MAJORITY of automobile manufacturers this fall have brought out sport type open bodies. The popularity of the closed car, which has been found by the public to serve a multitude of purposes, has driven the standard phaeton from its accepted position as the all-purpose car. The gap is being filled by this new sport type, which is lighter in weight and fleeter in appearance.

The sport model is very fully equipped with all the conveniences for driving. It has the fittings ordinarily found on special custom body jobs, which make the car attractive in appearance. In spite of price reductions these new models are far better equipped than standard phaeton models have been in the past.

The first sport models which appeared had steps in place of running-boards. This innovation was not continued to any extent. The appearance of steps in place of running-boards has been simulated by the use of bright metal grills on the side of the splasher above the running-board. Thus the reflection of advance design may be seen.

The bodies are not noticeably shorter, consequently a trunk can be used or not as desired. When the trunk is left off the trunk guards serve to brighten up the car and enhance its appearance. In general the bodies are made narrower in the rear and the use of wheel-housings is obviated. Fenders are fastened flat against the body sides.

Fig. 1 shows a composite drawing of general design. One feature is shown which appears to be coming back into use, and that is the molding along the top of the body side. Another feature is the strip on the top line of the body from the curtain to the front of the forward door to prevent injury to the paint surface. Some manufacturers use a metal strip or an aluminum casting for this.

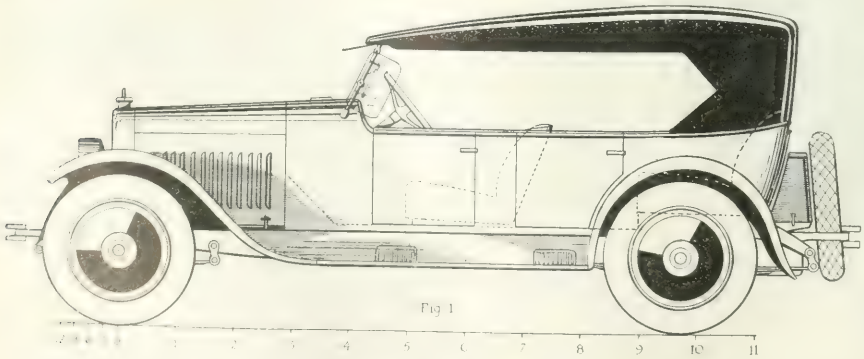
Wood is the ideal material for the top strip if it can be protected from the elements. Use of wood permits a very good contrast with the body color and does not require expensive production equipment. Probably its use would become more general if manufacturers would furnish a preparation to keep it looking well.

Side Moldings Tend to Reappear

Side molding may come into use again, as there is now a tendency in that direction. If the molding is rolled in the sheet and not attached afterward there is little difficulty placed in the way of painting.

The top shown in the illustration is the semi-clear vision type and is an improvement over the type which employs the use of gipsy curtains. Some manufacturers have replaced the black top material with a non-lustrous fabric. This material does not offer as great a contrast with the body color.

The hand operated cowl ventilator is now considered a necessity and has almost superseded the screw type. The sun-visor of fabric or metal and front and rear fender guards are now expected as regular equipment.



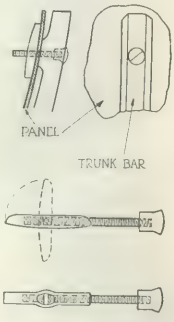


Fig 2

Fig. 1—Composite drawing of general design. Molding along the top of body side appears to be coming back in use. Semi-clear vision top shows improvement over top with gipsy curtains. Fig. 2 shows method of attaching trunk guards on body finished without provision for them. Two views of swivel stud. Swivel revolves when inside body while other end has finish nut which appears outwardly to be a screw head

Some Examples of Sport Model Body Practice

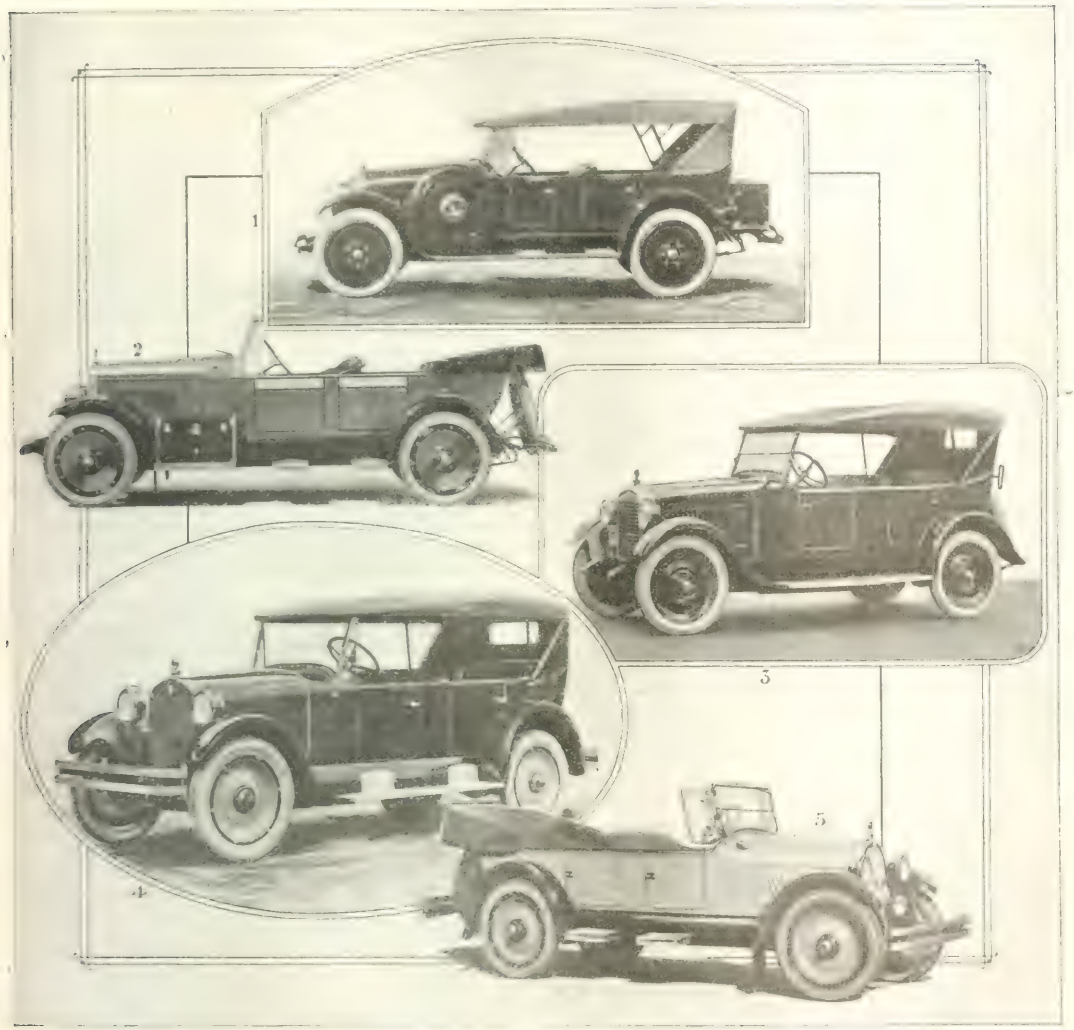


Fig. 1—Nash sport phaeton mounts fifth wheel on runningboard. Metal step plates used in conjunction with runningboard. Fig. 2—Auburn carries trunk forward instead of customary rear mounting. Fig. 3—Columbia sport body. Fig. 4—Reo uses metal grills on side of splasher. Fig. 5—Oldsmobile sport with steps in place of runningboard

Some sport models carry the tool box on the runningboard because the front seat is too low to afford space underneath. The latter place is also inaccessible. Carrying tools in the door pockets is satisfactory, but provision for only the lightest tools can be made.

Storage of curtains varies greatly. The best place is in a pocket in the rear of the front seat, but the cost of manufacturing the pocket no doubt may prevent its more general use. It is evident that cost of manufacture is not as great a factor as supposed, for even the medium priced cars are fitted with smoking sets, rear vision mirrors, footrests, robe rails and the like.

Conventional black leather is generally used for upholstery, but Spanish leather is quite common. Good springs for the seat cushions are found on all grades of cars.

Painting is a large item of expense because a variety of colors are used and striping is quite often employed. Lake and black, and blue and black, are the predominating sport body colors. These offer a very excellent background for extensive nickel trimmings.

Trunks and trunk guards show a wide variation in style. Fig. 2 shows a method of attaching trunk guards to a body that has been finished without provision for them. The lower figures show two views of a stud which is long enough to be cut off after being inserted. At one end is a finish nut, to outward appearance a screw head, and at the other end is a swivel which revolves when inside the panel. The trunk guard is also shown from the rear.

Automotive Industries
November 23, 1922

Getting Better District Managers

Part I.

Factories seek more capable traveling sales representatives. Supply limited. Training probably necessary in future. Job requires a wide range of knowledge. Most sales managers actively working for improvement. Methods discussed.

By Norman G. Shidle

DISTRICT managers, factory sales representatives, or traveling men, as they are variously called, are providing much food for thought among factory sales managers. Recognized as a vital link in the merchandising chain, these men have not been "hitting the ball" in a manner satisfactory to the manufacturers. Nearly every factory sales department is trying to devise means for improving their staff of district managers, either through new personnel or through increasing the effectiveness of the men now operating.

Different factories expect different things of their traveling men, but complete satisfaction is lacking all along the line. Various methods are being used to get better efficiency, and opinions differ as regards many of the points at issue. Most factory sales managers, agree, however, on a few major premises. Agreement is nearly general, for instance, on the following points:

1. **It is very difficult to get men properly qualified for district managerships.**
2. **The factory will have to do more actual training of men for these jobs than in the past.**
3. **The factory will have to lend more assistance in the way of basic market studies, checking of distributer and dealer performance, territorial analysis, etc., than in the past.**
4. **A greater number of traveling men will be needed in the future, despite the fact that there is already a great dearth of well-equipped men for such jobs.**
5. **The chief function of the district manager is to build distributers and dealers into real merchandisers.**

   The district manager must be capable of helping distributers and dealers in the solution of any of the practical problems which arise from day to day.
6. **The day of the district manager who devotes his time chiefly to getting distributers to take more cars has passed.**

   If the distributing and dealer organization can be built into a really efficient merchandising machine, the distribution of cars will take care of itself to a large extent.

Problems of finance, market analysis, production, sales quotas, procuring efficient traveling men, and many others, however, must be solved before the desired results can be attained. District manager difficulties became acute only in comparatively recent times, and until they became acute little actual study of the problem was made. Consequently, it is not surprising to find almost complete lack of uniformity in operating methods. The practice of nearly every company is still in the experimental stage. Each factory is trying different experiments. Even the exchange of experience and ideas has been comparatively limited up to the present time.

A survey of the activities of some important concerns, therefore, will facilitate the work of individual companies, and may promote further interchange of ideas on this important subject.

Factory ideas of what a traveling man ought to do fail to coincide with what such representatives do accomplish in most cases. The older established companies are demanding men capable of actually solving operating problems for distributers and dealers. Some of the new concerns want men of this kind too, but are demanding that the traveling man concentrate almost his entire attention on securing new dealers at the present time.

One long-established company, for example, has nearly 100 distributers and something like 800 or 1000 dealers. It operates six district managers, one of whom visits each distributer about once a month. This schedule is not rigidly adhered to, however, as the district manager is supposed to be where he is needed most at any given time. The district manager is the sole judge of how his time shall be distributed. The factory makes no effort to schedule his trips or to tell him where he should go.

THE district manager has supervision of his territory in a general way, but the distributer always has a direct line to the factory. The district manager is supposed to assist the distributers in connection with:

1. Finance.
2. Accounting.
3. Service.
4. Sales.
5. Routine problems and difficulties.

If a distributer becomes dissatisfied with anything, he is supposed to take it up with the district manager. If he fails to get satisfaction, he then appeals direct to the factory. There is nothing to prevent the distributer, however, from appealing direct to the factory in the beginning. As a matter of fact the distributer frequently does this.

The extent to which the factory backs up the district manager against the distributer depends, it seems, upon who the district manager is and who the distributer is. Theoretically, the factory would like to have district managers to whom it could give complete responsibility within their territory. But the difficulty of obtaining men sufficiently capable, however, has made it advisable to consider nearly every case on its own merits and act accordingly. The necessity for such practice on the part of the factory can be readily understood. The position of the district manager, however, appears none too pleasant. He cannot feel free to operate as general manager of his territory, knowing that he may be overruled in many instances.

Lacking complete power, he is probably constrained to side-step responsibility many times in doubtful cases. The proper adjustment of power and responsibility between the factory, the distributer and the district manager presents a nice problem, which must eventually be met frankly and solved along broad lines. The general confidence of a company in a district manager will always be involved, of course, but it would seem that some more definite working plan will have to be evolved in the future.

The general problem is mentioned here because the case cited is typical rather than special. It seems to be common to most companies, large and small.

Dealer education and distribution rests almost entirely in the hands of the distributers, so far as the factory mentioned is concerned. The district manager is expected to make suggestions to the distributer along this line and to urge the distributer to carry out the necessary activities to make dealers better merchandisers. The district manager may visit certain dealers in special cases, but as a general thing confines his activities to visiting, checking up and helping distributers.

The sales manager of this organization feels, however, that the factory will have to play a larger part in direct dealer education in the future. District managers will be important in extending this educational work, provided proper district managers can be found.

District managers aid in procuring new distributer contracts, but not new dealer contracts. A district manager makes his recommendation to the factory and the factory then signs up the distributer if district manager's recommendation is accepted. The factory usually follows recommendations in this respect, but the weight given to the district manager's opinion is in accordance with the factory opinion of the district manager. The same condition holds true as regards the cancellation of contracts. In some cases, the word of a powerful distributer is more highly regarded than that of the district manager.

FINANCIAL ability is a prime requisite, according to this factory, in a district manager. Financial problems are troubling distributers very greatly and the district manager must be thoroughly capable of lending them practical aid along these lines.

FEW factory sales managers are satisfied with the performance of their district managers. Capable men are operating in particular cases, but there is general dissatisfaction as regards the men handling sales territories.

Recent conversations with prominent sales managers indicate that serious effort is being made to remedy the difficulties.

This article tells what various factories expect of their traveling men, some of the chief troubles encountered, what operating methods are used now, and what is being done to get better results in the future.

District managers are given more responsibility in making distributer contracts and less in cancelling them, in the case of another well-established company which may be called company B for convenience. This company makes a middle priced car, has some 90 distributers and something like 1500 dealers. Its district managers have almost complete authority in signing up new distributers. Their recommendations are accepted in practically every case. They have no authority whatever, on the other hand, to cancel contracts. Cancellation possibilities always go direct to the factory sales manager who investigates very thoroughly before any action is taken.

PRACTICE here differs from the first case described also as regards district managers giving financial advice to distributers. District managers for company B have nothing to do with distributer finances. They do not get periodic financial statements from distributers and know little about the actual financial condition of the distributers. All such confidential financial matters are discussed by the distributers directly with the factory sales manager.

This is exactly opposed to the practice of the other company described, despite the fact that there is no great dissimilarity, either in the reputation of the organizations, or in the price of the product.

Company B has five district representatives in addition to its six district managers. The functions of the district managers are theoretically much the same as in the case of Company A, except for the differences mentioned. The district representatives are an interesting addition, however, worth special attention.

The functions of district representatives are to travel with the wholesale manager of the distributer; to help analyze dealer problems; to see that the wholesale department of the distributer is functioning properly; to help procure dealers wherever the factory thinks they are needed, and in general to assist the distributer's wholesale manager to function efficiently and properly.

Both the district managers and the district representatives report directly to the factory sales manager. They co-operate in a general way, but the district manager has no authority over the district representative.

These district representatives have been operating for more than a year and have proved highly successful. They were put on to supplement the dealer work which the distributer is supposed to do, but which many manufacturers have found the distributer is often loath to give his active attention. They perform a function which the district manager cannot, and apparently offer a good solution to an important merchandising problem. At least, Company B has found them highly useful.

A third company, Company C, agrees with Company A as to the major importance of finance in connection with distributers at the present time. This company, whose car is a bit lower in price than that of the two previously discussed, feels so strongly on the financial question that it is considering sending out factory experts who will devote their time entirely to assisting dealers and dis-

tributers to get on a sound and permanent financial basis.

One of the newer companies, Company D, believes that the primary function of the district manager is to build real merchants, but is concentrating its efforts at the present time almost entirely upon the expansion of its dealer organization. It plans to build its organization on this broad merchandising basis, however, and believes that one necessity is experienced, capable traveling men. The sales manager of this company thinks that traveling men should be built into the organization, kept with it for a long time and be well seasoned by experience.

A fifth example is Company E, which is also devoting a major part of its traveling men's time to building up a distributing organization. This company has had a high turnover in district managers, because of the lack of enough capable men. The sales manager here feels that sixty or ninety days will tell whether or not a traveling man is suitable for his organization.

These few examples will illustrate fairly well what most companies are expecting of their traveling men. Some companies give their district managers more assistance and support than others. The more important factories are providing their district men with market facts and territorial data to enable them to operate efficiently in a big way. Every company will have to provide such assistance in the future if it is to survive in this era of keen competition.

The better grade of district managers know the necessity for such background information and they will naturally gravitate to those companies which are handling their marketing work in the most intelligent manner. Other companies who really need the more capable district men because their district men have to operate without much supporting factual data, will not get those capable district men because of the lack of that very support.

Proposed Storage Battery Standards

AT a recent meeting of the Storage Battery Division of the Society of Automotive Engineers' Standards Committee, the following specification was approved for adoption as S.A.E. recommended practice:

Monobloc Battery Containers—

Height.—Containers shall be made in two heights only; namely, the B height for plates approximately 4¾ in. high, and the C height for plates approximately 5¼ in. high.

Overall Height.—The height from the outside of the bottom of the case to the top of the handle shall not exceed 9¼ in. for B containers, or 9⅞ in. for C containers.

Height from Top of Ribs to Top of Container.—These heights shall be:

B containers 6½ in. } Plus 0
C containers 7 in. } Minus 1/16 in.

Maximum variation between different compartments, 3/32 in.

Inside Width of Compartments.—5 31/32 in., plus or minus 1/32 in.

Inside Lengths of Compartments.—(a) 6-Compartment Containers

B Containers	C Containers
S-3-B 1 5/16 in.	S-4-C 1 1/2 in.
S-4-B 1 1/2 in.	S-5-C 1 11/16 in.
S-5-B 1 11/16 in.	

(b) 3-Compartment Containers

B Containers	C Containers
S- 7-B 2 1/16 in.	S- 8-C 2 3/8 in.
S- 8-B 2 3/8 in.	S-10-C 2 13/16 in.
S- 9-B 2 7/16 in.	S-13-C 3 1/4 in.
S-10-B 2 13/16 in.	S-14-C 3 5/16 in.
S-16-B 3 11/16 in.	S-16-C 3 11/16 in.
S-18-B 3 15/16 in.	
S-19-B 4 1/8 in.	

(c) Tolerances of plus 0 and minus 1/32 in. shall apply to container lengths of 3 5/16 in. or less and tolerances of plus 1/64 in. and minus 1/32 in. to lengths of over 3 5/16 in.

Partitions Between Compartments.—The thickness of the partitions between compartments shall be 3/16 in. minimum and ¼ in. maximum.

Overall Width.—The overall width shall not exceed 7½ in.

The following recommendation (as well as the foregoing specification) was formulated and will be submitted to the Standards Committee at its next meeting for adoption as an S.A.E. Recommended Practice:

Ratings of Batteries for Isolated Lighting Plants—

Lead-acid storage batteries for isolated electric lighting plant service shall have two ratings, a continuous rating and an intermittent rating. The ratings shall be determined at an initial temperature of 80 deg. Fahr. and shall be based on a final voltage of not less than 1.75 volts per cell.

Continuous Rating.—The continuous rating shall be the capacity in ampere-hours of the battery when it is discharged continuously at the 8-hour rate.

Intermittent Rating.—The intermittent rating shall be the ampere-hour capacity of the battery at a current rate equal to 1/24 of the said ampere-hour capacity when the discharge is spread over 72 hours.

To avoid night work, the following discharge and rest periods are suggested:

"An initial discharge period of 4 hours, followed by a 16-hour rest; then two 8-hour discharge periods, each followed by a 16-hour rest; the final discharge period being 4 hours."

The short periods at the beginning and at the end permit the test to begin at noon of the first day and end at noon of the fourth day.

Except for the final voltage per cell the ratings apply to nickel-iron batteries as well as lead-acid batteries.

Battery manufacturers should specify both ratings in their catalogs, using the following form:

S.A.E. Ampere-Hour Capacity Ratings: 100-140. The first number represents the capacity based on the continuous rating, and the second number the capacity based on the intermittent rating.

In making this recommendation it was understood that if one of the two ratings proposed is eliminated by subsequent Standards Committee or Society action, the Division recommendation shall be referred back, as it is considered that the situation can be covered adequately only by specifying both the continuous and intermittent ratings.

THE Bureau of Standards machine for testing the endurance of automobile tires is now being used as a part of the co-operative work in progress with the Post Office Department, the tests of tires on the endurance machine being checked against actual road tests of tires on Post Office trucks.

Power loss tests have been made on special tires submitted by three different companies. The Bureau is prepared to make a limited number of such tests.

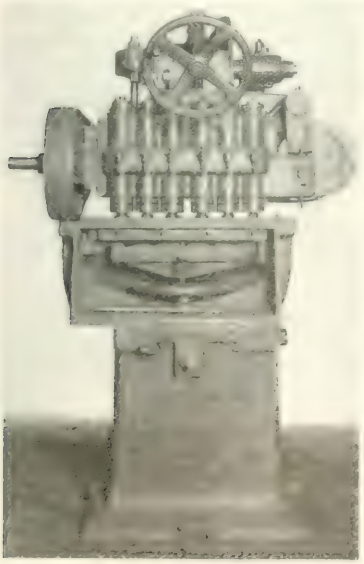
Engine Design Aids Rapid Machining of Combustion Chamber

Packard single-six offers good example. Symmetry of cylinders and valves permits profiling to be done in one operation on six-spindle machine. Cylinder head machined in 4½ minutes.

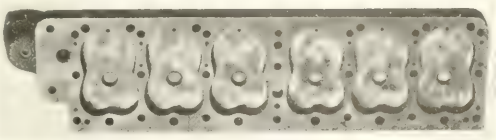
By J. Edward Schipper

IT has been common practice for several years to machine with care the combustion chamber in racing car engines and other special jobs to secure equality of compression. All the efforts to secure a perfectly balanced engine may be set at naught by unequal displacement in the cylinders; that, of course, means unequal impulses. All of the effects of properly balancing a crankshaft, connecting rod and piston assembly may be ruined by neglect of this factor.

The introduction of the detachable cylinder head made machining of the combustion chambers far more practicable than when head was cast solidly with the cylinder. In the latter case it was almost impossible to machine the combustion chambers on a production and commercial basis. With the detachable head, however, the profiling operation is much more feasible. Development has been carried to such an extent that it is now common practice to machine the combustion chambers on the medium and high-priced cars.



Coulter automatic profiling machine at work on Packard single-six cylinder head



Packard single-six cylinder head designed to facilitate production profiling

The Packard single-six is a typical example of this practice. Cylinders and valves of the Packard engine were all made symmetrical in design so that in profiling out the compression chamber a six-spindle machine could be used, every cutter following the same outline. This is the best way to reap the full advantage of the special profiling machines adapted to this work, such as that made by the Automatic Machine Co.

On some makes of cars, the valve space on one side of the engine is offset slightly with relation to the center line as compared with the valves on the other side of the engine. In this case, it is necessary to have several three-spindle right and left-hand machines to accomplish the same results that a six-spindle machine would have accomplished if the matter of design could have been correlated with the machine tools to produce the desired results.

Profiling in One Operation

The advantage of combining the design of the cylinder head with the characteristics of the machine tool is quite evident in this work. On the special engine, for instance, it would require two six-spindle machines to accomplish the results that one six-spindle machine could do if the design were changed. Instances are even noted where the difference was carried so far that the single-spindle machine is all that can be used. In this case, the old-fashioned hand profiler might just as well be used, as it is exceedingly difficult to have an automatic machine follow six different designs. To accomplish this would require a machine on the order of the Keller Mechanical Engraver, which is used in die work, but which takes only a very small cut at one time and can hardly be called a production milling machine.

The illustrations show the Coulter Automatic Profiling Machine at work on the Packard engine where the six cutters can operate at the same time. This machine has been designed specially to increase production on the profiling of the head, which is one of the most tedious machine operations.

The mechanism of this machine is controlled by one cam, which moves the head or spindle carrier longitudinally, while another moves the table or platen transversely. These cams are so designed and synchronized as to make the cutters follow the desired outline. After a cycle has been completed, the feed trips out, while the cutters revolve to clear themselves.

The operator's duties are reduced to merely chucking and unchucking the work and to facilitate this, the whole counter-weighted spindle head can be raised or lowered by the hand wheel above. The spindles with adjustable bearings are designed according to recognized milling spindle practice. There is an adjustment for wear in the cutter diameters and the cutters on each spindle can be vertically positioned independently. An additional adjustment on the transverse motion of the taper gibbed table is given to aid setting jig correctly and rapidly.

The work done on the Packard cylinder head, as shown in the illustration, is accomplished with cutters 1⅞ in. diameter, running at 143 r.p.m. The cut travel is 16 in. and a production time of 4½ min. for a completed head with six depressions is obtained.

Proposed S. A. E. Generator and Motor Standards

AT a recent meeting of the Electrical Equipment Division of the Standards Committee of the Society of Automotive Engineers, T. L. Lee, chairman of the Subdivision on Generator and Starting Motor Mountings, submitted several recommendations relating to the present standards. As these recommendations had been submitted to generator and starting motor manufacturers and users and had met with general approval, the Electrical Equipment Division approved them in the following form for consideration at the annual meeting of the Society.

As considerable trouble has been experienced with the present S.A.E. Standard Nos. 1 and 2 generator flange shaft extensions because there is insufficient room for a washer between the nut and the pinion and because of the location of the cotterpin, the Subdivision recommends that dimension *L*, Fig. 2, be increased by 1/32 in. and dimension *M* by 3/32 in. The revised dimensions allow sufficient room for a washer to be used and locate the cotterpin hole so that it will not break into the shaft center.

To provide engine builders with all information necessary for making provision for the mounting of S.A.E. standard flanges, the Subdivision also recommends that the additional contour dimensions shown in Fig. 1 be included in the present standard and that the thickness of the flange be specified as ½ in.

In view of the demand for an S.A.E. standard for starting motor flange mountings for outboard installations only, the Subdivision recommends the adoption of the mounting dimensions given in Fig. 3.

The Subdivision also recommends the adoption of a flange thickness of ½ in. for the present S.A.E. standard for starting motor flange mountings which is printed on p. B19 of the S.A.E. Handbook.

The Electrical Equipment Division has recommended that the present S.A.E. standard for starting motor pinions be revised to read:

"Starting motors shall be equipped with an 8-10 pitch, 11-tooth, 20-deg. pressure angle pinion. The starting motor shall be installed so that the pitch circle about which the teeth on the pinion are generated will be separated from 0.015 to 0.025 in. from the pitch circle about which the teeth on the flywheel are generated."

Gasoline Consumption Breaks Record

A NEW high record for consumption of gasoline in the United States was attained in the month of August, according to statistics compiled by the Federal Bureau of Mines, which show a domestic usage of 583,687,932 gallons. Consumption of gasoline in August was 3.1 per cent greater than in July, in which month a record consumption mark had also been established. Consumption figures for this August represent an increase of 16 per cent over the statistics for August, 1921.

Production of gasoline during August amounted to 549,958,376 gallons. The figures represent a decrease of approximately 20,000,000 gallons, or 3.5 per cent from the July output, which set a new monthly record for gasoline manufacture. Stocks of gasoline on hand September 1 amounted to 703,738,310 gallons, a decrease of 69,000,000 gallons during the month.

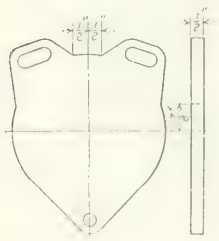


Fig. 1

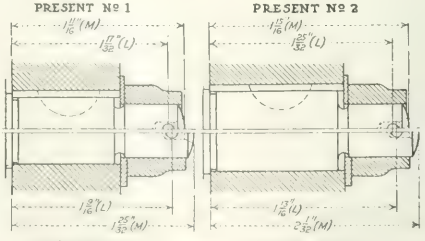


Fig. 2

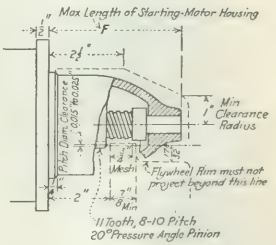


Fig. 3

Fig. 1—Proposed additional dimensions for generator flange mountings. Fig. 2—Proposed changes in generator flange mountings. Fig. 3—Proposed mounting dimensions for starting motor flange. Dimension F is 4 7/16 in. maximum for the 10, 11, 12 and 13-tooth small hollow shift and 4¾ in. for the 13-tooth large hollow shift

S. A. E., Government and A. P. I. Discuss Lubricant Specifications

Classification of engine oils according to viscosities is recommended, but final agreement is not reached. Acidity and emulsion tests are considered of doubtful value. Oil men's proposal to increase allowable carbon residue is voted down.

REPRESENTATIVES of the Society of Automotive Engineers, the American Petroleum Institute and the Government Interdepartmental Committee on Petroleum Specifications met last week in Washington, primarily for the purpose of discussing proposed standard specifications for engine lubricating oils prepared by the Lubricants Division of the S. A. E. Standards Committee. These specifications have been slightly revised since they were proposed at the summer meeting of the Society at White Sulphur Springs, and are given in Table I below. The items printed in bold face indicate the changes agreed to by S. A. E. and A. P. I. representatives at last week's meeting.

A large part of the discussion had reference to the classification of the various grades of oil in respect to viscosity as indicated by the terms "light," "medium," "heavy," etc. The Government representatives, especially those from the Navy Department, favored the use of a classification based largely on viscosity measurements at 130 deg. Fahr. and a somewhat different grouping under grade names. They were not in a position to take final action in any case but are to give serious consideration to the matter of bringing the Government specifications into harmony with the revised S. A. E. specifications agreed to by the S. A. E. and A. P. I. representatives.

None of the votes taken at the meeting are considered binding, but the sense of those present was secured on several points of considerable importance. The matter of acidity, for example, was discussed at some length as was, also, the emulsibility test. It was the view of several speakers that neither of these tests are a good index upon which to base conclusions as to the quality or durability of the oil. It was voted, consequently, that these tests be further investigated and that revision of Government specifications be made in the light of the findings. These two tests are not referred to in the proposed S. A. E. specifications. There was a decided feeling that specifications should be limited to items covered by tests of known value. It was agreed that an investigation should be made to determine whether or not the Waters oxidation test and the evaporation test are not more significant in indicating the tendency of an oil to deteriorate in use than are the acidity and emulsibility tests.

The value of the color test was questioned by some of those present but it was stated that this test is of value chiefly because it insures an oil free from sediment. S. A. E. representatives agreed to the changes in respect to color given in Table I.

Some of the oil company representatives expressed the view that the allowable carbon content of the oil as indicated by the Conradson test should be increased on all grades by at least 0.1 per cent, with a considerably greater increase on the heavier grades of oil. S. A. E. representatives stated that, in their belief, a higher carbon content would not be acceptable to the automotive industry, consequently the proposed increase was voted down. One oil man stated that the present limitations on carbon content can be easily met when naphthalene base oils are available for blending but that it is not convenient for all refiners to hold to the lower limits. A representative of one refiner contended that carbon in an engine cylinder forms more rapidly with an asphaltic base oil, although such oils show a lower carbon content in the Conradson test than do the paraffin base oils. A low carbon content specification is therefore inclined to discriminate against oils from the paraffin base.

In discussing the matter of viscosity representatives of the Navy Department stated that their preference for using a temperature of 130 deg. Fahr. as the temperature at which viscosity is measured, is due to the fact that a better comparison between asphaltic base oils and oils of other bases is obtained when this temperature is used. There appeared to be general agreement in this respect, but the majority of those present took the view that the custom of measuring viscosity at 100 deg. Fahr. is now so firmly established that a general change to 130 deg. would be exceedingly difficult and make the specification less likely to be generally used.

S. A. E. Specifications Important

There appeared to be a feeling among oil representatives that, although the present Government specifications are now widely used by other than Government purchasers, the S. A. E. specifications promise to have an even wider application. It is consequently of great importance that the S. A. E. specifications be thoroughly thrashed out before they are finally adopted by the Society.

It is manifestly desirable that the S. A. E. and the Government specifications agree as nearly as possible. In many respects the specifications agreed to by S. A. E. and A. P. I. representatives at the meeting are identical with those issued by the Federal Board, but the proposed classification differs considerably and will involve rewriting the Government specifications if the Government committee agrees to use the classification accepted at the meeting. One of the oil men said that the numeri-

cal classification accepted would be likely to cause a trend toward the use of heavier oil, as has been the case in Europe, with the result that the oils used are often too viscous and consequently tend to form carbon deposits rapidly.

In the discussion concerning acidity it was pointed out that it has proved impossible thus far to find any definite relation between the acidity and the durability of the oil or its tendency to deteriorate in use. In some tests made at the Bureau of Standards it has been found that the use of an oil for two hours in an engine often increases the acidity and carbon contents to such an extent that the oil would not pass present Government specifications. One oil man stated that the increase in acidity is more rapid with paraffin than with naphthene base oils, but that there is much question as to whether the acidity of the oil has any relation whatever to its freedom from deterioration under service conditions.

Waters Oxidation Test

It was pointed out that the American Society for Testing Materials is expected shortly to report upon the value of the Waters oxidation test and the evaporation test. A standard method for making these tests must be agreed upon before they can be commercially applied, even though they are found to give the desired information regarding the oil tested.

There was some discussion concerning the proposed S. A. E. specifications for gearset lubricating oils covered by the specification given in Table II. Some oil men objected to the flash point specified stating that oils of lower flash have been used with satisfaction. To this an S. A. E. representative replied that the specification followed is that used by the General Motors Co., which is said to be the only large automotive producer using oil in the gearset. The reason for specifying a flash point of 350 deg. Fahr. in winter and 450 in summer, is to prevent the use of tarry products in the lubricant.

No specific action was taken in respect to this gearset oil.

TABLE II. PROPOSED S.A.E. SPECIFICATIONS FOR GEARSET LUBRICATING OILS

Specification No.	Grade	Flash-Point, Deg. Fahr.* Min.	Viscosity at 210 Deg. Fahr., Saybolt Sec. Min.	Viscosity at 210 Deg. Fahr., Saybolt Sec. Max.	Pour Test Deg. Fahr., Maximum (American Society for Testing Materials Method)
110	Winter	350	100	120	10
160	Summer	450	150	170	45

*American Society for Testing Materials. Cleveland Open Cup.

These specifications cover grades of petroleum oil suitable for the lubrication of gear sets, differential gears, worm drives and roller and ball bearings used in connection with such motor vehicle equipment.

Compounded lubricating oils containing products other than those derived from petroleum are not covered by these specifications.

In opening the meeting N. A. C. Smith of the Bureau of Mines, who is chairman of the Inter-Departmental Committee, stated that the Government specifications for motor gasoline have recently been so altered as to decrease the initial boiling point from 140 to 131 deg. Fahr. and increase the 90 per cent point from 374 to 392 deg. Fahr. Time did not permit of any discussion in this connection nor was any explanation of the change given.

THE Council of the Institution of Automobile Engineers (England) in preparing the program for the session 1923-24 has decided to endeavor as far as possible to concentrate attention on one particular phase, and has selected as the general theme "Economy." In dealing with this subject, it desires especially to concentrate on the question of accessibility as it affects reduction of first cost and maintenance costs and as a selling point. The Crompton Medal for the session 1922-23 has been awarded to H. F. L. Orcutt for his paper on "Motor Car Gear-boxes."

TABLE I. PROPOSED S.A.E. SPECIFICATIONS OF INTERNAL COMBUSTION ENGINE LUBRICATING OILS

Spec. No.[1]	Supplementary Grade Names	Flash-Point, Deg. Fahr., Min.	Fire-Point, Deg. Fahr., Min.	Viscosity, Saybolt Sec. 100 Deg. Fahr. Min.	100 Deg. Fahr. Avg.	100 Deg. Fahr. Max.	210 Deg. Fahr. Min.	210 Deg. Fahr. Avg.	210 Deg. Fahr. Max.	Color[2] (NPA) S.A.E. Proposal	Color[3] (NPA) as Revised	Pour Test, Deg. Fahr., Max.	Conradson Carbon Residue, Per Cent Max.	Corrosion Test
15	**Light**	...	...	...	150	...	..	..	..	..	**5 (50-50)**	..	...	
20	**Light**	325	365	180	200	220	42	..	..	5	**5 (50-50)**	35	0.20	
020	**Light**	325	365	180	200	220	42	..	..	5	**5 (50-50)**	10	0.20	
30	**Medium**	335	380	270	300	330	44	..	..	5	**5 (50-50)**	40	0.30	
030	**Medium**	335	380	270	300	330	44	..	..	5	**5 (50-50)**	10	0.30	Required
40	**Medium**	345	390	360	400	440	46	..	..	5	**5 (60-40)**	45	0.40	for all
50	**Heavy**	355	400	450	512	575	50	..	..	6	**5 (70-30)**	50	0.60	grades
60	**Heavy**	360	...	...	...	...	55	60	65	..	**5 (80-20)**	55	0.80	
80	**Extra heavy**	380	...	...	...	...	75	80	85	..	**5 (85-15)**	55	1.50	
95	**Extra heavy**	390	...	...	...	...	90	95	100	..	**5 (90-10)**	55	1.75	
115	**Extra heavy**	400	...	...	...	...	110	115	120	..	**5 (95-5)**	60	2.00	

[1] For Specifications Nos. 20 to 50, inclusive, the numbers indicate the first two figures of the average Saybolt viscosity in seconds at 100 deg. Fahr. for the grades indicated. The first cipher in Specifications Nos. 020 and 030 indicates that the pour-test value of these two grades is 10 deg. Fahr. The numbers for Specifications Nos. 60 to 115, inclusive, indicate the average Saybolt viscosity in seconds at 210 deg. Fahr.

[2] Darkest color allowed for a mixture of 50 per cent oil and 50 per cent kerosene.

[3] Darkest color allowed for a solution made by mixing the oil with the per cent of water white kerosene noted, e.g. (70-30) means a mixture of 70 per cent kerosene and 30 per cent lubricating oil.

General.—These specifications cover grades of petroleum oil for the lubrication of internal-combustion engines, except aircraft.

Compounded lubricating oils containing products other than those derived from petroleum are not dealt with in these specifications.

Corrosion Test.—The following corrosion test shall not cause discoloration of copper strip. Place a clean piece of mechanically polished pure strip-copper about ½ in. wide and 3 in. long, and 10 cc. of the oil to be tested, in a clean test tube. Close the tube with a vented stopper and hold for 3 hr. at 212 deg. Fahr. Rinse the copper strip with sulphur-free acetone and compare it with a similar strip of freshly polished copper.

Effect of Dilution Upon Viscosity and Oiliness of Lubricant

So far as bearings are concerned a 300 sec. viscosity lubricant may be equally safe whether it is pure oil, or diluted oil of a heavier original body, but for piston lubrication, where higher temperatures are encountered, undiluted oil is vastly better.

By A. Ludlow Clayden

THE effect upon viscosity of varying degrees of dilution is known for many different kinds of oil and follows natural tendencies as I believe the curves illustrating this contribution will make clear.

The effect of a given percentage dilution varies with the original viscosity of the oil and is greatest on a heavy oil.

This might at first sight seem contrary to expectation, but remembering that it is *percentage* that we are considering, not absolute viscosity, will make the statement obvious. For instance, the effect upon the specific gravity of a flask full of mercury obtained by substituting 25 per cent of kerosene would be almost a 25 per cent reduction, while the effect of a similar substitution upon a flask of water would be only slight. In the same way the reduction in viscosity of a 300 sec. oil by the presence of 10 per cent diluent might be 45 per cent, but 10 per cent dilution of a 150 sec. oil would only reduce the viscosity 35 per cent. Going to the other extreme and taking a 1000 sec. oil, 10 per cent dilution might drop the viscosity 60 per cent.

Of course it follows that the effect of each successive percentage of dilution decreases. The following table, which accompanies Fig. 1, shows this very well; as applied to a sample of oil selected at random:

Dilution Per Cent	Loss of Viscosity Per Cent.
10	36
20	56
30	64
40	68

This does not mean, of course, that there is no advantage in starting with a heavy oil, because, although the per cent loss of viscosity may be rapid, the absolute loss may be well within practical limits. Taking another example, an oil of 600 sec. viscosity shown in Fig. 2 shows a drop of 53 per cent due to a 10 per cent dilution, while an oil of 400 sec. viscosity shows a drop of but 48 per cent, and an oil of 300 sec. viscosity a drop of 45 per cent. These reduce the actual viscosities to 282, 208, and 135 sec. respectively, or the 600 sec. viscosity oil after 10 per cent dilution is almost equal to the 300 sec. viscosity new oil.

Next as to the effect of dilution upon the lubricating value of an oil. So far as film *forming* characteristics are concerned, the admixture of original oil with kerosene is probably identical in action with a new oil, but the "oiliness" characteristic upon which the lubricating value of the film largely depends may be quite different. Oiliness is a subject upon which it is highly dangerous to say much at present. It is in a half investigated state, and really the same is true of the coefficient of friction of oil films generally. The effect of heat, however, would be quite different.

An oil, of what ever viscosity within the motor oil range, may be composed of hydrocarbons with substantially the same boiling point. Suppose such an oil is stable at 400 deg. Fahr.; that is to say, a film exposed to that temperature will evaporate evenly, then on exposure to heat the film will shrink in thickness but will do so evenly. Compare this with a mixture of a heavier oil and kerosene, and in the latter case the tendency is for the kerosene to boil out, leaving the oil behind. Such an action will be disruptive to the film, leaving it, in a sense, full of holes.

Summed up, this amounts to the fact that so far as bearings are concerned a 300 sec. viscosity lubricant may be equally safe whether it is pure oil or thinned out oil of a heavier original body, but for piston lubrication the new oil would be vastly better.

This being the case, we reach the only possible conclusion, which is that the important thing is the percentage of dilution itself rather than the effect of such dilution upon the viscosity.

There is yet another disastrous effect of a kerosene content, which is that an oil with much diluent is liable to leave worse cylinder deposits. Such an oil on the piston head will readily ignite and the kerosene burn out of it, leaving soot from its own combustion and reacting on the adjacent molecules of oil, tending to crack them and thereby form just the sort of gums necessary to catch the soot and thereafter bake into hard carbonaceous deposit.

Nothing Absolute About Dilution

Thus there is nothing absolute about dilution. It is not possible to say that so much per cent is safe and so much more dangerous. It depends upon the particular engine, its conditions of service and the original nature of the oil. One can merely say that the more highly stressed the engine, and the higher its piston temperatures, the smaller the quantity of diluent, which spells danger.

Of course, knowing the original viscosity, it is possible to check the diluent percentage by running a test on the crankcase oil, but it is easier to make a straight distillation and obtain the dilution direct. Hitherto nobody has

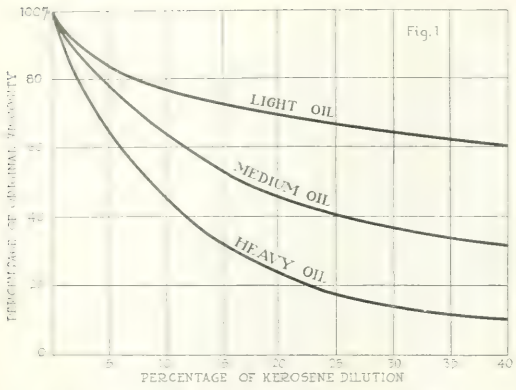


Fig. 1—Curves for a heavy, a medium and a light oil, showing the effect of dilution with kerosene upon their viscosities. Note that all curves start at 100 per cent with no dilution and that the curve shows percentage only

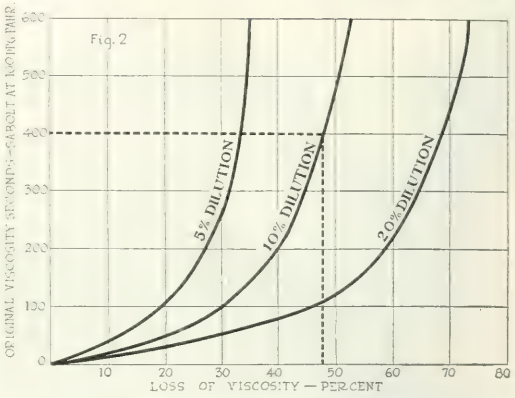


Fig. 2—Curves showing the effect of dilutions of 5 per cent, 10 per cent and 15 per cent of kerosene in oils of any viscosity up to 600 seconds at 100 deg. Fahr. The dotted line shows the method of reading, an oil of 400 seconds with 10 per cent dilution loses 48 per cent of its original viscosity

discovered a simple way of measuring viscosity, nor even a simple method of checking dilution with any degree of accuracy. Of course, the ideal is a dashboard indicator, and the Lea Viscometer gives promise of accomplishing a good deal in this direction. The principal question in the writer's mind is whether the average operator would pay attention to such an indicator even if it was stock equipment on his car.

Finley R. Porter in his Metropolitan section paper said that dilution is a carburetion problem and not a lubrication question, and he is undoubtedly right. To try to make an oil which will lubricate equally well whether diluted or not is rather like trying to make a tire which will hold air when shot full of holes. The mere fact that the dilution in really well designed and well made engines is but a fraction of average dilution puts the problem back where it properly belongs, on the shoulders of the engineer. Dilution should be prevented in the first place and not compensated for after it has occurred.

Fuel Research at Purdue

AUTOMOTIVE research work of interest to manufacturers is being carried on at Purdue University. Research activities in the automotive field at Purdue can be divided into two classes, according to G. W. Monro, Professor of Thermodynamics:

1. Road materials.
2. Fuel utilization.

The road materials investigation is not of great direct interest to automotive manufacturers, but its results will aid materially in solving problems indirectly affecting car and truck sales.

The researches on fuels and carburetion have been confined to the following fields:

(a) The mixture requirements of an engine as affected by variations of speed and load and so the determination of the range of fuel-air ratios which may be considered the *best possible* carburetion when both speed and load are subject to variations as in automobile engines. This investigation by Berry and Kegerreis has been completed and the results published as Bulletin No. 5, Purdue Engineering Experiment Station.

(b) The temperatures and amount of heat required and available in "hot spot" manifolds. This investigation involved a study of rates and characteristics of fuel evaporation at various temperatures with careful tests to determine if the engine exhaust furnished proper temperatures for best results. Considerable data were secured on rates of evaporation per unit area in order to provide some data for manifold design. This material is now being prepared for publication.

(c) A study of explosive mixtures through the color of the propagated flame.

(d) Atomization of liquid fuels during carburetion. This is a problem of first importance in engine design. This is being approached in two ways. First, directly, by mechanical production of various degrees of atomization and securing proper data on the results obtained, and second, by studying the effect of fluidity in liquid fuels in connection with usual carbureting methods.

(e) Elimination of "detonation" by chemical treatment of fuels. This field, which has been brought into some prominence by the appearance on the market of "non-detonating" fuels, is receiving proper attention. The perfection of carbureting methods for fuels giving "detoning" mixtures will probably give this question greater importance in the future than it has at present.

(f) High speed indicator. Research in high speed engines has been handicapped by the lack of a high speed indicator which should correspond in accuracy and sensitiveness with the electric oscillograph. An attempt is being made to supply this need by utilizing the change in electric characteristics of a gas, by a change in pressure. The recent development of the electronic tube opens up a promising and very enticing field for such development.

British Engineering Trends Shown at Olympia Exhibit

Overhead valves, unit powerplant, and aluminum pistons increase in popularity. More cars equipped with four speeds. Aluminum axles are prominent. Only one model carries front-wheel brakes. Most new engines have less than 120 cu. in. piston displacement.

By M. W. Bourdon

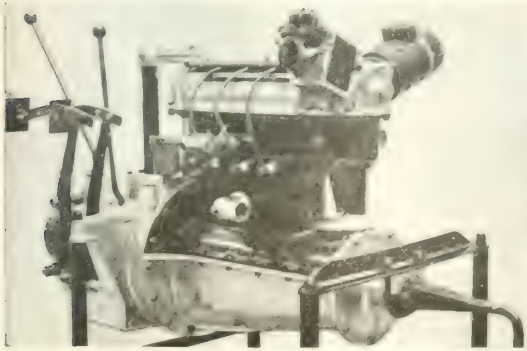
OF the swarm of new "economy models" at this year's show, to which reference was made in my cabled report, many are the product of firms which have previously concentrated on luxury types, while on the other hand, the original light-car makers are endeavoring to break fresh ground (for them) in a bigger type. It is an extraordinary state of affairs. Almost every maker who has been feeling the draft in his particular field has encroached on the plots of others; some have gone towards smaller cars, others have introduced larger models. As a result there is overlapping without end.

It is now quite impossible to define the light-car field. According to competition rules, the light car is a two or four-passenger vehicle with no weight limit but with an engine of less than 1500 c.c. (91.6 cu. in.) displacement. But we have makers ignoring that and calling their productions light cars despite engines approaching 2000 c.c. The only possible definition of a light car in these days is one having a high speed, high efficiency engine of under 120 cu. in. displacement.

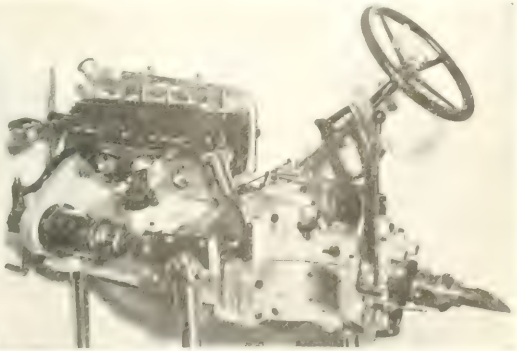
The fact that a large proportion of new models are of the four-passenger type with four-cylinder engines ranging from 100 to 120 cu. in. capacity might off-hand give the idea that there is a revulsion of feeling from the smaller sizes with a similar passenger capacity. But that is not actually the case. It is the result of the two moves already mentioned, viz., small-car makers introducing additional larger models and large-car makers supplementing their range by smaller models, both trying to widen their appeal, plus new firms who have entered the industry with cars of this size. This field has, therefore, been encroached upon from three directions, whereas, the one represented by cars with engines of less than 100 cu. in. has been further crowded mainly by new makers and the offering of additional models by makers already within it.

Valve Position

An increase in the number of overhead valve engines is one of the outstanding trends in British design, for these have increased from 24 to 33 per cent during the year, though not one of the additions has an overhead camshaft. Pushrods are now used on 74 per cent of the overhead valve engines, as against 56 per cent last year and 43 in 1920. The fact is, neither manufacturers nor buyers favor the overhead camshaft. The camshaft over the cylinders is clearly more expensive to provide in a satisfactory manner and has drawbacks in upkeep as compared with the alternative; so, while the overhead camshaft has admittedly points in its favor from the aspect of efficiency at high speeds, opinion generally



Smallest and cheapest British overhead camshaft engine, the 10-hp. Rhode (62 x 90 mm.)



Powerplant of new Ruston Hornsby Sixteen (3⅛ x 5⅛ in.). The five-passenger car of 117 in. wheelbase sells at £525

places the balance of advantages on the side of pushrods.

As to the reason why overhead valves have made their further stride in popularity, it is obviously the desire for more economy in operating costs. For instance, one prominent maker of light cars with a 67-cu.-in. engine, desiring to meet the increasing demand for four-passenger bodies, had originally in mind to increase his engine size up to 80 cu. in. or so. But he found that he could get the required increase of power by adopting overhead valves and keeping his engine the same size. He now obtained 21 b.h.p. at 3000 r.p.m., as compared with 16 b.h.p., which was the peak of the power curve with the side valve engine, and as a result his new four-passenger car uses practically no more fuel per mile than his old two-seater.

Side Valves Predominate in New Cars

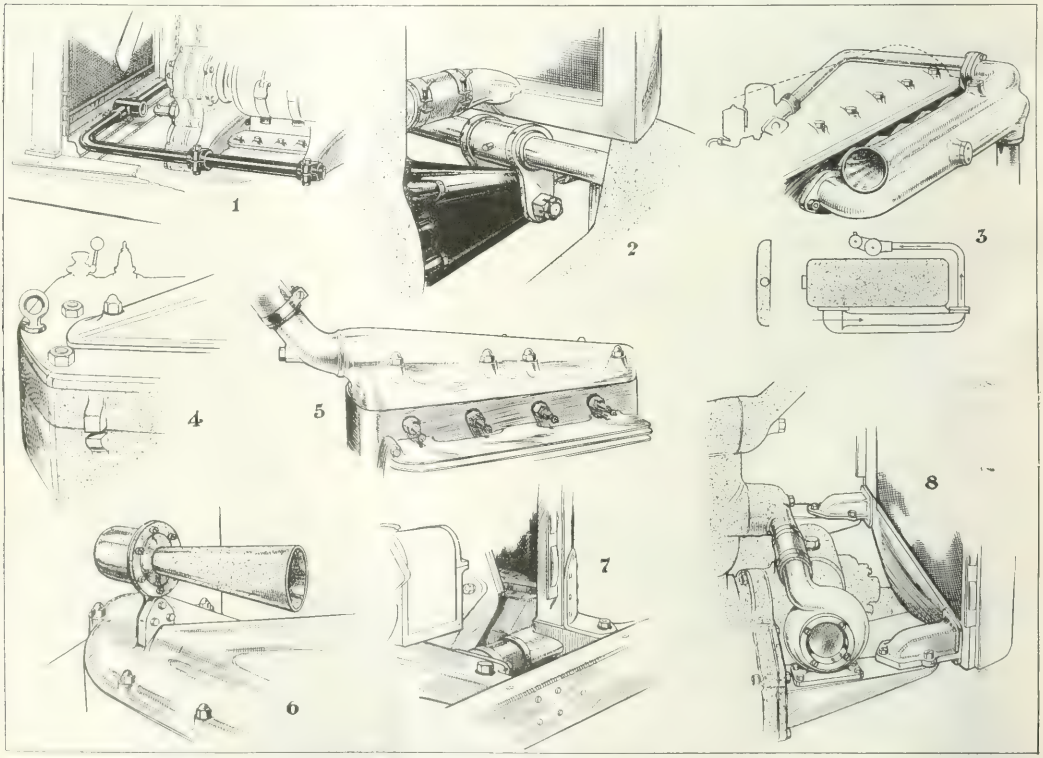
But overhead valves are, naturally, considered as of no great advantage unless they are to accompany such relatively high engine speeds as that just mentioned, and those makers who are inclined to get away from the high-efficiency light-car fetish by using a larger engine of moderate speed and efficiency, are either retaining or going back to side valves; Crossley and Wolseley, respectively, are cases in point with their new "14." Of new engines 46 per cent have overhead, 48 side and 6 per cent sleeve valves.

Cylinder Construction

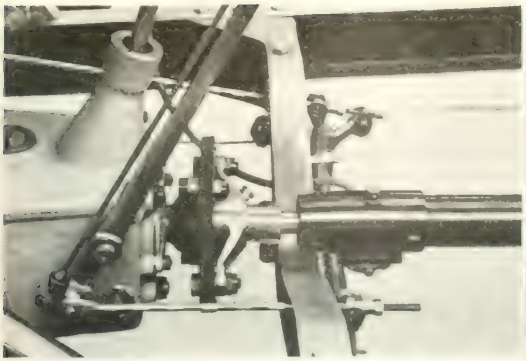
With the percentage of overhead valve engines, detachable cylinder heads naturally have also increased, though there are still 35 per cent of British engines with integral heads as compared with 47 per cent last year. On one new integral-head engine the valve caps are water-cooled by arranging them within the water space enclosed by an over-all riser of aluminum.

Casting of cylinders in pairs in the case of four-cylinder engines is now almost defunct, only 3 per cent having this arrangement (10 per cent last year). Block castings for sixes have also increased from 10 to 48 per cent, this being due to a great extent to the additional number of six-cylinder engines of less than 150 cu. in. capacity. Pair-cast cylinders are most popular for sixes, next to the block; there are four examples of three and one with separately cast cylinders.

Despite the large number of new engines of small size the practice of forming the cylinders and upper half of the crankcase as a unit in cast iron has not increased to any marked extent; it appears on only 20 per cent as against 15 last year. The barrel or unit type of crank-



1—*Front engine mounting of new Rolls-Royce Twenty; rear support consists of steel tube passing through crankcase, affording three-point suspension.* 2—*Front end support of engine on new Singer Ten.* 3—*Combined exhaust manifold and air intake of cast aluminum on new Morris Six.* 4—*Bosses on McCurd engine to enable joint to be broken easily. This engine also has an eye bolt at each end of head for lifting.* 5—*New Calthorpe with L-head cylinders has valve caps enclosed by overall aluminum water riser.* 6—*Integral standard for horn on Calthorpe cylinder head.* 7—*Water circuit from cylinder jackets to radiator on new Morris Six passes through right front crankcase bearer.* 8—*Water from pump to radiator on new 12-hp. Calthorpe passes through right hand bracket extension from crankcase, which also forms radiator support on that side*



Disk universal of 11-hp. Amilcar which has spherical pilot extension from front spider to rear one to enable joint to take torque



Lateral extension from bottom of steering housing to carry control levers on new 16-hp. Ruston Hornsby powerplant

case is used in a few more cars than last year; in one example it is of cast iron and is integral with the cylinders and the clutch housing flange. The oil pan is, of course, a separate entity, usually of aluminum, though of pressed steel in a few cases.

Aluminum cylinders have not increased, and they appear only on the 40-50 h.p. Napier, where they are cast as a unit with the upper half of the crankcase, and in one model of the Dorman stock engines, a 69 x 120 mm. four, with overhead valves. In this latter case the cylinder block is a unit with a barrel type crankcase which originally had a ball bearing at the rear end but now has both bearings of white metal.

Of the total output of British cars, probably not 2 per cent have engines designed as well as made by engine specialists. The same applies to transmission and axles, and excepting the Morris line referred to in the cabled report, which hardly comes within the category, there is no assembled car of any consequence made in England.

Sleeve-valve engines are still confined to Daimler, B. S. A., Argyll and Magnetic, in the passenger-car field, the first two being Knight engines, and both engines and chassis are manufactured in the Daimler plant; the Argyll has the Burt-McCollum single sleeve-valve engine, and so has the Magnetic—a 15-h.p. chassis with Entz transmission.

Hitherto the smallest sleeve-valve engine made on a production basis in England has been the 80 x 130 mm. Argyll, but the single-sleeve cylinder now appears in a 68 x 103-mm. size, and the Daimler-Knight in two smaller sizes, 59 x 94 mm. and 66.5 x 105 mm., both as sixes in new Daimlers, and the latter as a four in a B. S. A.

Number of Cylinders

Four-cylinder engines are still predominant, forming 75 per cent of the total, having thus lost but slightly to sixes, the latter now making up 15 per cent. Although the percentage of sixes has risen but slightly there are eight new models with that number of cylinders, two below 100-cu.-in. capacity, three between 100 and 150 and three between 150 and 200. There are only the same two eight-cylinder cars as last year, the straight-eight Leyland and the V-eight Guy, both of which have a very limited sale. Strangely enough, the makers of both these British eights are prominent in the truck industry.

The use of a sub-frame for supporting the engine is rapidly being discarded, only 15 per cent of British cars now having that arrangement, as compared with 25 per cent last year. Three-point engine suspension in the main frame is found on 33 per cent and a four-point on 55. Sub-frames have a four-point suspension in 94 per cent of cases, and the engine and gearset or the unit power-plant are almost invariably suspended in the sub-frame from four points as well, a plan which obviously makes the sub-frame of very little advantage.

Distribution

The silent chain has receded in favor since last year, appearing in 56 per cent of engines as against 60. Helical gears have advanced from 22 to 28 per cent and straight-toothed pinions are in use on 16 per cent, largely new models. The decline of the chain drive is variously explained. In a few cases it is ascribed to unequal wear of the links and pins which makes it impossible to devise any system of adjustment serving to obviate "thrashing" in a long or triangulated chain.

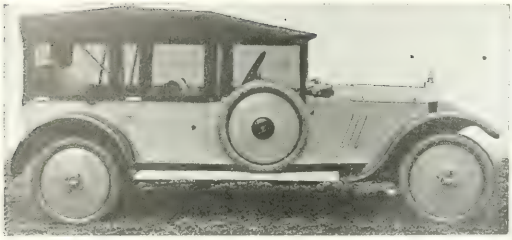
Non-adjustable short chains, one each for the camshaft, magneto and generator, are used instead by some makers, but this is found more costly than the use of helical gears, and so the latter have been substituted in some cases with good effect. As showing that chains have not been entirely satisfactory—probably because of improper application—it is often said that the noisiest parts of certain British cars are the so-called silent chains at the front of the engine.

Nevertheless, as the percentages given show, chain distribution is still most widely in use, and troubles in connection with it have been practically eliminated in many instances by using wider chains and larger sprockets. Wolseley now uses spiral bevels and chains in place of straight-toothed bevel and chain for his overhead camshaft drive.

Cooling Systems

Owing to the majority of new engines ranging below 120-cu.-in. capacity, thermo-syphon water circulation shows an increase, appearing on 58 per cent of engines of all sizes, as compared with 51 last year and 48 in 1920. Air-cooling has not developed, being still confined to two-cylinder light cars of under 60-cu.-in. capacity.

Control of the cooling water temperature has at last appeared on an appreciable number of British cars, thirteen models having something in this way. A thermostatic valve in the uptake pipe is used on six of these, a hand-operated valve in five (all Daimlers), a thermostatic valve operating radiator shutters on one and hand-operated shutters on another (the new 20-hp. Rolls-Royce). As yet any control of this nature is almost



New 8-hp. Standard 67 cu. in. three-door, four-passenger car with top erected and framed side panels in position

entirely confined to high-price cars of over 20 hp.; there are two exceptions, both 12 hp. fours with thermo-syphon circulating systems, the thermostatic valve in one case being in the uptake pipe, while in the other it takes effect upon radiator shutters.

The assisted thermo-syphon system of water circulation, embodying a pump within the jacket of the front cylinder with its rotor mounted on the belt-driven fan-shaft, is dying out, though there are still 12 per cent of water pumps thus placed and driven.

A complete change about has occurred in respect of nickel-plated sheet brass and polished white-metal radiator shells. Last year the latter had increased very perceptibly, but now 64 per cent of radiators have white metal shells, displacing both nickeled brass (now 32 per cent) and aluminum. Isolated examples are to be seen of attempts to simplify the water piping by utilizing one of the crankcase arms to form a part of the water circuit between cylinder block and bottom of radiator. It can be made quite an effective plan in thermo-syphon systems, and is utilized satisfactorily on one pump system (a new 12-hp. Calthorpe).

Engine Lubrication

After increasing in popularity for several years past the hollow crankshaft system of lubrication has lost ground, having receded from 54 to 44 per cent. But this is doubtless due to the large proportion of small engines among new models, for which this system is not considered necessary. The splash system (pump and troughs) has increased (21 to 34 per cent) and splash with pressure to the main journals receded from 22 to 18 per cent. Full pressure is used on only four cars, one of these having an engine of under 120 cu. in.

The gear wheel type of oil pump is still most popular (64 per cent), but the plunger pattern has gained (24 to 30 per cent). Only two cars have no pumps at all, one using the flywheel to lift the oil to galleries and the other an aluminum disk attached to the crankshaft just in front of the flywheel, the latter being outside the crankcase and the disk within it. In 78 per cent of engines the oil pump is submerged within the crankcase sump; plunger pumps are more often operated by an eccentric through strap and coupling rod and located in the sump than by cam and spring return alongside the camshaft.

Brakes

Aluminum pistons have increased very appreciably during the year, while steel and composite metal types have disappeared. The straight-sided type is almost universal, both the hourglass and the slipper having failed to give satisfaction. A big vogue was expected for the slipper type two or three years back, but manufacturing difficulties and trouble in overcoming piston slap when aluminum is used for it are variously put forward as reasons for its failure.

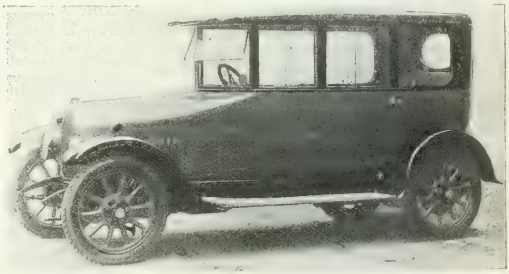
More than 50 per cent of the straight-sided aluminum pistons are of the split-skirt design with an internal expansion ring, a type which very considerably reduces piston slap in a cold engine. A bare majority, both of cast-iron and aluminum, have no scraper ring either above or below the piston pin; 22 per cent have a scraper in the skirt, and in 24 per cent the lowest gas ring combines the latter function and that of a scraper, its groove being beveled off below and drilled through to the interior.

Piston pins floating in the bosses as well as in the rod and those which are fixed in the bosses are almost equally used, 35 and 37 per cent respectively, the remaining 28 per cent being fixed in the rod. In approximately 60 per cent of the cases where the pin is free to rotate in the piston bosses no bushing is provided and in 90 per cent end-plugs of brass or aluminum prevent damage to the cylinder walls; spring steel rings in grooves are used in the remainder. H section connecting rods still find by far the most favor, tubular rods being few and far between.

Thirty-seven per cent of pistons have two rings and 58 per cent three. There is a solitary example with one ring only, four have two and one each five and six.

Valve Head Material and Design

A great many British makers are even more secretive concerning the alloys used in the various parts of their chassis than they are in regard to planned and actual



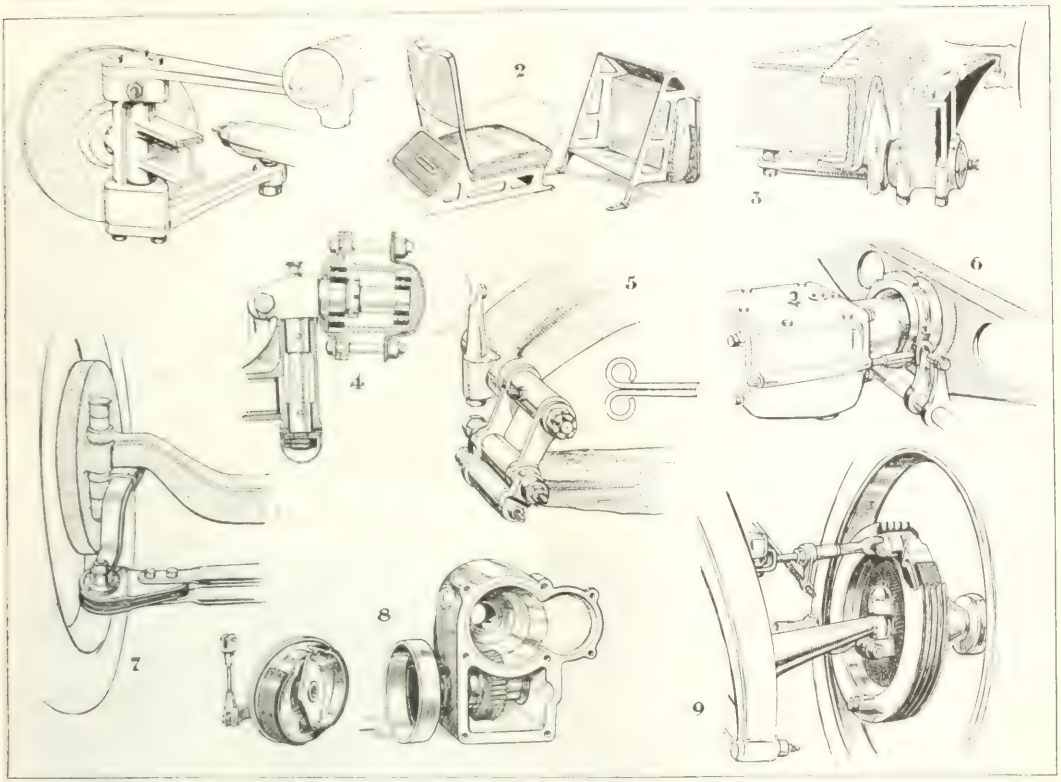
Sedan body with V front on 11-hp. Humber (68 x 120 mm.). all side windows divided vertically with front half sliding back to open

output, but from information provided in respect of 70 odd models it would appear that 3 per cent nickel steel is by far the most widely used material for valves. Sixty per cent of the valves are of this alloy, 32 per cent of nickel chrome steel, 4 per cent of cobalt chrome and 4 per cent of tungsten steel.

Carburetion

The normal Zenith carbureter, as distinct from the triple-venturi type, is by far the most widely used on British cars (51 per cent), Claudel coming next with the diffuser type (11 per cent). Six per cent have the car makers' own carbureters.

There is more evidence than ever before of attempts to improve vaporization. In the first place, there is more care in designing induction tracts with a view to preventing or reducing deposition of fuel, and more examples of definitely planned heating systems for the mixture. At the same time there is nothing strikingly original. There are more combined manifolds, some with hot spots opposite a right-angle bend in the induc-



1—New 12-hp. Calthorpe swivel axle with separate levers permitting left and right hand units to be identical. 2—Hinged and folding seat combined with footrest on new Singer Ten; base is of cast aluminum. 3—Trunnion support of cantilever spring on new De Dion. Has extension secured to cross member of frame as shown, to eliminate torsional stress on side member. 4—Front hub and swivel axle design of new Clyno light car. 5—Beardmore double shackle, permitting use of two full length spring leaves ending in opposed eyes as shown in inset view. Planned to reduce risk of breakage of top leaf. 6—Spherical support enclosing universal joint at front end of gearset mounted as unit with torque tube on new 15-hp. Singer Six. 7—Peculiar joint at end of twin cross coupling rod of steering on Bugatti straight-eight. Layers of fibre separate the two cranked plates. Plan is said to reduce weight, impart slight degree of flexibility and require no lubrication. 8—Servo details fitted to Sunbeam Six when front brakes are provided. Unit on right bolts up to gearset. Servo drum has worm drive through ratchet on worm wheel shaft. 9—Part sectional sketch of front wheel brakes on Sunbeam Six, fitted at extra cost of £125

tion passage and others with merely a large area of that passage heated by contact with the exhaust manifold. Daimlers have a heated spot arranged by casting a series of four fins on the exhaust manifold so that these alternate with adjacent fins on the separate induction pipe when the latter is in place.

Hot air as the means of assisting vaporization is rarely depended upon; in fact, a muff on the intake pipe is now exceptional. But on the new Morris Six an aluminum exhaust manifold on the left (the valve side) has an air intake pipe cast with and above it and running along the full length, with a bell mouth facing forward; at the rear end the air pipe has a flanged joint with a separate extension pipe running round the back of the cylinder block to the carbureter, which is on the right side and bolted up directly to a flange at the end of a transverse passage in the block. This arrangement necessitates a long intake passage, but as the bell mouth of the latter faces forward close behind the radiator fan a slight degree of forced induction may be expected.

The majority of makers still rely for vaporization solely upon the cast-in induction passage, usually leading from a carbureter flange on the opposite side of the cylinder block from the valves; 41 per cent of engines have nothing except the water jacket thus afforded to the induction tract. Only 8 per cent have a water jacket for a separate induction manifold, but 34 per cent have integral inlet and exhaust manifolds, while exhaust jackets occur in 7 per cent.

Gravity fuel feed is still most popular, and, on account of the large number of new small models, has increased from 54 to 64 per cent. Vacuum, after rising to 39 per cent last year, has now gone down to 31. Pressure systems have fallen still further, from 7 to 5 per cent.

Electrical Equipment

Magneto ignition is still used on the vast majority of British engines of all sizes, battery ignition alone being found on only 12 per cent, while magneto and battery are on 3 per cent. Wolseley, who used the battery system on three models in 1922, puts a magneto on a new "14". Daimler has adopted battery ignition for the new small

sixes because of the difficulty of getting a magneto to stand up to the high speeds at which these engines are designed to run. Perhaps the small size of the majority of British engines has not caused magnetos to give rise to such serious engine-starting difficulties in cold weather as in the case of the larger American engines in the lower atmospheric temperatures of U. S. A.; and the excellent low-speed sparking of British magnetos may have something to do with the satisfaction afforded by them.

The two-unit starting and lighting system occurs on 89 per cent of British cars, which is much the same as last year; 65 per cent have 12-volt outfits and this also represents no material change. But there has been a big stride toward making a positive-drive for the generator universal practice, though 43 per cent still are belt-driven, this figure comparing with 80 in 1920 and 62 per cent at last year's show.

Roller bearings have made no headway; in fact, for every part of British cars except the pilot of the gearset and the differential they have receded, and in those two items there is no change.

Ballbearing crankshafts remain at 6 per cent, 89 per cent have white-metal-lined journals, the remainder being roller, or combinations of ball and roller, and ball and white metal. Most of the engines of below 90 cu. in. capacity have two-bearing crankshafts, while three bearings are mostly used for sizes above that. There is an increase in the number of counter-weighted crankshafts of both four and six-cylinder engines, but approximately 80 per cent are without this refinement. Bronze is used for camshaft bearing in 53 per cent of engines; in 27 per cent die-cast white metal occurs, while the remainder are represented by 15 per cent cast iron and various combinations of ball, white metal, cast iron, bronze and roller.

In the gearset, ballbearings predominate for the mainshaft (87 per cent) and the layshaft (71 per cent). For the last named shaft plain bushings are, however, increasing at the expense of ballbearings, having risen from 14 to 22 per cent, and that, too, without any provision for allowing the shaft to be at rest while the direct drive is in use. Plain bushings are used in the majority (60 per cent) of pilot bearings, ball in 30 per cent and roller in the remainder.

In connection with the layshaft, it is to be noted that there is an increase in the number of British cars having a stationary shaft of round section secured to the casing by friction (end nuts, for example) or by pegs and end caps, thus permitting the use of plain bushed gear sleeves and eliminating splining on this shaft.

In 82 per cent of rear axles ball journals are used, almost invariably with separate double-thrust ball washers, for the combined radial and thrust ballbearing rarely appears either at the sides of the differential casing or backing the bevel pinion shaft. The latter in most cases has two widely spaced ball journals behind the pinion, for there are only isolated examples with a "nose" bearing. The 15 per cent of roller bearings in rear axles are mainly Timken, but there are a few parallel sided rollers in use here with ball-thrust races.

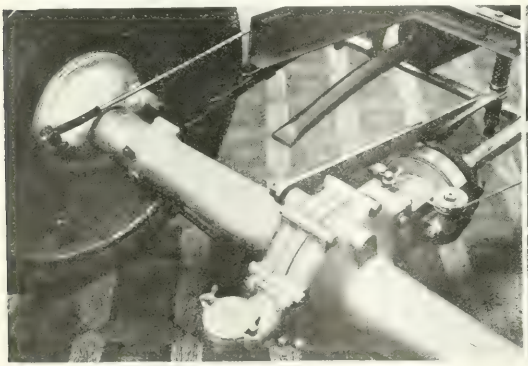
For the wheels ballbearings again predominate, being found in nearly 80 per cent. In the front wheels rollers have receded from 27 to 15 per cent and from 17 to 14 at the back. Ball and roller combinations appear in a few cases. Differing from the state of affairs adjacent to the differential, ball journals in the front wheels are supplemented by ball thrusts only in cars of costly types.

Clutches and Transmission

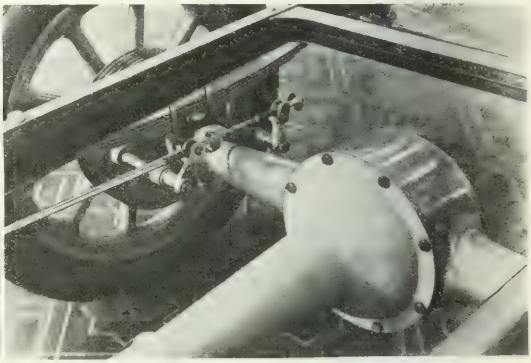
Cone clutches have remained stationary at 52 per cent and half of these are of the inverted pattern with a non-adjustable spring between the flywheel and the cone. Dry single-plate clutches have advanced only from 33 to 36 per cent, the dry multi-plate and multi-plate in oil having receded from 8 to 6 and 6 to 5 respectively. Rover, on the 12-hp. model, remains the only user of a single plate running in oil. Vauxhall, using a multiplate metal-to-metal in two models, runs the plates without oil, successfully depending for lubrication upon occasional charges of dry graphite introduced into the casings.

For both cone, dry single and dry multi-plate clutches, bonded asbestos fabric is generally used; leather is still used on 25 per cent of the cone pattern and three of the latter have metal-to-metal cones, aluminum to cast iron in one instance. Cork inserts are used by Morris only.

The unit power-plant construction has made a sudden leap forward in popularity (from 27 per cent to 48); this also is obviously due to the large increase in the number of small cars, for there are only two or three new and old models of over 120-cu.-in.-engine capacity with this construction. The unit-with-axle gearset, after increasing from 6 to 10 per cent in 1921, has fallen to 4 per cent; the unit with torque tube system remains the same (7 per cent), the successful 18-hp. and 30-hp.



All-aluminum axle of 9-hp. Lea-Francis car. Axle halves are integral with brake anchorages and cover plates. Semi-floating type



Double banjo type aluminum axle of 12-hp. McCurd car. Torque tube also in aluminum

Armstrong-Siddeley Sixes being conspicuous examples of cars with this arrangement. Of separate gearsets (41 per cent) two-thirds are mounted directly in the main frame.

Four-speed gearsets have increased, appearing on 46 per cent of cars as compared with 42 last year (50 in 1920). This increase is worthy of note, in view of the larger number of small cars and the general endeavor to reduce production costs. While central control lever on the gearbox cover shows an increase from 29 to 36 per cent, three makers who have adopted it in new models and two who have used it for a year or two are offering to supply right-hand control at buyers' option.

There are isolated examples of gearsets with all wheels constantly in mesh brought into use by dog clutches, but the sliding pinion is general. A new two-stroke engined light car, introduced by Leylands, is provided with a planetary gearset.

Slightly over half the total number of cars have open propeller shafts; in the remainder there are half a dozen examples of the semi-inclosed arrangement, where a short and exposed coupling shaft with a universal joint at each end runs from the gearset to the propeller shaft proper in a torque tube. Of open shafts 49 per cent have fabric disk joints at both ends; 27 per cent have a metallic joint front and rear, while the remainder have a metallic joint at one end and a fabric type at the other. For inclosed shafts the star type joint is used in 61 per cent of cases, a fabric disk in 26, sliding pot in 9 and steel disk in 4 per cent; all except the latter, which are new, represent but slight variation from last year.

Rear Axles and Springs

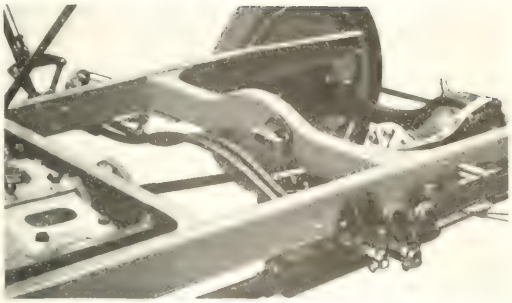
Aluminum for rear axle casings is increasing gradually, and to a greater or less extent the light metal now appears in the axles of 31 per cent of British cars, half of these having the center formed of it. In only five cases is a truss rod used. There are six examples of all-aluminum axles with tubular liners. One is of the full-floating variety, two are semi-floating and three are three-quarter floating; all occur on cars of less than 100 cu. in. capacity. In one case a unit casting in aluminum of the double banjo pattern is used without steel liners. There is one other example of an all-aluminum axle casing without liners; it consists of two units bolted up at the longitudinal center line of the chassis and each has integral spring seats, brake supports and even brake cover plates; it is, of course, of the semi-floating type.

Built-up axle housings represent 40 per cent. The pressed steel, double banjo axle casing occurs on 16 cars (a 30 per cent increase), 8 full floating, 7 semi and 1 three-quarter floating.

Taking axles of all types, the full-floating variety has now but a slight lead over the semi-floating. There has, in fact, been a great increase in the latter, for it has risen from 7 to 42 per cent, while the three-quarter floating has receded from 42 to 12 per cent. Once again this is a variation in trend which can be put down to the increased number of small cars.

Spiral bevel final drive has increased still further (from 63 to 78 per cent) at the expense of all other types. Worm gearing now occurs on 19 per cent of British cars (11 bottom worm and 8 top worm), as compared with 24 per cent last year. Straight bevels are nearly defunct, at 3 per cent. Torque and propulsion are taken by the springs in 72 per cent of cars with open propeller shafts, which represents a slight gain.

Springing systems, taken generally, are quite orthodox, only two cars in production having anything abnormal and those merely to the extent represented by duplicated (super-imposed) quarter-elliptics. Half-elliptics at both



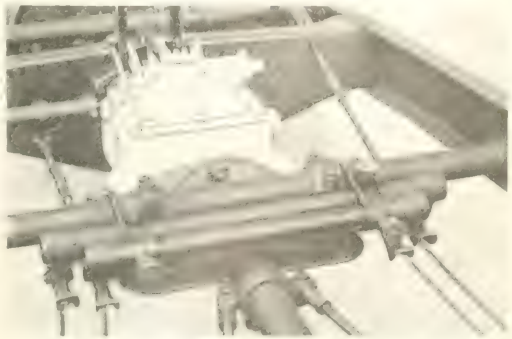
Swift Ten cross shafts and levers for cable brake connections. Levers are integral with grooved disk ends

back and front are found on 43 per cent of cars, the same as last year; cantilevers at the rear with semi-elliptic in front have dropped from 22 to 15, while quarter-elliptics all round have increased from 20 to 25. There are two cases of quarters in front and cantilevers behind. The suspension, consisting of one full length inverted semi-elliptic with two leaves, at each side of the car (the type used on the original Oldsmobile and Knox—*Editor*) has been discarded as an uncommercial proposition.

Spring checks (shock absorbers) of the frictional and hydraulic types are being standardized in a few cases, even on such low-priced cars as the Morris. Spring gaiters (covers) are even more widely in evidence as part of the standard equipment. But it is recognized that these additions represent a very unsatisfactory way of overcoming the failings of the main system of suspension; there is obviously something very wrong when it is necessary first to reduce inter-leaf friction to the minimum by inclosing the springs in covers insuring continuous lubrication and then to add checks to introduce a frictional effect upon recoil.

Braking Systems

British car manufacturers are very reluctant to adopt front wheel brakes, and several factors can be mentioned as explaining why they are not in a hurry to follow the lead of France. The first is that they have had it forced upon them that any development which adds materially to the cost of production must be viewed as



Equalizer shafts for cable brake operation on 12-hp. Albert. Transmission is unusual in having fabric universal at front end of enclosed propeller shaft

undesirable at the outset. They are not so ready as was the case formerly to welcome possibilities of improvements unless these tend to reduce operating costs without increasing production costs. Next, there is practically no demand for these brakes on the part of prospects and manufacturers contend that the feature would not assist the sale of cars.

The cause of front wheel brakes in England received a severe setback when Rolls-Royce failed to fit them to the new 20-hp. model. As Royce considers them either unnecessary or undesirable, the average car buyer is content to let it go at that.

Dealing with braking systems as they are, there has been a still further increase of all brakes concentrated on the rear wheels. Two sets of expanding shoes within the rear wheel drums now appear on 74 per cent of British cars; internal and external or both external are used on only isolated examples, while 23 per cent have brakes on transmission and rear wheels. Even where the latter combination occurs, external wheel brakes are rare, being applied in only 5 per cent of cars all told. There are a few cases of the transmission brake on the final drive shaft, but the vast majority are at the back of the gearset.

Steering, Wheels and Tires

Practically no change has occurred in steering gears, the worm and wheel being used on 56 per cent of cars, worm and segment on 22 per cent, and rack and pinion, planetary and cam type on the remainder.

Pressed steel, hollow-spoked wheels increased from 48 to 56 per cent; the disk type has fallen two points (29 to 27), wire from 18 to 15 and wood from 5 to 2. Clincher-edge tires remain almost universal, though a move toward the straight-side pattern has commenced, for these are now standard on 6 per cent of British cars, including one of the smallest (Singer Ten) and the largest (Rolls-Royce).

Standardized for the first time by an appreciable number of British car makers, cord tires have a 43 per cent representation of which 40 are Dunlops. With cord and canvas tires, Dunlops are used for 84 per cent of models, next being the Avon, with 5 per cent, and then Michelin with 3 per cent. American tires are named as standard by only one British car maker, who specifies Firestone.

For accessory drives from the engine—magneto, generator and water pump—the toothed or serrated rubber ring type of coupling is attaining wide use. In a similar type the metal plates have a series of round holes through them to accommodate suitable projections from the rubber coupling piece. In both types there is one more serration or hole on the driving plate than on the driven, the rubber being molded to suit, so that a Vernier adjustment is available in the case of the magneto drive to vary the timing, the rubber in all cases absorbing any slight irregularity in alignment which may exist between driving and driven shafts.

Overhead valve rockers, which in the opinion of some makers must be lubricated by oil under pressure, are now often supplied by drips from an overhead pipe, while in two or three new engines of this kind hand-filled oil containers are used; in one case (8 hp. Standard) an oil cup is located at one end of the hollow rocker shaft and oil exudes from the latter after slowly passing through a wick-surrounded copper tube with a series of 1/16-in. holes drilled in it.

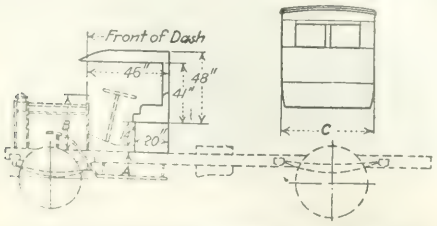
Vauxhall is the only user of the Lanchester Harmonic Balancer for four-cylinder engines, and only Daimler and Lanchester use the Lanchester friction damper at the end of the crankshaft of Sixes; but this latter feature is embodied in all models of the Daimler line.

Several makers are using hoods (bonnets) extending rearward behind the end of the engine and thus inclosing the gravity fuel tank within the engine space. This scheme shortens the cowl to a corresponding extent and carries the top half of the dashboard further to the rear; it appears to simplify the tank fixture, makes the cowl a slightly simpler proposition to fit, permits of more securely fixing the instrument board and puts the fuel-filling spout where it can be reached without disturbing the front passenger. In addition, the tank position discourages that objectionable feature, "drumming," which is difficult to eliminate when it occurs with the tank surrounded by the cowl.

Proposed Truck Cab Standard

EARLY last spring the Standards Committee of the Society of Automotive Engineers decided to undertake the standardization of motor truck cab mounting dimensions as it was considered important to make possible the production of stock cabs in order that users might not be obliged to have cabs specially designed with the resulting loss of time and added cost. Information was obtained from truck builders as to the mounting dimensions required for cabs used on their trucks. This information was tabulated and a tentative recommendation based thereon. The recommendation was reviewed at the last meeting of the Truck Division of the S. A. E. Standards Committee together with comments which had been obtained from truck and cab builders and as a result the recommendation was revised in some details.

The accompanying table of dimensions was approved by the Division members subsequent to this meeting and will be submitted at the next Standards Committee meeting for adoption as S. A. E. Recommended Practice.



Proposed mounting dimensions of motor-truck cabs

Truck Capacity, tons	1, 1½, 2, 2½	3, 3½, 4, 5
A	3½	4
B[1]	35	39
C	48	56

[1] Minimum for windshield lower edge.

Where cab sides, doors or side curtains are used, care should be taken that the driver's vision is interfered with as little as possible.

N. A. C. C. Service Managers Approve Local Service Associations

Flat-rate system appears to have almost universal approval. Service contracts are being granted to independents in open territory. Boxing for shipment and parts taxes discussed.

By J. Howard Pile

THE flat-rate system of charging for service now has the approval of practically every factory of importance. The N. A. C. C. Service Managers, meeting in Chicago, Nov. 14 and 15, devoted only a little time to the discussion of this important problem, but the very lack of discussion was significant. Three years ago at a similar meeting, there was almost universal objection to the plan. Last week all except two or three service managers appeared to be entirely sold on it. This apparent acceptance of the flat-rate system throughout the industry was an outstanding feature of the convention.

Definite indorsement of local service associations marked another reversal of opinion on the part of factories. The service managers have made a gradual about-face in their attitude toward local service associations, after having opposed them rather strenuously several years ago. At the Chicago meeting last week they agreed to get solidly behind a movement to form additional associations and to support those already in existence.

Factory practice in granting service contracts to independent service stations, reducing parts costs by shipping in carload lots, more efficient boxing for shipment and the payment of parts taxes were the other topics of importance discussed at the meeting.

Talk about flat rates centered almost entirely upon methods of possible improvement. R. A. Shelly, Dort service manager, stated that a recent census of dealers throughout the country indicated 75 per cent to be in favor of flat rates. W. R. Webster, Overland service manager, confirmed Shelly's statement as to the success of the plan and stated that some of the Overland branches were working the plan out with satisfaction to all parties.

Local Associations Discussed

The local service association picture was presented from the viewpoint of the owner, the dealer and the manufacturer. Alexander Johnston, editor of Motor, speaking from the owner standpoint, told of the great need for better service and told of thousands of letters received annually by his publication from car owners asking for service information of many kinds. The flat-rate system, he said, has been instrumental in reducing materially the number of kicks from owners.

Eugene Silver Cole, a Chicago distributer, gave the dealers' opinion of the service association. Using the experience in Chicago as an example, he pointed out that after an association is finally put into working order the dealers really begin to find out the great benefits they can obtain from co-operative action and from the free exchange of information and ideas. Presenting the factory view, B. B. Bachman, chief engineer of Autocar, said that designing engineers will have to pay more attention to service problems in the future than they have in the past. He said that local service associations will help to build up better service methods, which will materially benefit the factories.

Shipment of parts in carload lots means a considerable saving of transportation costs, discussion on this subject brought out. In many cases the shipment of new cars does not fill a box car to its minimum capacity and the dealer either has to pay a less-than-carload rate or the carload rate when the car is not full. The additional weight can in many cases be made up with parts shipments which brings the costs down considerable. The dealer can profit by this through placing his orders sufficiently in advance to allow the factory to make shipments to fill the cars.

Confusion on Parts Taxes

Considerable confusion exists as to which parts are taxable and which are non-taxable. Many factories have sent duplicate copies of their parts books to the Tax Bureau for the marking of taxable parts. It has been observed that there is no seeming uniformity in the markings when the books are returned.

Discussion about granting parts discounts to independent shops showed in development a very much more liberal policy by practically all manufacturers.

Boxing and crating of parts for shipment were discussed by Jefferson Caylor of the General Box Co., Chicago. He said that there was hardly a box or crate that could not be reduced in weight by a real study. In many cases savings of 50 per cent have been effected.

Lubrication and inspection policies did not show a great divergence, but several ideas that are worth noting were brought out. W. M. Warner, Cadillac service manager, said that the Chicago distributor uses a small paster which is stuck on the speedometer. On this paster is noted the mileage reading at which the car should be brought into the shop for inspection. When the season mileage and the figures on the paster agree, there is a direct reminder to the owner. The period of free inspection varies from the usual 90 days upward and some dealers are making a flat charge in inspection, oiling and adjustment for six months or a year, this charge running anywhere from $10 to $50. The Simons Sales Co., handling the Overland in Detroit, has such a service for one year for $25.

Snow Removal Program Will Make Winter Driveaways Possible

Bureau of Roads seeks co-operation from highway officials to keep transportation arteries open. Car shortage makes action imperative. Will safeguard steady outlet for production.

DUE to the fact that highways have been blocked by snow, automobile manufacturers have been forced to rely entirely on the railroads for winter shipments. Driveaways have been out of the question, for co-operation to keep the highways open has not been given by the Northern States.

In the event of further freight car shortages, the industry may be greatly hampered unless driveaways can be resorted to and this, coupled with the fact that all movement of freight and commodities is more or less delayed when the highways are impassable, has brought concerted action by officials, manufacturing interests and the Bureau of Roads. The Bureau has shown the need of co-operation, citing figures compiled by the National Automobile Chamber of Commerce.

Preliminary reports made to the U. S. Department of Public Roads on the snow removal program, recently mentioned in AUTOMOTIVE INDUSTRIES, indicate that the Northern States will co-operate with the Department's efforts to keep the main arteries of automobile traffic clear of snow.

State highway officials have been asked if they can arrange to supply the necessary labor to man snow shovels, provided the Bureau will furnish the necessary equipment, which the Bureau has agreed to do out of surplus stocks.

Tentative routes in Michigan, Illinois, Indiana, Ohio, Pennsylvania, Maryland, New Jersey, New York, Massachusetts and Connecticut have been mapped out by the bureau and these have been submitted to the highway officials. The accompanying map shows the layout of these projected routes.

EFFORTS to have a snow removal program carried out in the past have failed because of the refusal of certain highway officials to co-operate. Thus inter-state highway transportation has been made impossible because of certain neglected stretches of road.

Under the existing Federal laws none of the money appropriated by the Federal Congress can be used in snow removal work. However, the emergency can be met by the Bureau of Public Roads furnishing the equipment, free of cost, and the States furnishing the labor to perform the work.

State officials have been requested to submit figures showing the approximate cost, based on the number of miles of highways which must be kept open if adequate highway transportation is to be maintained. These figures are being compiled by the Bureau.

Figures furnished by the traffic department of the N. A. C. C. show that in the past automobile manufacturers had to ship the greater part of their product by rail during the bad winter seasons, because of the sole fact that highways were impassable.

The percentage of driveaways from the factories, figures show, are very high during the summer months, because manufacturers and dealers alike find it more advantageous to move their products in this manner.

September shipping reports from factories, covering 80 per cent of the total automobile production, indicate a total of 26,288 carloads of automobiles shipped by rail, 30,322 driveaways and 8754 shipped by boat. If the snow removal program for the coming winter can be carried through successfully, officials of the N. A. C. C. declare that almost the same percentage of driveaways can be maintained as during the summer months.

If the record production of motor vehicles is to continue there must be no impediment put in the way to dam the outlet. The movement of vehicles must be free and measures must be taken to prevent unforeseen rail tie-ups from inflicting damage on the industry. A great unit of transportation should not be dependent wholly on other transportation units for its livelihood.

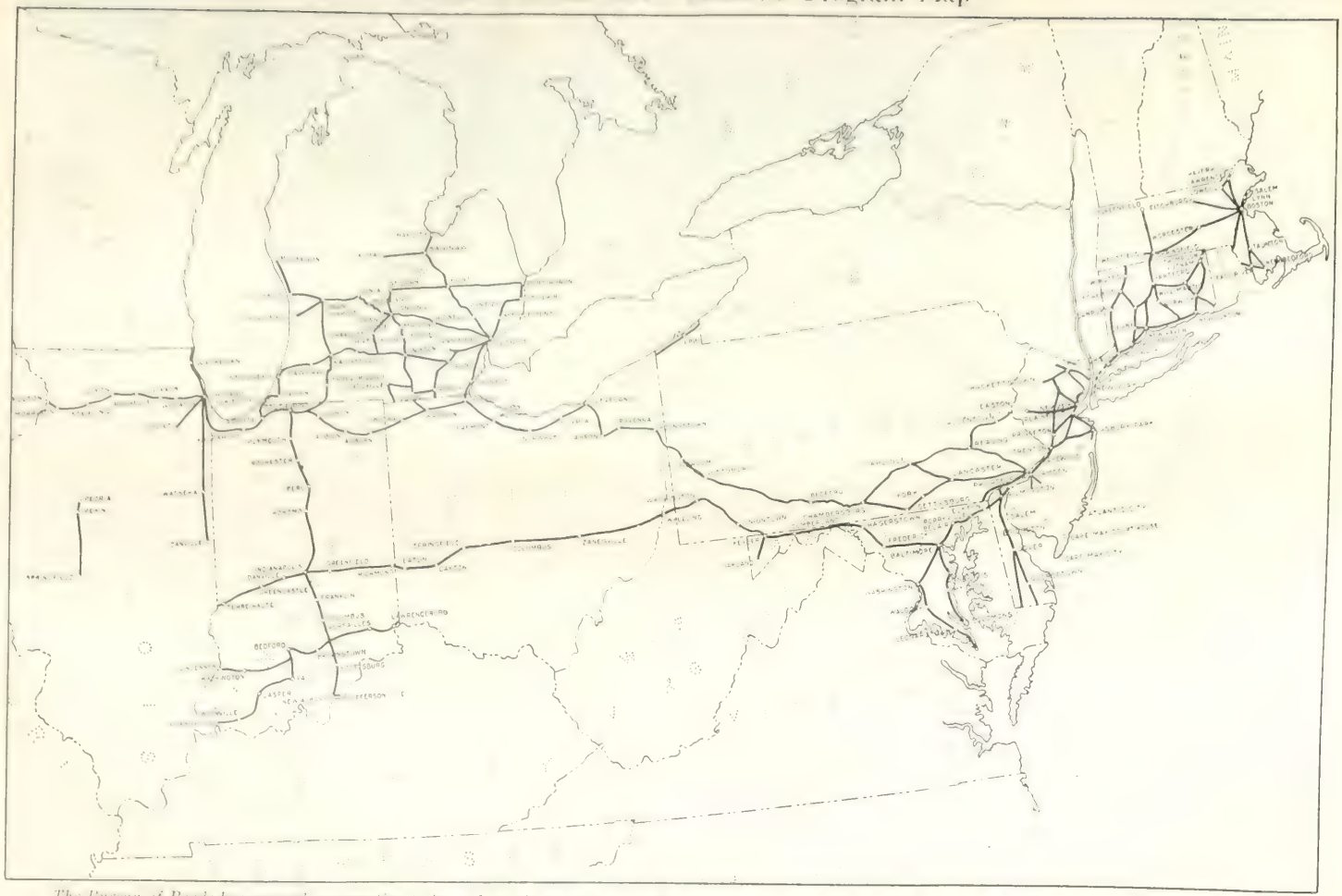
THIS winter the railroads will not be able to handle all the traffic in the congested manufacturing centers of the North and East. Automobile manufacturers may feel the pinch when it comes to shipments of raw materials and finished products. Open highways will be all important.

* * *

This article tells of the movement on foot to keep the highways cleared of snow. Indications are that co-operation between the Bureau of Roads and highway officials will produce a program of action that will keep the highways open and permit winter driveaways. This is a step of great importance to the industry.

THE wholesale price index in Germany advanced 114.3 per cent during the month of October, compared to an increase of 52.5 per cent during September, and is now 57,683 in automobiles compared with index price of 100 in July, 1914, according to the automotive division of the Department of Commerce.

Bureau of Roads Snow Removal Program Map



The Bureau of Roads has secured co-operation to keep the main arteries of traffic between the largest industrial centers free of snow during the coming winter. The map shows the tentative routes, laid out by the Bureau, in Michigan, Illinois, Indiana, Ohio, Pennsylvania, Maryland, New Jersey, New York, Massachusetts and Connecticut. The successful carrying out of this program will permit automotive manufacturers in such cities as Detroit, Flint, Saginaw, South Bend and Indianapolis to continue driveaways throughout the winter

Tariff and Taxes Fail to Check Sale of Motor Vehicle in Mexico

Industry is making marked progress in face of obstacles. Better off than other lines. Market for heavy duty trucks widening. Metered taxicabs popular. Business not confined to Federal district. Dealers are branching out in all directions.

MEXICO CITY, Nov. 15.

THE automotive industry in Mexico is continuing on the upgrade and distributers and dealers are looking forward to a continuation of sales, despite several unfavorable factors which recently have made their appearance. Some of the automotive establishments are being enlarged and in other activities the trade is showing its confidence in the future. In fact, the industry is progressing more satisfactorily than other lines of commerce.

One of the larger companies here has just begun an expansion program that will place its products on sale throughout practically every part of the Republic. This firm, in addition to its large sales room and service establishment here, has already established itself in Jalapa, Puebla, Monterey, Guadalajara, Tampico and Aguascalientes and will have opened additional establishments at Leon and San Luis Potosi.

The use of automobiles and automotive equipment is increasing outside Mexico City, with a consequent increase in the number of sales rooms and garages in other localities. Mexico, like other countries of the world, is turning more and more toward the automobile to solve its transportation problems and many of the tendencies so noticeable in other lands are duplicated here.

Used Car Serious Problem

THE problem of the used car is acute just now and distributors and dealers are bending every effort to clean their sales rooms of such cars, many of which were taken in trade on the sale of new models. This condition probably is not met with in some of the other countries of Latin-America, but it is an important factor here and the problem is being worked out slowly.

A recent decree places an import duty of ten per cent upon automobiles, which formerly had been admitted free. In addition, consular fees have been increased from three to five per cent and with taxes and other fees distributors bringing cars into the Federal district here will be called upon to pay a total of eighteen per cent. It is, however, the general opinion of the distributers that this will have scarcely any effect on the industry, and they expect that sales will continue at the present or at higher levels.

Truck use is increasing, not alone of the smaller types, which are extensively used in taxicab and bus service here, but of the larger sizes as well. Hundreds of these smaller buses are running about the streets of Mexico City, but a start has been made in the operation of greater capacity models. The American Motors, S. A., which handles the local distribution of one of the better known trucks, has recently disposed of six buses to the local street car company to act as feeders for its suburban car service. Another will be used by a passenger carrying line between this city and Toluca.

Dealers are encountering little difficulty in regard to collections from buyers. Cars are sold here on terms varying from three to four months, and payments on the whole are good. It occasionally happens that a bill is not met promptly, but bad debts are few. There is in all lines a willingness to meet obligations and a serious effort is almost invariably made to do so.

Distributers Keep Up Stocks

IN keeping up stocks distributers generally prefer to have their products come in a regular order, so as to avoid delay and demurrage charges. For this reason it is exceptional for very large shipments to enter at any one time. Cars and trucks, however, are kept in the sales rooms at all times and there is a constant flow of new vehicles from the factories.

The use of taxicabs seems to be undergoing something of a change. Not long ago a company was formed to try out a system of cabs with meters, the charge for the service being made on the basis of distance traveled as shown by the recording instrument mounted in plain sight of the passenger. The system has been a success thus far, and now it is stated that plans are being formulated for further development of this system. The representative of a large taxicab company, which now operates fleets in a number of North American cities and which has recently organized a similar service in Paris, has spent some weeks here and at Guadalajara and Puebla investigating the field for such service as is given in other cities.

Mexico, it is felt, offers a potential market for at least 100,000 automobiles, although at present there are in operation somewhere between one-fourth and one-third of this number. But in two or three years the number of vehicles has been doubled, and this during a general business depression following a long period of political uncertainty. The surprising achievement, which has brought Mexico into the front rank of motor-using countries, gives only a suggestion of what will be done as soon as there is a return to general prosperity.

Automotive Statistical Data

IN gathering statistical data on the number of automotive vehicles in Mexico, many difficulties are encountered, but it has been found that cars and trucks are being used in considerable numbers in many districts of the Republic. Listed alphabetically the following districts figure largely in the ownership and use of automobiles: Aguascalientes, Chihuahua, Ciudad Juarez, Torreon, Ensenada,

Vera Cruz, Guadalajara, Guaymas, Matamoras, Mazatlan, Merida, Mexicali, Mexico City, Monterey, Nogales, Nuevo Laredo, Piedras Niegras, Progreso, Saltillo, San Luis Potosi, Tamaulipas and Tampico.

In none of these districts are there less than 100 or 150 cars and trucks and the numbers range up to something like 14,000 or more in the Federal district. Trucks figure more largely than is generally supposed, there being one for each six or seven-passenger car.

Tractor use is on the increase, and they are to be found scattered throughout the Republic in varying numbers. The Tampico district is believed to have more tractors than any other section, with the Federal district and Aguascalientes coming next with approximately the same number.

Problem of Industrial Unrest Deserving of Wide Attention

Recent works give insight to situation from many angles.
Cost keeping furnishes subject for another new book.

WE have had so much of strikes recently that many will be tired hearing about them and want a change, but for those who wish to study their causes more fully there are several new books which give insight into industrial relations from different angles.

"Labor and Democracy" by William L. Huggins, published by The Macmillan Company, deals principally with the Kansas Court of Industrial Relations and hence handles the problem of industrial unrest from a legal standpoint. As presiding judge of this Court, Huggins is well qualified to write from the legal side.

Socialism and Bolshevism as solutions to industrial unrest are touched upon and dismissed in short order. The only possible solution is given as follows: "The application and strict enforcement of the principles of industrial justice by the orderly processes of the law will restore and maintain industrial peace." Gompers would probably reply, "! ! !."

Incidentally it was this Kansas Industrial Court Law that William Allen White, editor of the Emporia *Gazette*, was charged with violating when he placed a card in his office window expressing "49 per cent sympathy with the shopmen on strike."

* * * *

While on the subject of strikes it might be well to balance the ration by reading a study of the labor unions themselves. The history of the butchers', bakers' and candlestick makers' unions as well as the aims and motives of all the other unions are given in "Industrial Unionism in America" by Marion Dutton Savage, published by the Ronald Press, New York.

Miss Savage attempts to show the trend of the whole labor movement and we think that it is ably done.

The book should make interesting reading no matter what one's attitude toward industrial unionsm.

* * * *

Material of distinct value to production managers, foremen and cost accountants of machine shops is offered in a new book by W. R. Basset and Johnson Heywood, entitled "Production Engineering and Cost Keeping," published by McGraw-Hill Book Company, Inc., New York.

Because of the very general information given as well as the detailed description, this work will be of assistance to executives who wish to get a rather quick grasp of the subject without the necessity of wading through much technical matter. On the other hand a very concise idea can be obtained of any step in machine shop practice.

Cost keeping is very thoroughly covered. While overhead costs are very closely figured in larger machine shops and particularly where a single standard product is turned out, there is often great difficulty in connection with apportioning these overhead costs properly when a machine shop is small and manufacturing diversified products. The chapter on "Getting the overhead into the finished product" should therefore be of special interest.

* * * *

The World Metric Standardization Council has recently brought out "World Metric Standardization," a very large volume compiled by Aubrey Drury. Those who advocate the adoption of the metric system will find this book to their liking.

* * * *

A book appeared on our desk which we found very interesting reading and we believe that automotive executives will find it so as well. "The Reign of Rubber" by William C. Geer, published by the Century Company, takes one through the entire range of the rubber industry in a non-technical manner. Its interest lies rather in its imparting of general rather than specific knowledge.

Any work which attempts to tell the history of rubber, with all its multitudinous products, in 350 pages must needs condense and cut the material but it means that a great deal of interesting matter is presented without too much of the technical accompanying it.

Having discovered or at least made to realize how vital a part rubber plays in our daily life the reader turns to the final chapter on the future of the product. Here we find that experiments are going on constantly which may broaden the field of application and make rubber even more essential to our civilization. Many of the prophecies appear rather extreme but the field of inventive genius teaches us that hardly anything is impossible.

* * * *

For those who want a textbook on banking and credit which goes further in scope than the ordinary textbook on this subject and omits elementary principles, we suggest the recently published "Banking and Credit" by Davis R. Dewey and Martin J. Shugrue, both of the Massachusetts Institute of Technology. The Ronald Press Company is the publisher.

This book illustrates credit methods and shows the part that banks play in such transactions. The terms and conditions upon which credit is granted are told so that the man who contemplates securing financial backing may easily determine the best way to proceed.

At a time when foreign trade relations are upset and the new tariff bill has focused attention on the problem, it might be well to turn to the chapters on foreign exchange and brush up on this seemingly complex problem.

When we become imbued with the idea of selling without buying as a means of maintaining our position of leadership in the world of trade it is high time to read up on those facts that we have always known and frequently forgotten.



Plain or Anti-Friction Bearings for Railcars?

Hampson Replies to Critics

Editor, AUTOMOTIVE INDUSTRIES:

I am pleased to note from your issue of Nov. 9 that my railcar article has attracted some comment and that various points have been seconded except insofar as they affect your correspondent's own product. It may be of interest to know upon what I based my statements.

The automotive engineer is wedded to anti-friction bearings. He will not give an inch in that direction to save his very soul. That one point is the stumbling block every time railroad men and automotive engineers meet in an effort to get somewhere on the ultimate railcar. Anyone who attends these meetings or reads the discussions can tell you that.

I do not agree that the use of plain bearings involves retrogression or degeneration. I am not now a railroad man nor yet connected with the automotive trade but I have been in both. I have nothing to sell. Therefore, I view the matter from a standpoint of neutrality. If plain bearings in untold millions have stood up and been attended satisfactorily by the very low grade labor that obtains in railroad service, they certainly are entitled to a high engineering rating. That class of labor is what the railroad official has to get along with and he knows from long experience that a minimum of delay and expense accompanies the plain bearing. The statement that "a majority of freight train delays are due to plain bearings" is not borne out by the operating sheets, as I can readily prove.

I am fully aware of the Swedish railroad's experiments with anti-friction bearings under cars and locomotives. But conditions are different there. I am speaking of past and present conditions in the United States. I did not say that anti-friction bearings will not be developed or perfected for railroad purposes. I hope that they will be, for they certainly look like a step in advance, but until they have stood the test of years under the same adverse conditions that have obtained with plain brass bearings, they are not entitled to the same rating.

In mentioning a loaded freight car, my idea was to show this plain bearing under the most severe conditions of operation and maintenance. Any dub knows that you do not view freight cars and passenger railcars in the same way, but I venture to assert that if Mr. Brunner rides a hundred miles on a packing box in a freight car he will feel less fatigued at the end of the journey than if he made the same trip in a railcar constructed by certain of our automotive truck manufacturers. And the freight car is mounted on brasses set in pedestals. The labor of manufacturing, installing and maintenance is done exclusively by men who would not be tolerated for one day in an automotive plant.

Just one more word and I will rest the case of the bearings. Since that article was printed in AUTOMOTIVE INDUSTRIES I have been kept busy answering letters. Except for one letter from an axle manufacturer, they all are favorable. Let me quote from the Lehigh Valley's chief engineer: "Our experience with motor cars indicates that you are very much on the right track in your design of axle with the old type brass bearing. I hope someone will bring out such an axle and bearing, and I intend to try to get them for the cars we have in mind. . . ."

Mr. Guernsey took exception to the title of my article. I meant that the railroads needed the cars—and they do—but they are not buying because they are not satisfied with what is now offered, either from a perusal of specifications or from experience of brother roads that have spent time, money and patience. Right now, there are hundreds of routes where railcars should be employed instead of locomotives. The operating officials know this, too, but are they buying cars? The Short Line R. R. Association alone represents over 400 good prospects and the experience of the score of members who have various railcars is discussed regularly at their Washington meetings. I might add that the remaining 380 do not get enthusiastic and that the points of weakness brought out are invariably bearings and axles.

Now here is a disconcerting thing I have learned around railroad yards. In trying out drawbar pull of railcars you have to hook onto something which may be anything from another railcar to an old box car. I have used a spring balance connected up with levers as the most convenient means of getting a reading. You find plenty of four-wheel trucks (from under freight cars) around the yards and I have noted that it does not take 10 per cent more pull to start those old things than to start the four-wheel truck with anti-friction bearings (alone) from under a railcar. Once started, there is even less difference in pounds per ton pull required to keep them in motion.

DONALD A. HAMPSON.

Inclined Steering Knuckle Pivots

Editor, AUTOMOTIVE INDUSTRIES:

Ludlow Clayden's article appearing in AUTOMOTIVE INDUSTRIES for Oct. 5, entitled "Wheel wobble and other faults in the steering system," brings out several interesting points that should give food for further thought and investigation. It also shows that the automobile, as we know it to-day is yet far from being the practically perfect mechanism that some people would like us to believe it to be.

As for the slaying of popular fancies, while the object sought is most commendable, I can scarcely subscribe to some of the arguments put forth to this end.

Thus, for instance, the "second fallacy" anent the transverse inclining of the swivel pin, the author demonstrates that this construction practically does not neutralize the turning moment about the swivel, due to rolling resistance. In order to arrive at this result the force which in reality is applied at the point of contact

of the wheel on the ground is resolved into a force having its point of application in the middle of the stub axle. If this were permissible, the author would have gained his point; but as a matter of fact this transposition of the force alters the point of application of the force and hence is not admissible. By definition a turning moment is the product of a force by the distance that separates it from its virtual axis of rotation. Under these circumstances it is obvious that the assumption made in the article entirely changes the actual status of the problem, since leaving the force to act at its proper location shows that the inclined swivel axis actually intersects the force, and therefore the turning moment is nil. Does Mr. Clayden mean to infer in his exposé that the several distinguished designers of front wheel brakes, who incorporate the inclined swivel feature, are all "barking up the wrong tree"?

Of course in practice we have the mass of the wheel to contend with, and since this mass may be considered as being concentrated in the center of the wheel, any acceleration of the speed of travel of the car will call forth a force. The point of application of this force *due to inertia* of the wheel lies outside the axis of rotation, in this case the swivel pin, hence the tendency for the wheel to swing around the swivel. For this reason I agree with the author as to the desirability of seeing the advent of a construction having the king pin placed in the plane of the wheel. In the meantime we see another reason for favoring the use of lightweight wheels.

There is yet another statement I fail to see with regard to the so-called unstable equilibrium of the transversely-raked swivel construction. The author says: "Suppose the pivot vertical in side elevation and raked in end view. Then turning either way from mid-position causes the outer end of the stub axle to rise." Surely Mr. Clayden does not mean this seriously. A very cursory glance at Fig. 4b in the article will reveal the very opposite to be true, so that the conclusion of unstable equilibrium arrived at with this construction is entirely misleading.

T. L. Reepmaker d'Orville,
Engineer Dorville Motor Co., London.

Another View Concerning Wheel Wobble

Editor, Automotive Industries:

I do not agree with Mr. Clayden in regard to several points raised in his article in your issue of Oct. 5 and his previous article about front wheel wobble.

The cause of front wheel wobble is lack of equilibrium, due to the fact that the wheels are attached to the axle by a cantilever construction.

The wheel has always been—and, due to cord tires and detachable rims, is now even more so—a heavy mass. This, by the way, is why wobble is more heard of now than formerly. When the front wheels are directed out of their plane they usually tend to return to that plane. Now if any or all of the construction which supports them or controls them is flexible enough a pendulum action is set up which must be dampened out at once or it will continue to swing in its natural period of oscillations so long as that car speed is maintained constant irrespective of road conditions. I have caused front wheel wobble on an absolutely smooth road by swinging the steering wheel violently and then holding it rigid.

Cars designed with a non-flexible support for the front wheels will, I believe, never wobble due to any cause until some or all the connections become worn and loose—and this will be true no matter how far they are castored. By non-flexible support I mean a stiff chassis frame, fairly stiff front springs with well fitting spring bolts, tight spring clips on real spring supports, stiff front axle, not too much overhang from spindles to spring seat and not too much drop from center of wheel to spring support on axle—in other words, as near a straight front axle as possible—rigid steering tie rod and well fitting tie rod joints, rigid and if possible a straight drag link with correct and not too long drag link springs, and lastly a steering worm construction which is free. If the worm is tight it has the same effect when wobble does start as holding the steering wheel rigid.

Clayden states that friction in the worm damps out the wobbling action. My practical experience indicates that he is more wrong than right except in a rare case where all or most of the flexibility is in the twist of the steering column.

To correct wobble: tighten all loose connections. If due to weak or too flexible connections put plain washers in the spindles and tighten the tie rod and drag link joints. Check the front wheel castor. I have found that the top of spindle should be a little to the rear of the vertical position when the spring support on axle is below the center of the wheel.

One mistake in design on a great many cars is in making the knuckle arm too short. The longer this arm is the greater is the damping effect. A little friction on the end of a long spindle arm will stop almost any wobble.

Castoring of the front wheels so that they will have a tendency to return to straight position ahead after rounding an unbanked turn, or a self-righting action, is obtained only (when the spring support is below the wheel center) by raking the top of the spindle back. This because the point of contact of road and tire is then behind the point at which the knuckle pivot axis produced intersects the road.

If the spindles are castored ahead at the top the wheels are being pushed ahead of the weight of the car and there is the reverse of any self righting. If this is carried too far we have a dangerous condition.

There is no tendency, in my experience, for any plunging with the rearward rake unless the wheels are cut hard around, and this should never be done at speed.

I have known cars to wobble badly with vertical pivots, and think the only argument against castoring them slightly back is that some objection might be raised to the "lea helm" necessary on a crowned road.

In most cases cars never have the same degree of castor after a year's use as when due to the uneven deflection of the front springs and because of the fact that the spring support seldom remains in the fore and aft center of the spring.

Frank C. Chapman.

Radiator Performance Data

Editor, Automotive Industries:

I have been greatly interested in Mr. Clayden's articles on cooling systems and particularly in the article on steam cooling in the issue of Sept. 14.

As so few data or intelligent matter of any sort have been available on this subject it would seem to me that these articles should be assembled in a pamphlet. I would like also to suggest the subject might well be further enlarged upon with the addition of some data of actual performances of standard types of radiators. There is need for some sort of a text book on this subject to enlighten automotive engineers who, for the most part, seem utterly ignorant as to what goes on inside the engine jacket or of the simple fundamentals of thermodynamics.

Some of the most prominent engineers have assured me that the specific heat of air drops off so rapidly with increasing temperature that steam cooling can offer no advantages. Others have declared that the rate of heat transfer to air increase much faster than temperature increase and few know the difference between convection and radiation.

I hope you will follow up this good work with some good technical stuff. S. W. RUSHMORE.

Electrical Standards Win Approval

Editor, AUTOMOTIVE INDUSTRIES:

I have been much interested in Mr. Beecroft's description of the meeting of the Automotive Electric Association.

Everyone at this date knows that standardization is a very good thing both for the manufacturer and the consumer and I believe that, if not made too broad, standardization of both the starter and generator for motor cars will help quite materially.

The motor car manufacturer has had very little to say in the matter of the design of both starter and generator. He has been forced to take what was on the market.

There are at present a large number of different designs of generators on the market and it would be of very little service if we endeavored to make our standard so broad as to include all of them, for the value of standardization is greatest when the number of standards is the least.

There are several things which can be made standard for all generators: for instance, the minimum number of commutator segments, brush area per ampere, maximum temperature and minimum insulation resistance.

There is no question but that the future holds open the possibility of the use of disk type generators suitable for fan belt drive and also extremely small diameter generators that could be placed close to the engine crankcase and, while there is no great difficulty in designing these, the efficiency may have to be considerably reduced.

Standardization of direct connected starting motors should not be difficult and, as far as I can see, must be based on the stalling torque. I think that four sizes at most would be sufficient.

W. G. WALL,
National Motor Car & Vehicle Corp.

Comment on Generator Standards

Editor, AUTOMOTIVE INDUSTRIES:

I have carefully gone over the proposed generator standard as set forth by the Automotive Electric Association. In this connection I wish to make the following comments:

A long series of tests were made by this company during the winter of 1921 to determine the generator output requirements of the small car, such as should be covered by the generator No. 1, referred to in the above mentioned report. The results of these tests show that the requirements of the small car cannot be handled by a generator with the characteristics specified. The reason for this is that the small car requires, in business usage, more battery output and has a lower generator r.p.m. per car mile of speed.

The actual current requirement of a large car does not exceed the small to any marked degree, and large cars are usually equipped with generators running at a high r.p.m. per car mile of speed. The result is evidently that the small car requires a better charging characteristic to maintain the battery in a charged condition.

Realizing this condition, a standard charging characteristic should be established that would maintain the battery under the minimum driving condition a manufacturer would desire to cover, and variation in generator r.p.m. per car mile of speed be used as a basis for standardizing generator.

Permissible temperature rises and brush life must be given careful consideration on this unit, as the actual field condition varies to such a marked degree and individual drivers cannot be depended upon to regulate the output to conform to their requirements.

The generator should be designed so that the driver who uses his car on an average of 20 miles per day at a rate of not to exceed 20 miles per hour, making five starts and burning his lights only when driving shall maintain his battery. The following characteristic is a suggestion of the average charging rate:

COLD GENERATOR, BATTERY—1275 DEG. —6-8 VOLTS

7 m.p.h.	0 amp.
10 m.p.h.	4.25 amp.
15 m.p.h.	11 amp.
20 m.p.h.	15.25 amp.
25 m.p.h.	18 amp. max.

HOT GENERATOR, BATTERY —1275 DEG. —6-8 VOLTS

8 m.p.h.	0 amp.
10 m.p.h.	1.5 amp.
15 m.p.h.	7.5 amp.
20 m.p.h.	11.75 amp.
25 m.p.h.	14 amp. max.

Overlapping on different standards should occur in order that the full requirements would be covered with the fewest possible number of different generators, and it is my opinion that the field could be fully covered with not to exceed four standards.

A. R. LEWELLIN,
Chevrolet Motor Co.

Proposed Lamp Glass and Illumination Standards

AT a recent meeting of the Lighting Division of the Standards Committee of the Society of Automotive Engineers it was suggested that the present standard for lamp glasses, p. B6 of the S.A.E. Handbook, should be revised so as to make it more satisfactory for various devices used by lens manufacturers. A semi-circular notch was suggested, but not approved by the lamp manufacturers, as it would require redesigning the lamp doors and conflict with servicing the large number of lamps now in use. It was decided, however, to modify the form of the notch and a tentative recommendation was approved which will be tried out by the lamp manufacturers before it is finally approved by the Division.

A SECOND exhibit of agricultural machinery will be held in the Grand Palais on the Champs Elysées, Paris, in the latter part of January, the exact dates to be announced later, according to advices received by the Agricultural Implement Division of the Department of Commerce.

This exhibit will be under the auspices of the "Union Intersyndicale des Exposants de Machines et d'Outillage Agricoles," and will be confined strictly to articles used in agriculture, viticulture, horticulture and forestry. It is open to manufacturers of all countries.

Further details may be secured by communicating with the Commissariat General du Salon de la Machine Agricole, 8 Rue Jean Goujon, Paris.

Automotive Dealer Classification Usually Inaccurate

Present method of listing car dealers, garages and repair shops absurd. Functions are interrelated, not separate. Automotive retailers conduct variety of departmentalized activities.

By Harry Tipper

THE question is often propounded "what constitutes a dealer in the automotive field?" The ordinary lists of the trade classify separately, car dealers, truck dealers, garages, repair shops, supply dealers, etc. This general method of classifying the trade list has led us to a belief, more or less indefinite, that retail establishments specialize in one or other of these functions mainly. This is not true; an examination of any trade list will show that the number under the separate classifications is at least three times the total, indicating that the average retail automotive establishment operates at least three separate branches.

This method of classification is much as though the department store were separately classified as a grocery store, a hardware store, a furniture shop and a dry goods store. The real picture does not get home very quickly because of our absurd adherence to these terms —garage, repair shop, car dealer and supply store.

Perhaps the picture of automotive shops in a town of nearly 10,000 in the East may illustrate the whole situation more correctly and more vividly. This town has no manufacturing, is a residential town where over 95 per cent of the people own their homes and the car population is large. Consequently, the number of establishments is above the average for the section. Six years ago there were three automotive establishments in this place. One was called a garage and did a good deal of storing. It had a very small supply department and a repair shop with hand power tools in the rear. We will call him dealer "A."

The second establishment was in a building owned by a successful plumber and run by the plumber in addition to his own business. Selling cars and performing adjustment service was the only part of the automotive work done at this place, which will be labeled "B."

Dealer "C" was a salesman for a well-known car.

THE head mechanic employed by dealer "A" left him one day and started a repair shop in the ground floor of a new building, becoming dealer "D." Five years ago he paid his first rent for the place. Four years ago he shut off about 10 ft. square for a combined office and supply department. Three years ago he bought out the other ground floor tenant, trebled his supply department, added a garage and put in some machinery for his repair shop. One year ago he added a car agency.

Meantime, the plumber whom we labeled dealer "B" sold his plumbing business and went into the automobile end heart and soul. He started with his car agency and some service. Later he added a supply department. To-day he has a repair department, a new car sales department, a used car department and a supply store.

The opposition plumber, equally successful, had a son of age and mechanical turn of mind. Father and son built a garage and repair shop for the boy to run—the biggest garage in the town. This became dealer establishment "E." Two years later this place opened up a supply department, began trading in used cars and eventually took up a car agency.

An old livery stable was offered for sale. A good mechanic came from another town near by and bought the place. He set up his repair shop. It remains a repair shop.

To-day there are in this town ten retail establishments in the automotive business. Three of them are over six years in business. Four of them are over three years and three of them have come into existence within the last three years.

THERE are in these establishments nine car agencies, nine repair departments, eight supply departments, eight garages, etc. The proprietors are two old bicycle men, five mechanics, three business or commercial men. All of them started with one department only.

How did they come to spread out? They are not men of more than ordinary intelligence—most of them have only limited business experience. None figure far ahead.

The pressure of the market suggested the changes. Dealer "D" did not put in the large supply store in the front of his shop from long study. No. He put it in because people wanted to buy supplies when they took the car away after having it repaired.

The whole tendency of growth in this town has obliged the retailer to assume a larger number of functions and departmentalize his business. People wanted to get service where they bought cars and vice versa. They wanted to do their automotive buying where and when they were thinking about it. So the retailer responded by giving them the opportunity to do so.

All over this country the same story is being repeated and all over the country the retailer is becoming an automotive retailer, not a garageman, repairman or car dealer exclusively. It is time we ceased to use the absurd classifications mentioned at the head of this article and began to think about the automotive retailer as a group, with departments and functions to perform which he must combine because of the demand of the user.

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Tell Your Production Troubles

EVER since the recent S. A. E. Production Meeting we have been getting letters from production men telling about the benefits they got from the exchange of ideas that took place at that gathering. Practically all of them favor more sessions of a similar character, but in the meantime they don't want to go back to their individual factories and stay there without contact with other production managers.

They are already thinking specifically and constructively about possibilities for the next production meeting. One has suggested that the machine tool builders have a special semi-informal session with the factory production men, so that frank statements of troubles and possible remedies can be made and discussed.

Another factory manager writes as follows:

"I think it would be a mighty good plan if all those who were fortunate enough to attend the first production meeting would write to the officers of the S. A. E. the different troubles and different items of interest pertaining to their own work. These items could be kept on file, and at a later date the complaints which are the most common could be selected for special discussion at the next meeting."

Both these suggestions look good. To facilitate the exchange of ideas on this subject AUTOMOTIVE INDUSTRIES will be glad to throw open the columns of its forum. Future production meetings and production practice in general will make advances in proportion to the freedom with which principles and ideas along practical manufacturing lines are openly discussed.

Spontaneous Ignition of Hydrogen Jets

CASES of destruction of dirigibles by fire and explosion have been rather frequent recently, and the results in some instances have been of the utmost gravity. The inflammability of the hydrogen with which the bags of these dirigibles are filled naturally involves great risks, but just how the gases became ignited has remained a mystery in some cases. Of course, where a crash to earth occurs, large quantities of the inflammable gas are released quickly, and there is a possibility of their coming in contact with almost red hot parts of the engine and thus being set off. However, the engines are generally shut off as soon as something goes wrong, and as they are, moreover, inclosed in their nacelles, the chances of fire being caused in this way are comparatively remote. Another possibility lies in the severing of current-carrying wires extending the length of the hull, and this is believed to have been the reason for the explosion of the navy dirigible that fell into the Humber.

There have been, however, some disasters that were incapable of explanation by either of these theories, and this led to the belief that the escape of hydrogen through openings in the gas bags might be capable of inducing electric potentials sufficient to create sparks that would ignite the gas. That phenomena of flow are sometimes accompanied by the generation of static charges is well known, and it has been proved, for instance, that gasoline passing through the pores of a chamois strainer generates sufficient potential to cause sparks in the atmosphere. The flow of hydrogen through nozzles has been investigated in Germany recently, with respect to any possible accompanying electric phenomena, and the results have been negative so far as concerns the explanation of hitherto unexplained disasters to dirigibles. For it was shown that with the dry hydrogen gas escaping through a nozzle there was no sign of electric potential in the jet, even when there was a high pressure behind the jet. It is true that sparks as long as 3 in. were obtained if water was discharged with the hydrogen, and similar effects were produced when steam and hydrogen were discharged together, but since the bags of dirigibles are filled with dry gas this does not bear on the case in point.

Sane Stand on Legislation Needed

APPROXIMATELY 3000 bills relating in some way to motor vehicles will be introduced in the 43 State legislatures which will convene early in 1923. While there is likely to be little uniformity in the bills themselves, legislators generally are thinking along the same lines.

It can be taken for granted that in almost every State an effort will be made to reduce the accident hazard by tightening up regulations and restrictions. Many of the measures which will be proposed to attain this highly desirable end will contribute nothing to the sum total of safety, but a great many of them will be enacted.

Other subjects to be taken up, in addition to taxation and highways, will be the limitation of truck loads, weights and speeds as well as the highly important subject of the regulation of motor vehicles used as common carriers. There also will be the usual grist of bills relating to equipment, such as headlights.

In most cases the convening of the legislatures is less than two months away. It is none too early, therefore, for automotive interests to determine what stand will be taken on this prospective legislation. Uniformity of action and aim will be necessary if tangible results are to be obtained.

Not much can be accomplished at this time in seeking national legislation of a uniform nature. Each State will present a different problem. It may be possible to approach all of them on a somewhat uniform basis, fundamentally, but for practical purposes each State must be considered separately.

Each State has its own peculiar problems such as the need for revenue from motor vehicles, how this revenue shall be spent, the type of highway construction and the extent of its accident hazard.

When we speak of "uniformity of action" we mean for each particular State. There may be in that State a dozen organizations devoted to some automotive interest. They may have entirely divergent views concerning what attitude should be taken. An association of motorists and organization of motor truck operators may be as far apart as the poles in their views of certain proposed bills, but if they are unable to reach a compromise which will be reasonably fair to both, how can they expect legislators to pay much attention to them? There must be some common ground on which all automotive interests can stand in each State.

There certainly is one tenet to which every person interested in motor vehicles should subscribe, and that is fairness to the public. There is ample reason for legislators to determine to do every thing possible to cut down the number of street and highway accidents. Once this fact is admitted, it should be easy to proceed.

If the regulations proposed are sane and sound they should be approved. If they are not, they should not be opposed on general principles, but some sensible substitutes should be presented for the law-makers' consideration. Vituperation and loud lamentations because motor vehicles have been singled out for attack, will accomplish nothing.

Legislative programs which may be framed by automotive interests must be constructive and not destructive. In promoting these programs the work should be done out in the open. All the cards should be laid on the table and there should be no resort to lobbying in the usual meaning of the word.

The automotive industry, if it gets together on the platform on which its leaders stand, has nothing to fear from pitiless publicity. It is not asking special favors or special consideration. It asks nothing but fair play. It does not oppose reasonable and effective measures for promoting safety and when the laws are enacted it wants them enforced. It doesn't object to the payment of reasonable taxes. It will gladly pay for the maintenance of improved highways. It is opposed to the overloading and over-speeding of trucks.

If agreement can be reached in each State on these fundamentals, it should not be difficult to convince every fair minded legislator that the automotive industry honestly wants to help in the solution of pressing problems of taxation and regulation.

Widespread publicity should be given to the program agreed upon, if agreement is reached, and it is an honest program. This publicity should be educational in character. Every line of it should bear the stamp of truth and fair play. It should have none of the sinister earmarks of propaganda.

Honest educational work is not only legitimate but commendable. Propaganda, on the other hand, almost always has a selfish motive. The work of the National Automobile Chamber of Commerce and the Highway Education Board to promote highway safety, for example, is educational in the best sense.

These legislative programs, which should be worked out in advance, should be based upon the principle of the greatest good to the greatest number.

Operations Keep Up to Level of October

Body Shortage and Rail Situation Continue to Present Serious Problems

NEW YORK, Nov. 20.—The volume of production in automotive plants is remarkably close to the levels of October when operating schedules exceeded all records for that month. This is being done regardless of the fact that last month was occupied in part with catching up on production for September when coal shortage caused a curtailment of operations. Unless unforeseen difficulties arise it is probable that but for the inclusion of a holiday in a short month, November would not fall far short of the October mark of 244,000.

There is no diminution in the demand for cars. While metropolitan districts report a falling off in sales of open models the decline has been counterbalanced in those sections by a strong and consistent demand for closed types. Manufacturing schedules are centered around closed cars with a consequent heavy burden placed on body builders. Additional body plants are being rushed to completion but it is not likely that there will be any appreciable relief until after the first of the year.

Body Relief Next Year

The body shortage continues one of the big problems of the industry and it will remain so until the added manufacturing facilities are available or until there is a pronounced let-up in the demand for closed cars. Evidence is lacking of any perceptible stocking of open cars against spring demand. To the contrary, it is apparent that all cars produced, whether of the open or closed type, are reaching the hands of the consumer.

There is no improvement in the railroad situation which is hampering seriously the delivery of cars. Good weather conditions have lessened the difficulty of getting cars to dealers by means of driveaways and the industry will make general use of this means of transportation as long as the roads are passable. In the winter of 1920, the previous banner year in the history of the industry, a large percentage of cars were delivered by driveaways and since then road conditions have improved materially. More extensive efforts are being made this year to keep highways open and clear of snow. Regardless of this, however,

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Business in Brief

NEW YORK, Nov. 23—Greater firmness is noted in distribution, with a shift from primary to secondary lines. Industry has maintained a very fast pace for this time of the season. Retail buying has been good in many sections of the country due to the prevailing warm weather. Buying of holiday goods has increased.

There has been a slightly better supply of cars, but the shortage still prevails. Lumber shipments have improved as a result of better transportation facilities, but output is still curtailed in parts of the South and Pacific Coast due to car shortage.

Loadings for the week ending Nov. 4 were 19,653 cars less than for the preceding week, although greater than during the corresponding weeks of 1920 and 1921. The decrease was largely in merchandise. Total loadings aggregated 994,827 for the week.

The farmers are receiving better prices for grain and dairy products. Plentiful rain has helped the winter wheat crop, but has slowed down grain deliveries through making roads impassable.

Steel and pig iron production has been speeded up in spite of easing of the price of the latter. Open weather has stimulated building. Structural material and cement have boomed. Railroads continue to be large buyers of cars and locomotives.

The stock market suffered severe declines under aggressive bear pressure and levels as low as those which occurred in June were seen. A partial rally lifted many stocks in the latter part of the week. Bonds were firmer and showed activity. Call money eased off to 4 per cent. Bank clearings aggregated $7,252,668,000 for the week ending Nov. 16, a gain of 10.6 per cent over the previous week.

Thomart Stockholders Authorize Bond Issue

KENT, OHIO, Nov. 22—Stockholders of the Thomart Motor Co., which was organized during the period of inflation following the war, at a special meeting recently authorized a bond issue not to exceed $200,000. This is to be secured by a first mortgage on the plant, equipment and property of the company.

At present the company is selling about 20 trucks a month. In order to make a profit, however, the output must be increased to 50 trucks monthly, and to do this it will be necessary to increase the working capital.

American-Bessemer Companies Combine

Merger Probably Effective by January 1—Assets in Excess of $3,000,000

NEW YORK, Nov. 20—Awaiting only the formal approval of the stockholders to make it effective, the merger of the American Motors Corp. of Plainfield, N. J., and the Bessemer Motor Truck Co. of Grove City and Philadelphia is announced. No hitch in the negotiations is expected.

The consolidated company will be known as the Bessemer-American Motors Corp. with the Plainfield concern a dominant factor. It will have a capitalization of $2,000,000 of 8 per cent participating preferred stock and 200,000 shares of common stock, with assets in excess of $3,000,000, it is understood. It is hardly likely that the two parties concerned will be brought together until the first of the year. Until that time each will continue as before, with Ralph D. Mock as general manager of the Bessemer company.

The Bessemer Motor Truck Co. was established more than 10 years ago and makes a line of trucks ranging from one to four-tons. It has two plants located in Grove City and Philadelphia, and when the merger is completed, it is understood that operations will be centered at the Philadelphia plant.

The American Motors Corp. manufactures passenger cars and has been put on its feet in the last year through the efforts of President Carl H. Page, who has cleared away the financial difficulties of the concern since he took control.

Under the merger plan the consolidated company will have a complete line of trucks and passenger cars, handled by one selling organization.

Grant Halts Car Making While It Builds Trucks

CLEVELAND, Nov. 20—The Grant Motor Car Co., which is being operated by Receiver Joseph C. Hostetler, is manufacturing trucks, for which there has been a good demand since the receivership. The company for the present is not making new passenger cars.

The parts and service departments are being operated, so that dealers are enabled to hold the good will established by the car. The work of taking an inventory and appraisal is progressing.

FORD OCTOBER OUTPUT

DETROIT, Nov. 20—Ford Motor Co.'s October production in its American plants totaled 121,765 cars and trucks, approximately 32,000 more than any previous October. September aggregated 89,000 and in the foreign plants October showed an increase over September in each place.

G. M. Export Company Elects Mooney Head

Succeeds J. Amory Haskell, Who Will Center Efforts on Parent Organization

NEW YORK, Nov. 20—James D. Mooney was elected a vice-president of the General Motors Corp. at the recent meeting of the board of directors of that organization, which is the parent company of the G. M. C. group. At the same time the directors of the General Motors Export Co., accepting the resignation of J. Amory Haskell, the company's president, elected Mooney to that position, promoting him from his previous duties as vice-president and general manager. Other elections by the export company directors named A. L. Haskell as vice-president and general manager and Austin S. Murray to be vice-president and treasurer.

Executive Committee Additions

Additions to the executive committee of the General Motors Corp. include Charles S. Mott, executive vice-president of the G. M. C. in Detroit, and Fred J. Fisher, president of the Fisher Body Corp. In addition to James D. Mooney, John L. Pratt, general manager of the accessory division of the General Motors Corp., was elected a vice-president of the G. M. C.

Mooney, who now takes a position as one of the executive heads of the General Motors group, has been vice-president and general manager of the export company since the first part of this year, prior to which he was general manager of the Remy Electric Co. He has effected a complete reorganization of the export company's policies, and under his direction a striking growth has been recorded in the international sales of the General Motors cars, trucks and other equipment. In his new capacity he will devote his efforts to further extension of these activities, having complete control of the overseas trade, and under his direction will be placed the affairs of General Motors, Ltd., the English subsidiary handling the distribution of G. M. C. products in the United Kingdom. In announcing this change the company's statement declares that "his promotion is a recognition of his success in developing the foreign trade of the corporation."

Haskell Relinquishes Duties

J. Amory Haskell, who has been president of the export company, also was a vice-president and member of the executive and finance committees of the parent company. He will relinquish his connection with the export division and devote his time to the immediate interests of the parent corporation. He has headed the export company since Feb. 13, 1918.

The new vice-president and general manager of the export company, A. L. Haskell, is best known as manager of the Pan American Division of the company. He joined the General Motors staff in 1918, with the Buick Motor Co. branch at Chicago. A year later he entered the export company and has filled the positions of assistant treasurer, manager of the New York branch and manager of Pan American division. In the absence of D. A. Laing he has been actmg sales manager.

Austin S. Murray has been treasurer of the export company since 1920, and recently was elected a director of the company.

Racing Still Important in Stimulating Engineering Efforts as Well as Public Interest in Cars

By Col. J. C. VINCENT

Vice-President in Charge of Engineering of the Packard Motor Car Co.

Detroit, Nov. 20.

THE fixing of 122 cubic inches as the gross displacement for cars entering the 1923 Indianapolis sweepstakes indicates the progress that has been made in the past ten years toward increasing the efficiency and economy of gasoline motor-driven vehicles and offers a splendid opportunity for American car makers to demonstrate this in competition with the best of foreign built cars.

It is true that demonstrations and tests might be made in private, but such demonstrations lack the force and effectiveness that can be gained by competition in an international race. The army and navy engineers could test the effectiveness of new airplane designs and principles in private if they thought it advisable, but instead they chose to race their craft in great annual events upon which public interest may be centered and developed.

Racing in public serves to stimulate the best thought and effort of participants because there is so much interest aroused, and every possible precaution is taken to guard against mishaps upon which in private tests or exhibitions some chance might be taken. It may not be possible to guard against every eventuality which the new conditions of the race impose, but no matter what the results they will be invaluable from an engineering standpoint and will serve to stimulate to greater effort in the future.

There is a constant influence in the industry toward refinements making for greater power and lighter weight. Remarkable progress has been made in the past ten years and similar progress will be made in the future. As it is possible to lighten the weight of vehicles the engine dimensions may be reduced, and in this particular the running of the 1923 Indianapolis race will be a great continuing movement. The cars in this race will be proportionately lighter and smaller than in earlier year races and though designed for this particular purpose, their performance will be studied for the future design and development of standard passenger models.

Development of the American automobile would be benefited by manufacturers entering cars in the race as it would serve to concentrate effort upon getting the best possible cars representing America in the competition. We have entered with this thought uppermost in mind and will continue our efforts regardless of results this year until we have established the supremacy of American engineering. We will also be prepared to enter Packard cars in races abroad so that America may have a chance to demonstrate its cars in competition with the best the world affords.

I do not hold with the opinion that the automotive industry has outgrown the racing stage. I consider racing important to stimulate the best in engineering and am of the opinion that manufacturers should get back into racing, which is becoming too expensive for private individuals to maintain. The advancement of the art is such that races can no longer be won on flukes as in earlier years, but must go to the entrant most successful in design. Though the discontinuance of racing might seem to have little effect upon the actual sale of automobiles, it would leave the industry without one of the greatest interest-promoting points that it has had with the general public.

RYAN BANKRUPTCY ENDS

NEW YORK, Nov. 20—Allan A. Ryan, who was formerly in control of the Stutz company and who failed for $18,000,000 last July, has been discharged from bankruptcy by Justice A. N. Hand.

Locomobile Rearranging Factory at Bridgeport

BRIDGEPORT, CONN., Nov. 22—Announcing that it is busier than it has been during the past two years, the Locomobile Co. of America, Inc., is to-day operating its plant here with 1000 skilled workmen, and is making a re-arrangement of its buildings and additions to them that indicates increased working personnel and production.

Additions are being rushed by contractors to units of the so-called Liberty Building, which will allow correlation of machine work in one huge shop building, for construction of both passenger automobiles and trucks. Through purchase of additional property the corporation has squared up its property holdings. The newly acquired space will be utilized for an addition to the machine building.

2 Goodyear Directors Join Stockholder Suit

Attack Legality of Contract Entered Into with Leonard Kennedy Co. of New York

AKRON, Nov. 20—Francis Seiberling and R. L. Robinson of Akron, directors of the Goodyear Tire & Rubber Co. and party defendants to the four actions filed in the Akron Common Pleas Court by Mrs. Laura L. T. Weiss of Cleveland, a Goodyear stockholder, attacking the legality of the entire $85,000,000 refinancing and reorganization program of the Goodyear company, have filed answers to one of Mrs. Weiss's petitions in which they state they believe the allegations in her petition to be true.

The two Goodyear officials in their answers join in with the prayer of Mrs. Weiss in her charges against the new Goodyear management, and petition the court to grant stockholders of the company the relief which they say is due them.

Contract at Issue

The Seiberling and Robinson answers specifically concern the petition of Mrs. Weiss, attacking the legality of a contract entered into by the Goodyear Tire & Rubber Co. and the Leonard Kennedy Co. of New York. Under the terms of this contract, according to the clauses in Mrs. Weiss's petition, Goodyear pays the Kennedy company $250,000 a year plus 5 per cent of the company's annual profits in excess of $10,000,000, but not in excess of $20,000,000, for the services of E. G. Wilmer as president and the services of other Goodyear officers named by the financial control which succeeded the regime of F. A. Seiberling in the spring of 1921.

The two directors state that they were not members of the Goodyear directorate on May 12, 1921—the date upon which the Kennedy contract was negotiated—but were elected as such on March 27, 1922. They also state that until the filing of Mrs. Weiss's petition they had no knowledge of the terms and conditions of the Kennedy contract. Their joint answer also avers that since the service of summons upon them as defendants in the suit, they have carefully examined the contract and all of the circumstances connected with its execution.

Cousin of F. A. Seiberling

Francis Seiberling is a cousin of Frank A. Seiberling, founder of the Goodyear company, and now president of the Seiberling Rubber Co. Francis Seiberling, during the Seiberling regime of Goodyear, was one of the company's attorneys as a member of the law firm of Slabaugh, Young, Seiberling, Huber & Guinther.

Since the filing of their answer it is reported in Akron that through the influence of F. A. Seiberling, who still retains control of his common stock in the Goodyear company, both Francis Seiberling and Robinson were elected to the Goodyear directorate board for the explicit purpose of unearthing the Kennedy contract and of aiding in exposing its terms.

Interests back of Mrs. Weiss in her four actions against the new Goodyear management, were successful not only in unearthing the contract but in getting authentic photographic copies of it in its entirety, and these photographs are attached to Mrs. Weiss's petition.

Goodyear officials will not comment upon the answers filed by Seiberling and Robinson.

Attorneys in the case claim the Kennedy contract was entered into while F. A. Seiberling was still president and in control of the Goodyear company, without his consent or authorization, and that it was negotiated by a special delegate of the financial group handling the refinancing, who had been designated by these bankers as temporary secretary of the Goodyear company.

Seiberling did not step down and out and relinquish control of the company until May 13, and the contract is purported to have been signed by the Goodyear company through the temporary secretary representing the financial interests and new management on May 12 while Seiberling was still in control.

INDIVIDUALS AND NOT FORD LISTING STOCK

DETROIT, Nov. 17—Listing of the stock of Ford Motor Co. of Canada, Ltd., is not a company action, according to a statement from the factory, but the action of individual stockholders. The shares of the company have been listed officially upon the Detroit and Toronto stock exchanges for a number of years.

Quotations in New York, approximating 400, are not unusual, as the stock has been holding close to this figure and mounting as high as 440 at times on the local exchange. There is little trading in the stock, which is closely held, and few sales are in quantity exceeding ten shares.

TYER RUBBER CHOOSES OFFICERS

ANDOVER, MASS., Nov. 20—Myron H. Clark has been elected president of the Tyer Rubber Co., maker of Tyrian tires. He formerly was manager of footwear and miscellaneous factories of the United States Rubber Co. Walter E. Piper, formerly manager of the Boston Rubber Co., has been elected vice-president.

PAUL B. VOSBURG DEAD

NIAGARA FALLS, N. Y., Nov. 20—Paul B. Vosburg, service manager of United States Light & Heat Corp. since September, 1919, died on Nov. 6.

Durant Takes Steps Toward Body Making

Hayes-Hunt Corp. Formed—Production Will Start at Elizabeth Plant

NEW YORK, Nov. 20—Incorporation of the Hayes-Hunt Corp. at Dover, Del., with authorization to issue 1,000,000 shares of capital stock without nominal or par value marks the debut of a Durant subsidiary which will build about 200,000 closed bodies a year for the big holding organization. It also means the construction of body building plants in connection with the six Durant and Star car building plants.

The principals in the Hayes-Hunt Corp. are J. Clarence Hayes of the Hayes-Ionia Co. of Grand Rapids, Mich., and J. H. Hunt, for a long time connected with Chevrolet interests in St. Louis. The new company, however, is entirely independent of the Grand Rapids organization. As yet no officers have been named, Mayles F. Bradley of Durant's executive staff serving as the temporary president.

Plans have been completed to begin operations first in Elizabeth, where space has been set aside in the plant formerly owned by the Willys Corp. and now part of the Durant interests. Three hundred men will be put to work and the force augmented as fast as possible. In all likelihood it will be necessary to build plants at Lansing and Oakland, and it is expected that all six body building factories in various parts of the country will be in full operation by March or April.

Work will be concentrated at first on the production of Star closed bodies. Later on, closed jobs for the Durant will be built. The Hayes-Hunt Corp. will not make open bodies. The bulk of this work for Durant will be done by the Mengel Body Co. of Louisville which will fabricate the material. The bodies will be assembled at the various Durant plants.

Equipment Association Discusses Constitution

CHICAGO, Nov. 21—A business meeting of the Association of Automotive Equipment Manufacturers, attended by 135 members and prospective members, discussed the proposed constitution and bylaws drafted and approved by the board of directors. The constitution was taken up by sections and unlimited discussion was permitted.

A number of minor changes were suggested, and when it appeared that the work could not be completed at that meeting, it was voted to refer the instrument back to the committee of the board. At the association's regular meeting, to be held Nov. 27, final action will be taken.

Following the meeting 12 new applicants for membership were received.

Hupp Sets Schedule of 40,000 for 1923

One-Third of That Number Distributors Told Will Be Closed Cars

DETROIT, Nov. 21—Hupp Motor Car Corp. has set a schedule of 40,000 cars for 1923, approximately one-third of which will be closed cars. The schedule represents a one-third increase over the schedule for this year which was fixed originally at 30,000 but which will reach approximately 35,000. It is estimated that the export business in 1923 will reach 2500 cars, an increase of about 1000 over the 1500 total this year.

The company has just concluded its annual distributor convention, which was attended by 90 per cent of its wholesale organization. Contracts for cars for 1923 signed at the convention were in excess of the company's scheduled output. It was pointed out, however, that the schedule did not represent the company's manufacturing capacity, but was a conservative figure fixed after careful study of probable business conditions in the new year.

Dealer Organization Increased

General Sales Manager O. C. Hutchinson, at the convention, said that the company's dealer and sub-dealer organization had been increased from 900 to 1500 during the year and that a further increase would be made this year. The company will hold its usual dealer meetings at New York and Chicago during the national shows at each of which 500 dealers will be entertained.

Hutchinson urged the distributors to co-operate and assist dealers in meeting merchandising requirements. Particular attention should be paid to educating the retail salesmen, he said, as these men in the final analysis are the ones who eventually sold all the cars for the factory. Marketing methods should be studied and improved constantly, he advised, so the dealers may keep their establishments at high efficiency.

Used Car Difficulty Explained

The only reports the company has had of used car difficulty were from dealers who tried to do more business than their districts warranted, Hutchinson said. At the time the factory pointed out the fallacy of forcing business, he declared. Under its merchandising policy, Hupp was always in position to divert its product to districts in which there was assured demand, Hutchinson said, without loading dealers in territories temporarily caught up.

C. E. Salisbury, service manager, described the company's flat rate system which he said was now being used by practically all of its distributors. Within a short time all distributors and larger dealers will have the flat rate system in effect, he said, as experience has shown it to be most satisfactory both to the owner and to the operator of the large service shop.

Hupp business at present is running largely to closed cars, but it is reported that 50 per cent of the present business in open models is for the special sport models which were introduced last month. The demand for open models at this season has been largely increased by the special line. Next fall the company will be prepared to increase its output of closed cars over the one-third quota set for the early part of the year.

TRACTORS ARE NOT "MOTOR VEHICLES"

MILWAUKEE, Nov. 20—The question whether or not tractors are amenable to the State motor vehicle license laws of Wisconsin has been settled by an opinion of the Attorney General holding that no license need be taken out by the owner.

The opinion says that tractors are not "motor vehicles" within the meaning of the statute, and explains: "It should be noted that the State Department always has construed the law to exclude tractors from the class of motor-driven contrivances for the operation of which a license is required."

Studebaker Reached Its Year's Quota November 15

SOUTH BEND, IND., Nov. 21—On Nov. 15 the Studebaker Corp. reached the quota of 100,000 cars announced at the beginning of the year by President A. R. Erskine, thus completing the schedule in exactly ten and one-half months.

Studebaker plants continue to operate at capacity, demand for all models still being considerably in excess of production. Thousands of sales are reported to have been lost this year because production could not keep pace with demand.

Large additions to Studebaker plants are now being constructed, both in South Bend and Detroit, to take care of the planned production in 1923 of 150,000 cars.

Receiver Is Appointed for London Motor Plow

SPRINGFIELD, OHIO, Nov. 20—On application of Edwin L. Shuey, Jr., a stockholder, John G. Cooley has been appointed receiver for the London Motor Plow Co. by Judge F. W. Geiger of the Court of Common Pleas. The assets of the company are placed at $39,665 and the liabilities at $37,086.

Shuey in his application stated that the company can meet its debts if it is not pushed by creditors. One suit has been filed against it and other creditors have been threatening to file actions. The company was incorporated July, 1921, with a capital stock of $150,000.

Moon Distributors Order 15,625 Cars

Fifty Per Cent More Than Company Ever Built in Year Wanted in 1923

ST. LOUIS, Nov. 22—At a meeting of all Moon distributors at the factory here orders were placed, with shipping instructions, for 15,625 cars in 1923, nearly 50 per cent more cars than the Moon company has ever produced in one year in its history.

In addition to contracting for this large number of cars the distributors agreed, under a co-operative warehousing and financing plan sponsored by the company, to take one-third of their total allotments during the three winter months and the remainder in equal monthly quotas, thus enabling the factory to maintain a steady rate of production throughout the year.

Supply of Cars Short

The distributors were agreed that last spring and summer they could have sold many more cars than they did if the cars had been available. They did not have large stocks on hand, however, and the factory, having dropped to low production during the winter, was unable to expand immediately to meet the demand. Officials of the company desired to maintain the whole factory personnel intact this winter and keep production at a fairly constant level. They appealed to the distributors to aid by stocking cars in warehouses this winter and the distributors responded to the full extent in meeting this appeal.

Assistant Treasurer Earl F. Nelson explained the financial co-operation in a short talk at a banquet during the meeting. He said distributors should use their credit at their banks and through the commercial automobile financing companies when possible.

Banks Will Advance Loans

The Moon company, he said, is prepared to deposit in the local bank of any distributor the amount of money necessary to finance his purchases, with the understanding that the bank will make loans as needed to the distributor over a period of three months.

The bank must take full responsibility for the credit risk and for releasing cars from the warehouse, but the Moon company agrees to take back within three months any new and unused cars upon which loans have been made and not repaid.

Having reached a peak production of 1018 cars in August the Moon company has reduced its schedule with the coming of winter, and its output this month will be about 650. Orders for materials, however, have been placed for delivery right away under the new arrangement and plans are being made to start Dec. 1 on a monthly production schedule of 1250 cars.

Building Open Cars for Spring Demand

Manufacturing Efforts, However, Center Chiefly Around Closed Types

DETROIT, Nov. 20—Stocking of dealers on a limited scale by manufacturers with strongly financed dealer organizations is getting under way against the early spring demand. Although there is a continued large demand in closed cars, the call for open models has fallen off extensively in most parts of the country, and factories maintaining major operations are doing so by building against next year's purchases.

The lightness in the stocking as compared with previous years may be traced directly to the increased demand for closed models, which is placing the industry more firmly on an all-season basis. Many persons, otherwise purchasers of open models in the spring, are buying closed models now, making immediate business possible where formerly an open model would have been carried over.

Closed Cars 50 Per Cent of Output

Closed car business in almost every branch of the industry is now exceeding 50 per cent of total output. With manufacturers of better-priced cars it is running as high as 70 to 80 per cent. Manufacturers running on close to normal summer schedules are stocking dealers with open models, though a large number of open models are being sold at this season, due to the increasing popularity of special sport designs.

The closed car demand alone now has reached proportions adequate to carry most manufacturers through the winter on a satisfactory earning basis, but the outlook for spring is regarded as warranting continued manufacture of open cars in large quantity. Manufacturers whose dealers are not stocking are operating on immediate business alone on schedules ranging from one-half to two-thirds lower than summer business.

Increase Dealer Representation

Companies are pushing vigorously their campaigns for increased dealer representation, and many important retail and distribution changes are being made every day. Restricted sales territories are being thrown open by many leading manufacturers, resulting in many dealers in less popular lines taking over sales of the more popular product, but in some cases this condition is inverted and sub-dealers of the big lines are switching to exclusive sales contracts with the smaller companies.

There is tremendous activity in the sales field, all through the industry, and every effort is being made to line up desirable dealers wherever they may be had. Almost all the big makers are increasing their manufacturing schedules for 1922, and this necessitates increased sales outlets. The building up of dealer organizations in cities continues strongly, and apparently the larger companies will develop this policy more extensively.

The traffic problems of factories will be aggravated from this time on by reason of the cessation of major boat operations on the great lakes, though some of the smaller lines will continue for some time longer. Freight cars have been scarce enough up to this time, but they will be scarcer than ever for a while. This fact alone will tend to hold stocking to a minimum, as long distance shipping facilities will be required largely for immediate business.

Deliveries of steel to the plants continue to be slow, and, in addition, much inferior steel is being received which cannot be used. This condition is adding a still further burden to the traffic and inspection departments, and is also causing much confusion as it is tying up freight cars for returning.

TRUCKS AND TRACTORS SELLING IN SOUTHEAST

ATLANTA, Nov. 21—Cotton at 25 cents per pound, the highest mark it has reached in forty years, outside of war times, has further stimulated the farm implement and tractor sales in the Southeast the past two months, according to the latest report of the Federal Reserve Bank of Atlanta.

September tractor sales continued well above those of a year ago the same month, while October experienced a further increase over the entire district. Indications promise steady sales volume in tractors and trucks for farm use all winter, according to reports of distributors in this section.

Durant Interests Start New Process Gear Plans

NEW YORK, Nov. 20—The incorporation of the Premier Gear Co. with Myles J. Bradley as temporary president has been recorded in Delaware. This is the first step taken in the reorganization of the New Process Gear Co. of Syracuse by the Durant interests which now are in control.

Within a short time it is likely the Premier title will be abandoned for that of the New Process Gear Co., at which time Durant is expected to announce his plans of operation so far as the gear manufacturing unit of his organization is concerned.

STANDARD METAL SOLD

THOMPSONVILLE, CONN., Nov. 22—The Standard Metal Work Corp. here has been sold to the Premier Manufacturing Co. of Sandy Hook, N. J., which also absorbs the W. & B. Douglas Co. of Middletown, making a $1,500,000 combine. The Standard makes automobile accessories and parts.

Car Building Plans Press Parts Makers

Number of Orders Received by Them Indicates Sustained Operations

MILWAUKEE, Nov. 20—Inasmuch as the condition of an industry is fairly well demonstrated by the movement of shipping directions, it is interesting to note that manufacturers of automotive parts and equipment continue to be favored with delivery orders on contracts far beyond their most hopeful expectations based on the situation at the middle of November in former years. It is evident that passenger car manufacturers intend to sustain their winter production at a higher rate than past averages. At this time specialists in Ford materials and equipment in this center are being pressed probably harder than in any other month this year, obviously because of the increased output recently put into effect at Detroit.

Shortage of Soft Coal

The fuel situation has become so settled that it is no longer a major topic of comment. The supply of soft coal is short, however, and economy is being practiced by all users. Mild weather so far this season has been of material help in conserving the small supply. Electric power users of central station current are practicing economy, but only by suggestion rather than demand, and it does not appear that it will become necessary to curtail the supply. Nevertheless steam generating plants have no over-supply of coal, while hydro-electric plants are encountering the condition of a smaller water flow than usual, due to the extreme drouth during the late summer and early fall.

The freight car shortage remains a serious problem to local manufacturers, especially in getting automotive materials to Eastern points. Motor truck delivery is in general use, both on short and long hauls, although there are certain limitations which make this recourse not entirely equal to requirements. No improvement in railroad transit conditions is looked for, as winter operating handicaps soon will be superimposed on the more or less unnatural obstacles now existing.

Farm Machinery Gains

Comfort is found in the reports from manufacturers of agricultural machinery. For instance, the large Van Brunt works of John Deere at Horicon, Wis., resumed production Nov. 15 on a 60 per cent schedule effective until May 1. For 20 to 24 months deliveries from this plant have not averaged more than one-third of normal. It is stated that a cleaning up of dealers' stocks and an increased replacement need among farmers are making the resumption possible.

The freight car shortage is making

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Tire Makers Promise Dealers Co-operation

Retailers at Convention Take Steps to Strengthen Own Organization

MILWAUKEE, Nov. 17—"We tire dealers must work in harmony with the manufacturers in order to achieve the best results possible for dealer, maker and consumer" was the keynote of this year's convention of the National Tire Dealers Association, as enunciated in an address by the new president, George J. Burger of New York.

Discussions during the various sessions developed clearly that the dealers recognize that, if the tire business is to be purged of evils and nuisances, the dealer must first put his house in order, and then he may expect and be assured of the utmost co-operation of the manufacturer.

Representatives of virtually every representative tire manufacturing concern in the country were present by invitation, and a most friendly attitude and a helpful tone pervaded every expression made by them on the floor of the convention.

To Build Up Strong Body

While it was discovered to be the main idea of some members in the past to attempt to work upon the manufacturing interests rather than among themselves to eradicate acknowledged evils, at this convention the thought was dominant that it is essential that a strong, powerful body of dealers committed to ethical practices be built up, and to such an organization the assistance of the manufacturing group was gladly promised.

Standards of qualifications for eligibility to membership are being formulated, and it is believed that within a relatively short time dealers will be seeking membership in the association instead of requiring strong urging and persuasion to join. Like all new organizations, the tire dealers, since their association was formed a year ago, have battled an uphill fight to make the general body of dealers recognize the importance of belonging to the association and making themselves a part of its work.

Qualifications for Membership

At present the qualifications, which will be effective until Jan. 1, are that an applicant for membership must be a bona-fide dealer in tires, whose principal business is the merchandising of tires, and whose practices and policies subscribe to the generally accepted principles of legitimate, fair and honorable dealing. The dues of $6 per annum will be increased to $15, and as soon as the new secretary is able to put under way a membership campaign, the standards of eligibility will be strengthened.

Briefly, the aims of the association as enunciated at the Milwaukee convention are:

1. The sale of blemished and seconds to bona fide dealers instead of "gyps" and brokers
2. The discontinuance of basing equipment accounts on five instead of four tires.
3. The absorption of the war tax.
4. The reducing of direct sales to national and commercial accounts.
5. The enactment of ordinances, already accomplished in 25 cities, prohibiting spurious advertising and misrepresentation.
6. Increased margin of profit to the dealer.
7. Abolition of mileage adjustments.
8. Mutilation of all tires returned for adjustment.

That an advance of 5 to 10 per cent in the price of tires is to be looked for was the statement made by a number of dealers on the floor, although no direct intimation of increased tire prices was given by representatives of manufacturers in public expressions.

Frank Zeman was re-elected vice-president of the association.

ELECTRIC TAXICABS APPEAR IN NEW YORK

NEW YORK, Nov. 20—A new type of taxicab went into service in New York when the Electrotaxi Corp. placed a fleet of electric cars in operation last week. These are the first electric taxicabs that New York has had since the old electric hansoms of more than 20 years ago. Finished in two tones of gray the new cabs are in sharp contrast with the prevailing color schemes of public vehicles.

It is the intention of the Electrotaxi Corp. to work the cabs in double shifts, keeping them on the streets from 18 to 20 hours a day. Two sets of batteries are to be used and the battery compartments are specially designed for rapid changing, so that an exhausted battery may be removed and a fresh one substituted in less than 10 minutes. By thus changing the battery, the cars will have an operating radius of approximately 120 miles, and a maximum speed of 25 m.p.h.

Midwest Rubber Discusses New British Restriction

ST. LOUIS, Nov. 18—One of the largest meetings this year of the Midwest Rubber Manufacturers' Association was held this week at the Missouri Athletic Association. The regular monthly meetings of the association are held in Chicago, but this meeting came here at the request of a committee of St. Louis members. A luncheon was held at which the principal speaker was Charles M. Hay, a St. Louis lawyer.

There was extensive discussion of the new British regulations designed to stabilize the production of crude rubber by the imposition of graduated export taxes. The opinion was generally expressed that the new regulations will tend to stabilize rubber prices at a level somewhat higher than the present price.

Equipment Men Join in Educational Work

Service "Associates" Formed in Chicago as Development of Informal Body

CHICAGO, Nov. 18—The Service Equipment Associates, an organization to promote education on the proper understanding and use of equipment in automotive maintenance establishments, was formed at the Congress Hotel last night. G. W. Brogan of the Black & Decker Manufacturing Co., presided.

The organization had its beginning last May when a group of equipment manufacturers agreed upon a plan of pooled advertising of the promotional or educational sort. This advertising was planned to promote improved equipment and has centered about the slogan "The well equipped shop gets the business." This advertising was first placed in *Motor Age* and *Motor World* and later extended to other publications.

There was no formal organization back of this plan but a several months' trial had convinced most of the participants that it was worth while. On Nov. 10 a meeting was held when a more formal organization was discussed and a committee named to draft the plan. This plan was placed before the members of the groups and some invited guests last night. Short talks were made by William Webster, commissioner of the Automotive Equipment Association, and Ray W. Sherman, merchandising head.

New Members of Committee.

Three members of an executive commission were elected as follows: For three years, G. W. Brogan; for two years, S. V. Wood, Mid-West Manufacturing Co.; for one year, Charles F. Hodgson, Weaver Manufacturing Co.

Four meetings will be held each year, two of which will be on the occasion of the Automotive Equipment Association meetings. All are to be of the round table order and promotion of the use of better and more complete equipment is to be the only objective. The member firms are:

T. R. Almond Manufacturing Co., American Bureau of Engineering, Black & Decker Manufacturing Co., Burton Rogers Co., Continental Auto Parts Co., Greenfield Tap & Die Corp., Jacobs Manufacturing Co., Marley Manufacturing Co., Miero Machine Co., Mid-West Manufacturing Co., Frank Mossberg Co., Oxweld Acetylene Co., Weaver Manufacturing Co., Joseph Weidenhoff, Wright Manufacturing Co., Bonney Forge & Tool Works, Stevens & Co. and Kellogg Manufacturing Co.

DAVIS HEADS DOSS RUBBER

ATLANTA, Nov. 21—At a recent meeting of the stockholders of the Doss Rubber & Tube Co., T. J. Davis was elected president and general manager, the change effective at once. Warren M. Sutton was named vice-president.

Postpone Operation of Mexican Tariff

More Time Is Granted Dealers in Which to Import American Made Cars Free

MEXICO CITY, MEXICO, Nov. 18—Foreign automobile manufacturers and dealers will have an opportunity to continue their shipments into Mexico unrestricted until the latter part of December and possibly until Jan. 15. The Treasury Department has issued an official order suspending temporarily the decree which placed an ad valorem duty of 10 per cent on all automobiles imported to Mexico. This decree went into effect early in October.

It is stated that a considerable number of automobiles were imported while it was in effect but under the new order of the Treasury Department these collections will be refunded to those who paid them.

The order was issued in response to a protest of the automobile dealers of Mexico City and other towns of the country who set forth in their plea for lifting of the duty that it worked a severe financial hardship upon them inasmuch as they were not given time before the decree went into effect to replenish their depleted stocks of automobiles, and that many sales had been made at prices based on the importation of the cars free of duty.

It is stated that the suspension of the duty will continue until the outstanding orders for automobiles have been filled, which will be the latter part of December or the early part of January.

North Carolina Showing Gains, Campbell Reports

DETROIT, Nov. 21—Commenting on business conditions in the south Atlantic district, Colin Campbell, general sales manager of the Chevrolet Motor Co., declared North Carolina to be showing remarkable gains in an industrial sense, so much so that hydro electric companies in that district have announced that they are unable to make additional contracts for power.

Bankers in that district advised him on a recent trip that bank deposits in that State have reached a higher mark than ever before. Many cotton factories are working two shifts, he said, and the demand for help is taxing the district. Under the influence of higher prices for cotton, the last of the crop of two years ago is being rushed to market and there is little possibility of further storing by growers.

The highway construction program of the State is also furnishing a large amount of employment and in addition is creating an increased demand for automobiles. Sales of low priced cars in that territory have shown remarkable increases in recent months, he said, and the outlook for large business in 1923 is especially bright. Better prices for grain and oats in the middle Atlantic States is also strengthening the car demand in those districts, he declared.

ANTI-THEFT SECTION OF MOTOR LAW UPSET

DIXON, ILL., Nov. 22—Illinois motor vehicle law sections which make it a felony to have possession of an automobile, the engine numbers of which have been changed, is unconstitutional, according to Circuit Judge Harry Edwards of Lee County. He quashed counts in an indictment against V. J. O'Gorek on this ground.

May Add Six-Cylinder Car To Present Templar Line

CLEVELAND, Nov. 20—The Templar Motor Co. in all probability will place a six-cylinder car on the market, continuing at the same time the four-cylinder model.

The price will be such that both cars will come into the market under much better conditions from the price standpoint. This feature is being planned with the idea of much larger production and greater sales of cars.

T. L. Hausman, receiver of the company, states that reorganization plans were being worked out and that some time in January a statement of details probably will be made public.

In the meantime, Hausman, who is in active charge of the plant operations, is making new cars and shipping them daily. All dealers are being supplied with parts, and the court protection that was secured has enabled him to obtain sufficient working capital and thereby overcome what had been a serious handicap.

Business has exceeded expectations of the receiver, who has obtained several new contracts since he took hold of the plant.

FLINT EXPECTED NEXT MONTH

NEW YORK, Nov. 20—Durant Motors expects to have the first of the new Flint cars out by the first week in December. There has been a slight delay in the original program, caused by a few changes in engine proportions. The Flint engine will be made by Continental, but will be built along lines laid down by Durant and Continental engineers.

3368 MILES ON 40 GALLONS

LOS ANGELES, Nov. 20—Seeking a gasoline mileage record instead of a speed mark, Cannonball Baker, riding a Neracar motorcycle, has completed a trip from New York to this city, 3368 miles, reporting a consumption of 40 gallons of gasoline and five gallons of oil. His running time was 179 hours, 28 minutes, or an average of 20 m.p.h.

Schwab Tells Dealers Basis for Optimism

Country in Better Shape Than Year Ago—Sees Greater Improvement in 1923

INDIANAPOLIS, Nov. 22—Charles M. Schwab, president of the Bethlehem Steel Co. and now a moving factor in the reorganized Stutz Motor Car Co., told Stutz distributors and dealers, assembled here for a one day conference, his reasons for believing that the automotive industry as well as all business interests of the country should share in his confidence of good times ahead and continued prosperity and increased trade during the coming year.

Says Outlook Is Very Good

In stating his reasons for his optimism he said:

After a little recession due to conditions abroad and to the recent election and the uncertainty due to future legislative action, I find the outlook is very good. I believe I can point out sound grounds for my optimism. The whole country needs material in every line and in great quantities. The railroads will need much steel. The farmers will get good prices for their crops, and so will the cotton growers, for the world needs more cotton than it has needed for several years. In fact the world is short of every fundamental and will continue so. That means prosperity.

Continued and steady growth for general business and for the making and selling of automobiles can confidently be expected for next year. At present unsettled world conditions and the upsets of the recent election have disturbed the outlook, especially in certain quarters. These things are temporary. They will soon pass.

The marketing of farm crops at good prices and the continued growth of general lines will discount the disturbing elements of the immediate present. By the first of the year we can confidently look for materially bettered general conditions and a steady growth and expansion from month to month from then on. I do not look for a boom. I sincerely hope there will be none. But steady growth and progress I do look forward to.

People Still Want Cars

"The people seem to want more and more cars," Schwab said, with a broad smile, when asked if he thought general business and industrial conditions warranted the assumption that the country could continue to absorb motor cars next year at the 1922 rate of production. "With the probable growth and expansion and progress of general trade next year it would be quite unreasonable to expect the motor industry and trade to lag. All fundamental conditions point to steady growth and progress. All conditions are better than they were a year ago. The motor industry made records this year. There seems no sound reason to expect anything but a growth and steady rise after the first of the year."

Fifty Stutz distributing agencies were represented at the conference and dinner.

Men of the Industry and What They Are Doing

Elwood Haynes Returns Home

Elwood Haynes, president of the Haynes Automobile Co., has returned home on the President Arthur after a European trip. He reports considerable feeling in England over the American tariff law, which, he believes, will have a depressing effect on industrial activity throughout the British Isles.

Executives Plan Arctic Trip

Plans are being made for a hunting trip to the Arctic Circle next spring in a flying boat which will follow the Hudson River and the Canadian lakes and rivers to James Bay and then to Hudson's Bay. There a camp will be pitched, and the sportsmen will go after polar bears and walrus. Booked for the trip are Howard E. Coffin, president of the National Aeronautic Association; W. E. Metzger, vice-president of the Columbia Motors Co.; Harold H. Emmons, president of the Detroit Chamber of Commerce; Police Commissioner James W. Inches of Detroit; I. M. Uppercu, president of the Cadillac Motor Car Co. of New York, and Charles F. Redden, president of the Aeromarine Airways. It will take three days to make the trip, it is estimated.

Peed Made Overland Sales Head

L. G. Peed, has been appointed sales manager of the Willys-Overland Co., succeeding A. C. Barber, who goes to Chicago to become president of the Overland Motor Co., the Overland branch in that city, a position formerly held by W. H. Taylor. It is understood that Taylor contemplates moving to California. Peed has been assistant sales manager for Overland for about a year, going to the position from Toledo, where he was branch manager. Previous to that he was retail sales manager of the New York branch.

O. L. Smith Resigns

O. L. Smith, chief inspector and efficiency engineer for the Velie Motors Corp., Moline, Ill., has resigned after 13 years' service with the corporation. He will join the Lowden Machinery Co. forces in Fairfield, Iowa.

Hudson Advances Draper

J. S. Draper has been appointed assistant sales manager of Hudson Motor Car Co., his appointment being part of the change in the sales department by which Harry G. Moock becomes sales manager and H. B. Phipps, export manager. Draper was formerly identified with the company as district manager.

Rosenbach Manages D & B Sales

David Rosenbach has resigned as director of sales of the Farran-Kinney Co. of Chicago to become manager of sales for Dalton & Balch of Chicago, manufacturer of D & B silent timing gears. Rosenbach has been in the automotive equipment field for over 20 years, having been secretary of the Automotive Equipment Association and sales manager for the Rayfield carbureter.

Anklan Heads Hall Lamp

William F. Anklan, who recently was advanced to the presidency of the Hall Lamp Co., with works at Kenosha, Wis., and Detroit, began his career with the company as a bookkeeper in the office of the Kenosha plant 20 years ago, when the industry was known as the Badger Brass Manufacturing Co. When the Hall company was formed as a consolidation, Anklan was transferred to the general offices in Detroit and made secretary and treasurer afterward. For several years he was chief assistant to J. F. Hartz, whom he now succeeds as president. Hartz has been elected chairman of the board.

McCann Arrives in London

W. G. McCann, export manager for the Hendee Manufacturing Co., which makes the Indian line of motorcycles at Springfield, Mass., has arrived in London to attend the Olympia Motorcycle Show, to be held in the English metropolis, from Nov. 25 to Dec. 4. McCann will remain in Europe for at least three months, visiting various points on the Continent following the London show, where his company will have a large exhibit.

Whitehair With G. M. Truck

Harry S. Whitehair has joined the national sales division of the General Motors Truck Co., making the third member of the sales force in this division. Whitehair will have general charge of all territory outside of New York and Chicago, where the company already has headquarters in the national division.

Harroun Joins Marvel Carbureter

Ray Harroun, who for several years has been prominent as an automotive engineer, has joined the organization of the Marvel Carbureter Co., Flint, with combined responsibilities in executive engineering and sales.

Heringhaus Joins Fisher Body

Alphonse G. Heringhaus of LaFayette Motors Corp. has resigned to become associated with the Fisher Body Corp. He will travel out of the Detroit office.

Bethlehem Appoints Beary

M. Herbert Beary has been appointed special factory representative of the new Bethlehem Motors Corp. He will make his headquarters in Kansas City, Mo.

Metzger-Hurlburt Motor Co. Formed

Metzger-Hurlburt Motor Co. has been formed in Detroit by William E. Metzger and William B. Hurlburt to handle the Columbia in that city. Both Metzger and Hurlburt have been prominent in the industry for many years, a large part of the time being associated with each other. Metzger has been identified with many companies both in the manufacturing and sales ends. Besides being one of the founders of Cadillac, he was the "M" of the E-M-F combination and has been a vice-president of the Columbia Motor Car Co. for several years. Hurlburt after being associated with Metzger in the early days of the industry, served as a distributor in eastern cities of several cars and later organized the Hurlburt Motor Truck Co. of New York. Since leaving the truck company he has been with Metzger in the Wills Sainte Claire distributorship.

Graves Succeeds Barnes

William H. Graves, assistant chief metallurgist of the Packard Motor Car Co., has been appointed chief metallurgist to succeed C. E. Barnes resigned. R. R. Robinson has been appointed assistant manager of purchasing.

Belgium Proposes Higher Duty on Cars and Parts

WASHINGTON, Nov. 22—Increased duties on automobiles and parts are proposed in a draft of the new Belgian tariff which will be submitted to Parliament at an early date, according to a cablegram received from Commercial Attaché Cross at Brussels. The proposed duty on automobiles and parts is 160 francs per 100 kilos to be increased by a coefficient of 4.

Automobiles weighing up to 4000 kilos have been dutiable heretofore at 20 per cent of the c.i.f. value in port of entry, while those weighing over 4000 kilos and all parts of automobiles have been assessed at the rate of 12 per cent ad valorem.

New York Court Upholds Taxicab Bonding Statute

NEW YORK, Nov. 20—The Appellate Division of the Supreme Court has upheld the validity of the State law requiring the bonding of taxicabs in cities of the first class. This decision was made in the test case of Charles Martin, who failed to comply with the law, which calls for a bond of $2,500 for each taxicab to guarantee compensation if a passenger is injured.

Justice Dowling, who wrote the decision, held that the validity of the statute was not affected by the expense, however heavy, that must be borne by the owner of a taxicab.

Seeks to Halt Plan of Wagner Electric

Stockholder Gets Restraining Order in Connection with Reorganization

ST. LOUIS, MO., Nov. 18—A temporary restraining order, returnable Dec. 8, was granted to-day in a suit for a receiver and an injunction to prevent the reorganization of the Wagner Electric Manufacturing Co., a Missouri corporation, into a corporation under the laws of Delaware. The suit was filed by representatives of the estates of Richard C. Kerens, John J. Raleigh and Jane M. Leahy, who own about 1600 shares, or 2.7 per cent of the stock of the Missouri corporation, against the corporation and its officers and directors.

The plaintiffs allege that the reorganization, if consummated and allowed to stand, would make their stock valueless, and they seek to oust the present management of the company, recover its assets and have the management vested in a receiver and stockholders of the Missouri corporation.

Layman Denies Charges

W. A. Layman, president of the old and the new corporation, said the reorganization had already been effected and that the new corporation had been functioning since Aug. 11. He added that the change was duly ratified by 93 per cent of the stockholders of the Missouri corporation at a meeting Aug. 4 and that the interest of no stockholder was prejudiced.

The plaintiffs ask that the officers and directors be restrained from holding a meeting of stockholders Dec. 29, called for the purpose of voting on a plan to reduce the capital stock. Accusations of misconduct in office are made against the officers and directors of the corporation and their removal is requested so that they can be replaced by stockholders interested in continuing the Missouri corporation.

Assets of $11,851,606

The Missouri corporation had outstanding 15,000 shares of one kind of stock of a par value of $100 a share. At the beginning of this year, it had assets of $11,851,606 and debts of $4,219,923. It had been in financial straits, but since last March the business has been showing a profit. At one time, Dec., 1920, the company owed $7,139,238. The company manufactures single and poly- motors, transformers and auto- starting and ignition apparatus.

The petition alleges that early in 1920 the directors of the company anticipated a deflation in the value of inventory and proposed to market $3,500,000 of pre- stock through a New York broker at a discount of 7 per cent. This deal fell through, as did a subsequent ar- to finance the company through G. H. Walker & Co., St. Louis brokers.

In 1921, the petition sets forth, certain St. Louis and New York banks and trust companies that had loaned money to the company placed representatives in the directorate. From that time, it is alleged, the inventory was reduced; money derived from the sale of products was paid on the debts to the banks, and the business was operated at a loss.

Says Stockholders Lost

When the business began to show a profit, in March, 1922, the petition says, the banks and trust companies thereupon demanded payment of their loans, and since then the directors and representatives of the banks have conspired to transfer the assets of the company to the Delaware corporation. The charge is made that the Missouri corporation received no compensation for the assets thus transferred, and that the reorganization was made for the benefit of the obligations to the banks and trust companies, and at a loss to the stockholders.

SEES BLOW TO TRADE FROM CAR ACCIDENTS

PITTSBURGH, Nov. 21—Members of the Pennsylvania Automotive Trade Association were warned last night by Benjamin G. Eynon, state registrar, that "While the effects of accidents on sales is negligible now, the time will come when the accumulative force of abuse will deal a crashing blow to the industry."

He said the time will come when the average citizen will demand legislation forbidding the building of engines above a certain speed and restricting fast traveling.

He predicted over 760,000 cars and 66,000 trucks will be registered in Pennsylvania this year, and probably 900,000 cars and 80,000 trucks next year.

Operations Keeping Up to Level of Last Month

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the industry cannot help but feel the effects of rail congestion and the lack of available transportation facilities.

A more wholesome tone is being given to the truck branch of the industry, with both heavy and light duty vehicles feeling an impetus in sales.

Excellent conditions prevail in the export field with no reason for qualifying the general impression that this will be the best year in the matter of shipments.

Business with part makers continues good with collections showing no decline from last month.

$10,000,000 Plant in South Is Report

Automotive Interests Are Said to Have Bought Site in West Virginia

PITTSBURGH, Nov. 21—Orders received by Pihl & Miller, Inc., of Pittsburgh, construction engineers, for a great quantity of constructional steel lend strength to the rumor that a large automobile plant will be built at Ridgeway, a township near Martinsburg, W. Va. The Pittsburgh firm admits receipt of the order for material for such a factory in that town, but declines to mention names.

It also has developed that the interests back of the deal have bought 3000 acres of land at an average price of $200, upon which the plant will be constructed.

According to the rumors, the plant is to cost $10,000,000. No stock has been offered for sale, and efforts to find out who is back of the project have failed. It is said, however, that financial interests of Pittsburgh and Detroit are fathering the project. It is known that one of those approached is Harvey S. Firestone, but he is reported to have refused to be a participant.

About the only available information regarding the project is the report that it is a four-cylinder car that will be built to compete with a popular model of the same size already on the market and to sell at a lower price.

As far as can be gathered, the project contemplated is something similar to the Marysville venture of Wills Sainte Claire in that it is expected to build a city of 16,000 homes at Ridgeway.

Detroit Knows Nothing

DETROIT, Nov. 20—No one here will admit any knowledge of the $10,000,000 company at Ridgeway, W. Va. Harold H. Emmons, president of the Board of Commerce, declares he knows nothing of it and, further, never has heard of William Jordan, who is said to represent Detroit in the West Virginia deal.

Road Matters Considered at Michigan Conference

GRAND RAPIDS, MICH., Nov. 21—A joint session of the north central division of the National Highway Traffic Association and the Michigan State Good Roads Association was held here to-night, the speakers, including David C. Fenner of Mack Trucks, Inc.; Roy D. Chapin, president of the Hudson Motor Car Co.; Arthur H. Blanchard, president of the National Highway Traffic Association, and George H. Pride, treasurer of the National Highway Traffic Association, and David Beecroft, vice-president of the North Atlantic division of the National Highway Traffic Association and directing editor of The Class Journal Co.

Timken Axle Selects Glover as President

Succeeds A. R. Demory Who Leaves Company Because of His Ill Health

DETROIT, Nov. 22—Fred Glover, vice-president and general manager of the Timken-Detroit Axle Co., has been elected to the presidency, following the resignation of A. R. Demory. The resignation is effective Dec. 2 at which time Glover will assume the presidency and H. W. Alden will succeed to the position of chairman of the board. No other changes in the organization are contemplated. Both of these positions were left open by Demory's retirement.

Ill health is given as the reason for Demory's resignation. It is his intention to spend the next year or more in travel and rest. To this end he has severed his connection with the Timken company entirely, his stock having been sold during the last few months.

Glover became associated with Timken in July, 1919, coming from Washington, where he had been identified with the motor transport service. Previous to that he acted as vice-president and general manager of the Gas Truck Co. of Minneapolis. When this company sold its holdings to the Emerson Brantingham Co. He became vice-president of the new company.

Alden has been with Timken for 17 years and has been associated in the motor car field since 1895. Since the organization of the Timken Detroit Axle Co. in 1909 he has been in complete charge of design and engineering.

Executives of the Timken company express complete confidence in the future of the automotive industry. Increased volume of business in both truck and passenger car field in 1923 is indicated by contracts already filed. It is expected that the volume of business in the new year will aggregate $24,000,000.

Rickenbacker Acquires Old Detroit Shell Plant

DETROIT, Nov. 21—The Rickenbacker Motor Co. has taken over the former plant of the Detroit Shell Co. where shells and ammunition were made during the war. The building adjoins the Rickenbacker property. In it are 20 concrete and steel abutments, with a solid base 20 feet in the ground and rising from the floor level to four feet in height, which must be removed before the company can use the building, necessitating a delay in occupancy of at least two months.

The plant will be connected with the present Rickenbacker factory by a 60-foot archway, giving the organization approximately 500,000 sq. ft. of floor space. The new addition will house a continuation of the assembly line and will be the finishing end of the production line.

SUPREME COURT ACTS IN TAX ON GASOLINE

WASHINGTON, Nov. 20—Motorists in the State of Arkansas cannot be forced to pay a gasoline tax pending the final adjudication of the constitutionality of the question as to whether or not a State can levy a tax of one cent a gallon on gasoline and kerosene.

The Supreme Court to-day granted an injunction on the application of the Pierce Oil Corp. to continue in force a temporary injunction secured in the Federal Courts against the enforcement by the State of a State tax of one cent a gallon on gasoline consumed in motor vehicles.

The constitutionality of the question is now before the Supreme Court and pending final decision, it was held that the temporary injunction in Arkansas must stand.

Other building activity at the Rickenbacker factory, which soon starts its second year of production, include an addition to the office building, an enlarged experimental department, the installation of a complete factory service station for Rickenbacker tourists and the construction of an executives' garage.

Would Use More Diplomacy in Taking Care of Traffic

NEW YORK, Nov. 20—As illustrating the difference between brute force and diplomacy in handling traffic and showing how modern methods of efficiency are working out, Alden L. McMurtry, until recently consulting engineer of the Connecticut State Motor Vehicle Commission, told members of the Metropolitan section of the Society of Automotive Engineers at their meeting here that one traffic officer can stop and warn 50 motorists of violations of regulations in the time it would take him to make one arrest and carry the case through the courts.

While McMurtry in his paper on "Regulations Governing the Use of Rural Highways" devoted most of his time to explaining the workings of the Connecticut law, the way the commission handled its records and the system of law enforcement in the State, the discussion that followed threw many interesting sidelights on the situation.

The small-town constable idea must go, declared McMurtry, who believes the success of traffic regulation should be measured by the results attained in reducing the number of accidents and not by the number of arrests made.

NEW AUBURN "SIX"

AUBURN, IND., Nov. 20—Confirmation of the rumor that the Auburn Automobile Co. will bring out a smaller and lower priced six-cylinder model is made by President A. P. Kemp.

Earl Motors Elects Scobie as New Head

Formerly Vice-President and Treasurer—Financial Interests Approve Choice

JACKSON, MICH., Nov. 21—George C. Scobie, vice-president and treasurer of Earl Motors, Inc., under the Earl régime, has been elected president to succeed Clarence A. Earl, resigned. Scobie is a Jackson man, having served successfully with Hayes Wheel Co. as auditor, controller, secretary and director, continuing in the latter capacity after joining Earl.

Before becoming identified with the Hayes company, he was a member of the accounting staff of Price, Waterhouse & Co. and has a long financial and business experience. He became active in the Earl company together with other Jackson men early in the year, when the company experienced financial difficulties. His place as head of the company has created general satisfaction in Jackson, where the residents have a large financial interest in the company.

Several important changes will be made in plant departments, but Scobie has deferred announcement on these pending thorough consideration of the needs of the company. Though the company has made progress during the year, as attested by its improved position at the national shows, it is planned by the new executive to bring it much more to the forefront. In this connection it is also noted that the company has enjoyed a very high export business during the year, which it plans to enlarge.

With Scobie as president, the company is reported to be in position to secure ample financing at all times, as he enjoys a large measure of confidence of the interests backing the company.

Disturbances Delay Cable Report of Argentine Show

NEW YORK, Nov. 22—The annual automobile exposition at Buenos Aires, Argentina, under the direction of the Automovil Club Argentino, opened on Nov. 9 and was concluded on Nov. 19. Plans had been made to publish in this issue of AUTOMOTIVE INDUSTRIES a resume of the show results, to be cabled to New York by the editorial correspondent of this publication and *El Automovil Americano* in the Argentine capital. Due, however, to the interruption of the service of the All-America cables by the recent earthquakes and tidal wave in Chile, this editorial message was not forthcoming.

Efforts to obtain the desired information via the Western Union lines, which follow the east coast to South America and pass through the Bahama Islands, landing at Miami, Fla., have been unavailing thus far.

Caution Emphasized in Parts Symposium

Replies Made to M. A. M. A. Questionnaire Predict Sound Credit Conditions

NEW YORK, Nov. 20—"What in your opinion is the automotive outlook for 1923 with respect to finance and credit?" is the question asked of some of the leaders in the industry by M. L. Heminway, general manager of the Motor and Accessory Manufacturers Association, in a questionnaire sent out. Replies received predict sound credit conditions and keen competition.

Heminway's correspondents in this symposium unite in declaring for unremitting vigilance in granting credit and show optimism tempered by caution as well as displaying a forward-looking faith in the dynamic progress of the automotive industry.

Sees Encouraging Outlook

Representing the vehicle manufacturers, A. R. Erskine, president of the Studebaker Corp. said:

> The outlook for 1923 in respect to credit, finance and sales is most encouraging. I believe the volume next year will equal if not exceed this year.

According to Alfred Reeves, general manager of the National Automobile Chamber of Commerce, a few of the car manufacturers may have some difficulty, but on the whole the credit and financial outlook is good. He points out that arrangements are being made with 22,000 bankers throughout the country to get credit for dealers, particularly in the carrying of floor stocks, while more and more finance companies are entering the field to handle the retail sales.

According to many representative parts manufacturers, 1923 will be the final test of financial strength for small automobile manufacturers.

A leading carbureter manufacturer says:

Improvement Looked For

> It is our opinion that the finances of the better companies will improve during the first six to nine months of the year 1923, and on the other hand we will not be surprised if some of the companies who are not well financed find it necessary to drop out. Whether they will discontinue doing business or will be absorbed by some of the larger companies we cannot say, but we assume that there are so many cars on the market to-day that the manufacture of some of them could be discontinued without having a bad effect on the industry.

Similar views are expressed by many other unit manufacturers and suppliers of raw material who are in close touch with the basic conditions in the industry, but they all agree that this does not represent a pessimistic outlook for the trade as a whole. Furthermore, it is pointed out that many small concerns, with a sound product and a strong clientele, are not necessarily weak because they happen to be small. Some small concerns are in better shape financially than several of their larger competitors. In the main, though, the outstanding vehicle manufacturers in the principal price divisions are making sharp inroads on the business of the smaller manufacturers through economies in production and distribution.

One of the largest parts manufacturing concerns in the country has this to say:

> Finance and credit will be on easier footing than in 1922 due to the remarkable performance of the industry. It will carry into the year of 1923 the conviction to bankers and financiers that the automobile industry is on a sounder and more popular basis than ever before.

Car makers who do not give excellent value for the money will have a difficult time, say many executives. In general, 1923 will be a year calling for vigilant work on the part of credit managers. A representative Detroit parts manufacturer sums up the situation thus:

> There is a feeling among financial men that the next few years are going to bring very strong competition among automobile companies, and therefore the financial men will have to be very careful in giving credit, for, while some will make large profits, many will fall by the wayside. This condition will not change until business has really cleared itself of practically all weak concerns and is in the hands of a few strong companies.

"Most of the weak sisters have already been eliminated," says a Cleveland accessory manufacturer, "and the few remaining ones will be either refinanced on a sound basis or eliminated from the field by the force of competition, thus leaving the industry as a whole in better shape," or, as another manufacturer expresses it, "those car manufacturers now in good financial condition will show a steady improvement and those not at the top will probably fall back."

Car Building Plans Press Parts Makers

(*Continued from page* 1048)

Milwaukee one of the leading shipping centers for North and Western distribution by Michigan manufacturers especially. Great Lakes transit lines are carrying a relatively enormous number of passenger cars from Detroit, Flint, Lansing and even Toledo. Crosby Line steamers have been carrying between 60 and 75 new cars to Milwaukee every day from Muskegon, Mich., to which point the cars are driven from factories for cross-lake transit, to be driven from Milwaukee to Wisconsin, Minnesota, Iowa, Dakota and even Montana.

The Pere Marquette Line, which does not ordinarily call at the Muskegon port, has been bringing several boatloads each week since late in October. As an accommodation to Buick, two shipments of 40 cars each were brought from Muskegon to Milwaukee last week by the Pere Marquette.

The Crosby Line is planning to put on another steamer for the Muskegon-Milwaukee run.

Engineers Discuss Automotive Railcar

A. S. M. E. Section Takes Up Question Following Paper Read by Herbert Chase

NEW HAVEN, CONN., Nov. 20—Discussion of the paper by Herbert Chase entitled "Some Trends and Recent Developments in Automotive Vehicles" presented before the local section of the American Society of Mechanical Engineers here this evening hinged largely upon the subject of railcar development, the principal speaker being W. L. Bean, mechanical assistant to the president of the N. Y., N. H. & H. R. R. Co.

Bean criticised the six-wheel railcar made by simply modifying existing truck chassis, and stated that he believes the use of these vehicles will be confined chiefly to use on short lines where traffic is exceedingly light. Cars of considerably larger capacity, but still using light automotive construction are needed by the New Haven road and would see wide use elsewhere, said Bean, and he is doing much to encourage this type of construction.

Favors Eight-Wheel Type

He favors an eight-wheel type of car having a capacity of 60 or more passengers and a fair sized baggage room.

Bean said further that some form of separate air compressor is needed, both for whistle and brake operation. The engine must be designed for railcar characteristics. A six-cylinder engine developing fully 120 hp. appears to be required and means for operating the car from either end are quite necessary. Railcars used by the New Haven road have been much improved by increasing the gear ratio to give 43 instead of 29 m.p.h. at the same governed engine speed.

Little Depreciation of Cars

It was originally expected that the depreciation of the New Haven railcars would be such as to require that they be written off in three years, but the durability has proven so good that a five-year basis is now employed. Roller bearings first used on leading trucks proved to be too small. Larger roller bearings have stood up well and are favored over plain bearings. Automotive steam units for railcars are not favored because the labor used is not familiar with the automatic devices required.

It was learned after the meeting that the General Electric and Westinghouse Companies are interested in building lighter gas-electric railcars and that the New Haven road is giving their proposals serious consideration. The New Haven road is now installing an R & V Knight six-cylinder engine in one of its railcars for experimental comparison with present four-cylinder poppet valve engines of slightly less displacement.

Truck Builders Meet with Parts Makers

Efforts Will Be Directed Toward Boosting Specialized Unit Vehicles

DETROIT, Nov. 22—Plans for the welding together of unit parts makers and manufacturers of specialized unit motor vehicles into a compact organization for the promotion of this type of vehicle in the present expanding truck market were discussed at a meeting of the National Association of Motor Truck Industries this week, at which there were also present representatives of leading companies making up both elements of this branch of the industry.

Out of the meeting comes a plan whereby the former name of the organization will be shortened to Motor Truck Industries, and its management placed in the hands of a group of officers headed by Martin L. Pulcher, president of the Federal Motor Truck Co., and a board of directors composed of nine truck makers and six representatives of parts makers.

To Harmonize All Efforts

The fundamental principle of the association is to promote the merchandising of specialized trucks by harmonizing all efforts to this end. Directors and officers will consider at once the advisability of selecting a merchandising manager and a plan of selling patterned somewhat along the lines of the Automotive Equipment Association.

Efforts will be made to bring into the association all reputable makers of specialized unit trucks, so that united action may be taken on all problems confronting makers in this particular field. Consideration of the extent to which makers should go in the financing of dealers will be one of the first important matters taken up, and a plan in which the association may participate as a group may be developed if determined necessary.

Tone of Truck Market Better

The confinement of automobile buying to fewer lines and the consequent smaller margin for dealers in these favored lines, together with the general improvement in the tone of the truck market, was considered as creating opportunities for truck makers to wean good car dealers over to the truck end of selling and thus overcome the shortage of responsible dealers under which the truck industry as a whole has been laboring.

There was a pronounced feeling on the part of all companies present to vest absolute confidence in the ability of Pulcher to organize an association which would bring desired results. As a mark of this, the parts makers present voted to throw themselves open to any suggestion for the general betterment of conditions which he or his committee might suggest, and declared themselves ready to do their utmost to eliminate any cause of misunderstanding in the past.

By association it was pointed out that truck makers may act unitedly in prompting efficiency in truck sales, and that tendencies to bid against each other for dealers may be overcome by elevating the general standard of dealers so that all may have good ones. Monthly meetings, at which sales experts in all fields would be heard, and from these the association could garner sales information which, in turn, would be passed out to dealers in the form of regularly issued sales promotion organizations.

Discuss Contract Handling

There was some frank discussion on the handling of contracts and commitments during the recent inventory liquidating period, in which the positions of both truck makers and unit makers were shown and out of it came the apparent feeling that these difficulties had been handled to the best possible advantage of everyone, and that misunderstandings could have been avoided had there existed a joint association.

Those participating in the discussions were Fred Glover, new president of Timken-Detroit Axle Co.; George W. Yeoman, Continental Motors Corp.; G. E. Wilder, Gemmer Manufacturing Co.; C. A. Dana, Spicer Manufacturing Co.; A. E. Parsons, Brown-Lipe Gear Co.; L. M. Viles, Buda Co.; C. C. Hinkley, Hinkley Motors, Inc.; W. L. Horning, Waukesha Motor Co.; David Beecroft, the Class Journal Co.; A. V. Comings, Chilton Co.; J. W. Stephenson, Indiana Motor Truck Co.; H. T. Bouldin, Selden Truck Corp., and J. F. Bowman, Garford Motor Truck Co.

238,514 Cars and Trucks Produced During October

WASHINGTON, Nov. 23—Figures received by Department of Commerce through the Bureau of the Census place the total production of passenger cars in October at 217,098, compared with 187,128 in September, while truck production amounted to 21,416 as against 188,656 in September. In October, 1921, production totaled 134,734 passenger cars and 12,813 trucks. Total output of cars and trucks in October was 238,514.

The following table gives the total production for each of the last four months, with corresponding figures for the same months of last year. With a few exceptions, the reports each month are from identical firms and include approximately 90 passenger car and 80 truck manufacturers. October figures are subject to slight revision when all reports have been received.

	1922	1921
Passenger cars		
July	224,057	165,574
August	249,225	167,705
September	187,128	144,669
October	217,098	134,734
Trucks		
July	21,357	10,766
August	24,200	13,080
September	18,656	13,648
October	21,416	12,813

Packard Votes Stock Dividend on Common

Fourth Apportionment in Nine Years—Shares Outstanding, $11,885,100

DETROIT, Nov. 21—Packard Motor Car Co. will pay a 100 per cent stock dividend on Dec. 16 to holders of common stock, directors at a meeting yesterday determining that a portion of the accumulated surplus should be permanently invested in the business to care for needs created by its rapid expansion.

This will make the fourth apportionment of new common stock by the company in nine years, the previous distributions being 40 per cent, October, 1913; 10 per cent, February, 1916, and 50 per cent, August, 1916. The authorized common stock was increased from $13,000,000 to $30,000,000 in 1919, at which time the par value was reduced from $100 to $10 a share. Common stock to the value of $11,885,100 was outstanding on Aug. 31 this year. When the new dividend is paid the outstanding will be approximately doubled.

Stock Outstanding

In addition to the outstanding common, the company has outstanding $14,789,800 of its authorized $20,000,000 of 7 per cent cumulative preferred stock and about $7,400,500 of 8 per cent gold bonds due April 15, 1931, and dated April 15, 1921, these forming the residue of an authorized issue of $10,000,000. The balance sheet as of Aug. 31, 1922, shows accumulated surplus of $17,004,438. There would be a surplus of about $5,119,338 remaining after meeting the transfer to capital account.

President Alvan Macauley computed the book value of common stock to be $24.31 on the basis of the company's showing in the last annual report. Stock on the local market was offered at $20.25 Monday with $20.12½ bid.

Wire Wheel Will Enter Market with Disk Type

BUFFALO, Nov. 20—Announcement is made that the Wire Wheel Corp. of America will produce and market a new steel disk wheels, which will be called the Buffalo. This step has been taken after the situation had been thoroughly canvassed and General Manager O. J. Rohde convinced of the public demand for a disk wheel. Years have been spent in developing the wheel, and the company has had the co-operation of factory engineers and production managers.

The mechanical features will not be announced until the national shows, when the new wheel will make its debut.

The Wire Wheel Corp. of America, one of the pioneers in its field, has heretofore confined its manufacturing efforts to wire wheels alone.

Atlantic City Plans $4,000,000 Speedway

Expect Work Will Be Completed in Time for Proposed Meet on July 4

ATLANTIC CITY, Nov. 20—Automobile racing will be one of the attractions of this resort next summer, plans having been completed for the construction of a 1½-mile board speedway by the International Speedway Association.

Concrete grandstands capable of holding 150,000 people will be built at an estimated cost of $2,700,000; another half million will be spent on the track, while it is expected that the cost to fill in 400 acres of meadow land which has been selected as the site of the track will be $160,000. The location chosen is between the Pennsylvania Railroad and the Absecon Boulevard, about 1½ miles from the boardwalk.

Work will start Jan 1, and it is hoped to complete it in time for a proposed meet, the date of which has been set for July 4, and which has the sanction of the American Automobile Association.

Prince Designs Speedway

John S. Prince, builder of many automobile board speedways in this country, is the designer of the proposed speedway. In this one, however, he has deviated from his usual practice in that he plans an inner track, one-quarter mile in circumference, which will be used for motorcycle racing and athletic events. In addition, it is planned to utilize the infield for baseball, horse shows, etc.

The International Speedway Co. is incorporated for $6,000,000, of which it is expected $4,000,000 will be used in building the plant. At present more than half a million has been subscribed, it is said, and the rest, it is stated, is in sight. C. H. Berlekamp of Cleveland, who is well known in the tire manufacturing field, is president of the company, and Prince is vice-president. The general manager is E. F. Corcoran, while among the directors are Harry Holloway, superintendent of the Brier Hill Steel Co. of Youngstown, Ohio, and Herbert S. Fray of the James Connolly Construction Co. of Cleveland and formerly with the International Harvester Co.

NEW STEVENS HEATING PLANT

SPRINGFIELD, MASS., Nov. 21—The receivers for Stevens-Duryea, Inc., have obtained permission from the creditors to install a new heating system in the plant at Chicopee Falls and also to relocate a spur track leading to the plant. These changes will increase the efficiency of the plant, but no marked increase of production is contemplated at present.

NEW JERSEY ROADS DINNER

NEWARK, Nov. 18—The New Jersey Good Roads Association, which has become a permanent organization composed of leading automotive and other business men of the State since the approval of the $40,000,000 highway building program by the voters on election day by a majority of more than 16,000, will hold its first annual dinner at the Robert Treat Hotel here on Dec. 5.

Among the speakers will be Alfred Reeves, general manager of the National Automobile Chamber of Commerce, Senator Edge and Governor-elect Silzer.

FINANCIAL NOTES

Gilliam Manufacturing Co., Canton, Ohio, at a recent directors' meeting declared the regular semi-annual dividend of 3½ per cent on preferred stock. Checks are now being mailed to stockholders. Officials of the company report volume of business more than trebled since Jan. 1 of this year, making further building expansion necessary. Much new equipment has been installed during this year, and an additional assembly room 40 x 90 feet is now being equipped and will be completed soon. Three new carbonizing furnaces have just been completed. Engineers are now working on plans for a new building which will cover the entire property recently purchased from the Kohler Baking Co.

Stewart-Warner Speedometer Corp. has declared an extra distribution of $1 a share on the common stock, thus bringing the year's payments up to $5 a share. Next year, there is every reason to believe the stock will be on a $5 basis. The company, it is said, now has more than enough cash to pay such dividend and has no indebtedness outside of current bills. Sales up to Nov. 15 more than equaled those for the entire year of 1921 and net profits for the first nine months of this year totaled $3,514,078, or the equivalent of $7.32 a share.

Lee Rubber & Tire Co., reports show net earnings for nine months ended Sept. 30 of $278,351, after reserves for taxes and contingencies. Net sales for the nine months were $5,167,253. After payments of dividends for the first three quarters the surplus was $414,388. Unit sales of tires showed an increase over the same period of last year of 15 per cent and unit sales of tubes an increase of 40 per cent.

Republic Motor Truck Co. receiver has issued a statement showing the company's financial condition as of Sept. 28. The assets, excluding good will, shop rights, etc., are fixed by the appraisers at $6,289,929. Liabilities to all classes of creditors of record total $5,181,861.

Milwaukee Motor Products, Inc., Milwaukee, manufacturer of the "Milwaukee" timer for the Ford and other cars, has increased its capital stock to $350,000 to handle the increasing volume of business and provide for contemplated extensions of production capacity.

Chicago Motor Bus Co. has applied to the Illinois Commerce Commission for permission to issue $3,750,000 worth of stock to finance the extension of the company.

CARLISLE PLANT CLOSED

STAMFORD, CONN., Nov. 22—A shutdown of the Stamford plant of the Carlisle Tire Corp. was announced today, due, the company says, to a general slump in business this winter.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Last week the rate for call money ranged from 3½ per cent to 5 per cent, as compared with 5 per cent to 6 per cent in the preceding week. An easier tone was also noticeable in the time money market. The rate for all maturities from 60 days to 6 months was 5 per cent, as compared with a range of from 5 per cent to 5¼ per cent the preceding week. The prime commercial rate continued to be quoted at 4½ per cent to 4¾ per cent.

Although freight loadings in the week ended Nov. 4 failed by 19,653 cars to measure up to the total of the preceding week, the decline was of a seasonal character.

Based on the amount of coal loaded at the mines, the estimated coal production in the week ended Nov. 11 was 12,600,000 tons, of which about 10,700,000 was bituminous coal and 1,900,000 anthracite. Production is continuing at a rate which allows the addition of a considerable amount to the reserves after taking care of current domestic requirements.

Although the November crop estimates for cotton and cereals, with the exception of corn, remain essentially the same as for October, changes in prices make a change in the value of the crops. The combined cotton, wheat, corn, oats and barley crops were valued on Nov. 1 at $4,727,000,000, as compared with a valuation of $4,144,000,000 on Oct. 1, and of $3,225,000,000 for last year's crop on Nov. 1, 1921. This is an increase of 14 per cent over October and of 46 per cent over Nov. 1 of last year, and it will be an important factor in increasing the purchasing power of the farmer.

The Federal Reserve statement as of Nov. 15, 1922, showed decreases of $6,907,000 in gold reserves, and $6,522,000 in total reserves. Total bills on hand increased $14,631,000.

Chicago Bus Permitted to Extend Its Service

CHICAGO, Nov. 22—Permission to operate motor buses over south side boulevards here has been granted by the Illinois Commerce Commission to the reorganized Chicago Motor Bus Co. of which the president is John A. Ritchie, formerly head of the Fifth Avenue Coach Co. of New York.

The application of the Depot Motor Bus Co. for a similar permit was denied. The new service must be inaugurated within six months, according to the terms of the permit. Officials of the company state, however, that service will be started in a shorter time and that from 40 to 50 buses will be put in service at the start. The buses are to be manufactured in Chicago by a new corporation headed by Ritchie and operated as a subsidiary of the Yellow Cab Manufacturing Co.

INDUSTRIAL NOTES

American Bosch Magneto Co. reports unfilled orders in excess of $9,000,000, of which the magneto division is credited with $6,200,000 and the starting and lighting system lines the remainder. This compares with $8,000,000 forward business a year ago this time. Shipments of magnetos during 1922 will exceed average shipments of the years 1914 to 1918 inclusive, the company reports. In 1919 and 1920 shipments were more than 100 per cent greater than anything previously accomplished.

Aluminum Specialty Co. of Manitowoc, Wis., has broken ground for a shop addition estimated to cost $65,000 with complete equipment. It will be three stories, 40 x 140 ft., and will be ready about Feb. 15 or March 1. Demands upon the company from the automotive and other industries all year have been in excess of capacity, and extensions have been undertaken now that ample assurance has been received that the new facilities will be utilized without waste when completed.

Fairbanks, Morse & Co., Chicago, is transferring the pump department of the Eclipse works in Beloit, Wis., to the branch factory at Three Rivers, Mich., in order to provide more adequate space for the internal combustion engine plant, which by spring will occupy practically all of the Eclipse works. The Beloit plant is one of the largest of its kind in the world and during the past two years has undergone material enlargement.

Rote Leather Co., recently incorporated for $1,000,000 under the laws of Delaware, has purchased the plant of the Doyle Rubber Co. at Akron. It will install machinery immediately and have the plant in operation by the first of the year, according to President B. W. Rote of Cleveland. J. W. Hildebrand is secretary of the company. The company will manufacture imitation leather for automobile tops.

Hendee Manufacturing Co. in October completed the third month's business since its 1923 models were announced. The total number of domestic sales for the three months was considerably more than double the amount of business done in the first three months of the 1922 selling season. Actual domestic sales for October, 1921, were more than treble domestic sales for October, 1922.

J. B. Greenway of Roanoke, Va., long associated with the tire manufacturing industry, is planning the establishment at Columbia, Tenn., within the next few months of a factory for the manufacture of tires, according to advices received from the Chamber of Commerce of Columbia.

Harley-Davidson Motor Co., Milwaukee, manufacturer of motorcycles, bicycles, air-cooled engines, etc., is about to start work on another factory addition, 80 x 125 ft., now that it is completing work on an additional story on one of the main factory buildings.

Philips Automobile Body Corp. at Ravenna, Ohio, which is taking over the incomplete plant of the McElrath Tire & Rubber Co. plans to remodel and complete the plant before spring. The new company it is said is ready to expend $100,000 on the work.

Hodes Zink Manufacturing Co. of Freemont, Ohio, manufacturer of automobile fabric accessories is installing 50 new machines in its factory. When these are in operation 50 more women will be employed making a total working force of 275.

B. L. Schmidt Co., Davenport, Iowa, manufacturer of the micro machine, has changed its name to the Micro Machine Co., in order to link the name of the company with the name of the product. The company has moved into a new factory building.

St. Louis Spring Co., manufacturer of automobile springs, will build a large and modern manufacturing plant, on property recently acquired in St. Louis. The company plans to occupy the new quarters by Jan. 1.

Willys-Overland Co.'s former plant at Elyria, Ohio will soon be engaged in the manufacture of actuating farm gates, J. S. Green of Indianapolis having purchased the building for that purpose.

Schott Brothers of Ashland, Ohio, has bought the Willys-Overland clubhouse at Elyria and will convert it into a buffing wheel factory.

Rolls-Royce Announces Prices on Body Models

SPRINGFIELD, MASS., Nov. 20—Rolls-Royce of America announces prices on its 12 body models, showing a range of from $10,900 to $13,500 as follows:

	Number of Passengers	Price
Roadster	2-3	$10,900
Phaeton	4-5	10,900
Phaeton	6-7	10,950
Enclosed drive cabriolet	5	12,800
Limousine	6-7	12,850
Sedan	4-5	13,150
Sedan	7	12,900
Enclosed Drive limousine	6-7	12,900
Town brougham	6-7	12,850
Suburban limousine	7	12,900
Salamanca cabriolet	4-5	12,950
Full cabriolet	6-7	13,500

BERGOUGNAN INCREASES PRICES

NEW YORK, Nov. 21—The Bergougnan Rubber Corp. of Trenton, N. J., has increased the price of its cord and fabric tires and tubes 12½ per cent, effective at once. The change in price is partly caused by the increased cost of production, due to the rise in the price of rubber and fabric. The Trenton plant is now working at full capacity.

FORD BODIES CUT IN PRICE

ST. LOUIS, Nov. 22—A reduction of $51 in the price of bodies for Ford cars has been made by the Coupe De Luxe Body Co. The coupe body, which is four passenger, has sold for $350 since it was introduced several months ago. The new price is now $299, f.o.b. factory.

FIRST STAR FROM ELIZABETH

NEW YORK, Nov. 20—The first of the Star cars to be manufactured at the Elizabeth plant came through on schedule last Thursday. While production will be at the rate of 25 a day for the time being, it is expected that by June 1 the Elizabeth plant will be turning out 500 Stars and 150 Durant fours a day. Elizabeth is the fifth Durant plant to start Star production, and the output is in excess of 200 a day in all these factories.

State Officials Tell Their Views on Taxes

Also Discuss Car Thefts, Sentiment Favoring Title Law As Solution

FRANKFORT, KY., Nov. 18—One of the outstanding features of the meeting of the National Association of Secretaries of State held here yesterday was the attitude toward more equitable systems of taxation for motor car owners in various States.

The conferees devoted considerable time to discussion of automobile thefts, sentiment favoring a title law in each State as the best solution of the problem. M. O. Eldridge, executive chairman of the American Automobile Association, told the State officials that more than $2,500,000 represented the value of stolen cars recovered since the enactment of the Dyer Act in 1919.

Frank Wenzel, chairman of the State Audit Bureau at Albany, N. Y., demonstrated a device against thefts consisting of a coil around the steering wheel in which certain key numbers covering the numbers of engine and chassis were stamped.

Motorists Willing to Pay Share

Eldridge pointed out the need of dividing State finances into two groups. He said:

> There is a tendency in some States to place the entire cost of building and maintaining trunk line highways on the automobile, which is manifestly unfair and impractical. Motorists, as a rule, are willing to pay their just share of road taxes, but the American Automobile Association believes that the capital outlay for the building of new roads should be obtained from bond issues amortized over a period of years from general taxation, and that the maintenance expenses should be paid from current revenues obtained either partially or wholly from the users of the highways.

Officials from New Jersey supported Eldridge in his contention and discussed the advantages of this division in their State.

Eldridge told the conference that motorists generally opposed gasoline taxes, especially in view of high taxes levied on automobile owners by States and municipalities. He expressed the opinion that the gasoline tax would be the fairest form of levy in event the impost was in lieu of excessive taxes.

The age limit for drivers of motor vehicles was discussed freely. While no resolutions relating to the automobile industry were passed the conferees favored licenses for drivers in every State with 16 years as a minimum age.

Louis L. Emerson, Secretary of State for Illinois, was re-elected president of the organization.

It was decided to make an effort to assemble all organizations dealing with State problems in one conference to be held at Asheville, N. C., next June.

Calendar

SHOWS

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8 - 13 — New York, Second National Automobile Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Nov. 25-Dec. 4—London (Olympia), Cycle and Motorcycle Show, British Cycle Motors, The Tower, Warwick Road, Coventry.

Dec. 15 - Jan. 2 — Paris, Aeronautical Salon, Grand Palace, Chambre Syndicale des Industries Aeronautiques, 9 Rue Anatole de la Forge.

Jan. 13-24 — Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

April - July, 1923 — Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

RACES

May 10 — Berlin - Grunewald, German Grand Prix.

CONVENTIONS

Dec. 6-8—St. Louis, Third Annual Meeting of the American Petroleum Institute, Hotel Statler.

Jan. 15-19—Chicago, Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show.

Jan. 29 - 31 — Chicago, Annual Meeting, Automobile Electric Service Association, Congress Hotel.

S. A. E. MEETINGS

Metropolitan Section

Dec. 14 — Speaker, Charles P. Grimes, Research Engineer, H. H. Franklin Manufacturing Co.; Subject, Air Cooling in Automotive Engines.

March 15—Speaker, William P. Kennedy, President, Kennedy Engineering Corp.; Subject, Trolley Buses and Flexible Vehicles for Street Railway Service.

April 19—Speaker, Edw. E. La Schum, General Superintendent, Motor Vehicle Equipment, American Railway Express Co.; Subject, Engineering Features of Fleet Operation.

May 17—Speaker, F. P. Gilligan, Secretary, Henry Souther Engineering Co., Subject, Metallic Materials for Automotive Work.

Other Meetings

Jan. 9 - 12 — New York, Annual Meeting.

Jan. 31 — Chicago Meeting and Dinner of the Society at the Congress Hotel.

Bosch Magneto Case Dismissed by Court

WASHINGTON, Nov. 20—After more than a year's investigation by the Federal Government of the sale of the Bosch Magneto Co. by the former alien property custodian, the Government's suit to dissolve the sale has been dismissed by the District Criminal Court on the ground that no overt act was shown to have been committed and therefore is not within the jurisdiction of the local court.

The case was taken up by a District grand jury, who considered evidence tending to show that a conspiracy existed in the sale of the company, and the jury returned a verdict that the overt act complained of had been committed outside of the district, and therefore, upon advice of the attorney representing the Government, the grand jury was compelled to cease further investigation.

Assistant Attorney General H. J. Galloway and William M. Offley, who presented the testimony to the grand jurors, declined to say where the Department of Justice would seek next to secure an indictment. The matter, however, will not be dropped, Galloway declared.

"The Government has ample evidence to prove that there was conspiracy in the sale of this valuable property and will press its suit to a conclusion," he declared.

Sparks-Withington Acts As Host to A. E. A. Party

JACKSON, MICH., Nov. 18—The Sparks-Withington Co. was host to-day to a party of 150 men and women, including jobbers, officers of the Automotive Equipment Association, a number of business paper representatives and the wives of some of the guests. The visitors, who came here from the A. E. A. Convention at Chicago on a special train, watched the making of Sparton horns during the morning and in the afternoon were taken on another special train to Ann Arbor, where they witnessed the Michigan-Wisconsin football game.

The Sparks party had breakfast, lunch and dinner at the Jackson City Club, where an informal program of entertainment and speechmaking was a feature of the dinner party in the evening. Captain William Sparks acted as toastmaster and the speakers included Colonel Winthrop Withington, Major Philip H. Withington, Harry and Clifford Sparks, N. H. Oliver, president of the Automotive Equipment Association, and Howard M. Dine, past president. A number of the jobbers and other visitors also made brief remarks.

Used and Open Car Sales Show Decline in Chicago

CHICAGO, Nov. 20—Retail sales of automobiles in Chicago have dropped off very perceptibly since the first of this month, used cars and open models being most seriously affected. A fairly good demand continues for closed models, and there are indications that a considerable number of such cars will be bought for Christmas gifts this year.

There is still plenty of interest in things automotive, and business is by no means at a standstill. In the week ending Nov. 11 there were 472 cars sold on deferred payments. This compares, however, with 645 such sales in the week ending Oct. 28 and an average of around 900 weekly throughout the summer. These figures are furnished by the Central Automobile Financing Association which compiles records of all time sales for which papers are filed.

Unusually mild and open weather continuing up to this time has greatly encouraged the use of automobiles this fall, and as a consequence maintenance work and the sale of equipment and accessories have enjoyed sustained prosperity.

May Compel Owners to Take Insurance

PHILADELPHIA, Nov. 22—Recommendations for legislation for compulsory automobile liability insurance throughout Pennsylvania are to be formulated by a committee appointed at a meeting of the traffic division of the Philadelphia Chamber of Commerce, which was attended by 40 representatives of the principal insurance companies here. Compulsory insurance, it is said, would effect a reduction of 50 per cent in insurance charges.

At the meeting the statement was made that 80 per cent of the automobiles in the State do not carry insurance. This statement prompted an agreement on the possibility of grading insurance rates upon the basis of accident records. The creation of the special committee followed.

A meeting will be held in the near future at the Chamber of Commerce of representatives of automobile, civic and trade organizations in other lines, and the special committee at that time will submit a report.

Committee Appointed

This committee, composed of five insurance men, is as follows: Walter J. Chase of Henry Brown & Co., C. C. Lippincott of the Hutchinson-Rivinus Co., F. G. Reese of the Pennsylvania Manufacturers' Association Casualty Insurance Co., W. A. McCrea of the Pennsylvania Indemnity Exchange and J. E. Van Dorn of the American Mutual Insurance Co.

The plan is to determine upon a course of action looking toward adopting methods for a graded insurance and the possibility of requiring the carrying of insurance by irresponsible car owners, dependent upon their records for safety, carelessness, etc., so that careful drivers need not be penalized for the carelessness of others.

AUTOMOTIVE INDUSTRIES
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Management Must Be Made to Fit Dominant Buyers' Market

Consumer will dictate for next decade. Demand will be uncertain. High prime costs must be offset by savings elsewhere. Accurate market analysis requisite. Real merchandising essential. Skillful selling operations necessary in fierce competition.

By H. S. Person*

IN the conduct of any enterprise there is a major function, the responsibility for which resides somewhere in the organization, of determining future policy. In many enterprises this function may be regarded lightly or even disregarded on the principle that sufficient unto the day are the problems thereof; but in the larger enterprises, and in all well-managed enterprises of any size, it is not neglected.

It is highly probable that an increasing number of enterprises will come to recognize that policy determination is a function which requires serious and continuous attention. It will involve the ascertainment of and analysis of facts concerning which executives have in the past had little interest, and it will involve, above all, much and careful thinking. It is questionable whether the American executive can be characterized as a thinking executive so much as one intuitioned in reaction to immediate facts; he himself has been proud rather to consider himself a doer and go-getter par-excellence—he who acts and gets while others think. If he is what he believes himself to be, he is the natural product of his economic environment; but one question to be raised is whether there is not evident a sufficient change in the environment to make any such pride now unreasonable.

The particular phase of the policy problem which we are to consider is presented in the question, "How must executives shape their managements to meet developing industrial conditions?" This question is fundamental for a particular kind of management is an expression of decisions on many other matters of policy.

LET us give our attention first to developing industrial conditions. A first glance is reassuring, for the revival due to follow the acute depression of 1921 is obviously already under way. This is indicated in all the reports of fundamental lines of activity. Bank clearings, car loadings, the production of basic commodities and merchandise distributions have increased; stocks and bonds are more active; the spread between commodity prices has been reduced and in general a possible further long-run decline in commodity prices has been checked by price advances; there is an increase in employment and even in places a shortage of unskilled and skilled labor. Executives are reporting that they are "getting the red ink off their books"; and frequently there appear in the press optimistic utterances of captains of industry.

*Managing director of the Taylor Society, organized to promote the science of administration and management. Digest of paper read at the annual meeting of the society in New York, Nov. 22-24.

But a second, less superficial consideration of conditions causes us to hesitate to join those who believe "it is all over except the shouting." May not this evidence of revival be only the evidence of rebound from the extreme depression and may not the present rate of acceleration be only temporary, to be replaced by a rate more moderate? May not the projection of a curve into the future on the assumption of a continuance of the present rate of revival be a dangerous basis on which to establish managerial policy for the future? The more thoughtful and cautious fear so.

WHEN there is eliminated the activity to supply seasonal and terminable demand, and particularly the intensive activity to supply the abnormal demand for fundamental necessities to which the exiwencies of war denied satisfaction—for instance, construction and all the lines of industry attendant on construction—when there is observed the fact that consumers' demand for a wide range of commodities and services is continuing to be hesitant and cautious, there is not left a sufficient amount of evidence to warrant a projection of the curve of industrial activity into the future at its present gratifying slope.

A third and more penetrating analysis, this time of more fundamental conditions, is even disconcerting to those who believe it is all over except the shouting. During the past decade, as a result of the study of earlier cyclic movements, we have learned that certain economic phenomena, such as the quantity of money and credit, have a definite relation to industrial activity. The store of money and credit influence prices and the price movement influences industrial activity. We should recall that the long period of accelerating industrial activity culminating in the frenzy of 1920-21 was coincident with a long upward swing in prices; that in general industrial activity increases in intensity with an upward price movement, is stagnant when there is a downward price movement, and is hesitant and uncertain in the early years of a new stable price level.

Of course, the ideal condition is a fairly stable general price level, but when a condition of stable price level suddenly confronts an industrial generation which has become accustomed to a consistent upward price movement over a long period, the new condition of stability, because different from the accustomed, is upsetting to the individual, either as a demander or producer, and it takes a considerable period, measured not in months but in years, for him to learn just what he can safely do both in purchasing and in producing.

During recent years some sound work has been done in the analysis of fundamental industrial conditions and tendencies, which has given a basis for policy determination more substantial than anything we had previously had. It may be observed that during the past three years of experience wholly new to us, the forecasts of these investigators have "called the turn" more accurately than the prophesies—or guesses—of business men.

These investigators have succeeded in making some accurate measurements of basic elements which determine price conditions for a number of years ahead and the safest judgment to accept is that, in the words of the Harvard Committee on Economic Research, "the present price level is substantially that around which the fluctuations of the business cycle must play" for the next ten years.

The conclusion I would have you draw is that for, say a decade, a consumers' demand is likely to remain so hesitant and uncertain as to be out of proportion to our capacity to produce. It does not seem necessary for me to give this particular audience any proof that the war has disclosed that our capacity to produce far exceeds anything we had believed it to be. Now I put this question to you as practical managers: If our productive capacity is great, and if it can be made much greater simply by eliminating sheer idleness, and if consumers' demand is fairly certain to be hesitant for the coming decade, have you or have you not a really critical management problem confronting you?

However, before considering the kind of management that problem is going to force upon you, I want to make one more, a fourth, analysis of present industrial tendencies, painting the picture upon a large canvas. Let us give the picture a striking American title: The Overland Trail—from a dominant sellers' market to a dominant buyers' market. We all appreciate that we are now in at least a temporary buyers' market; I am suggesting that we are on the trail to a dominant buyers' market and that we are possibly already on the great divide. If we are, we shall learn to manage our enterprises differently.

A summary review of the industrial history of the United States should make it patent that we have been brought up in a sellers' market. We have been pioneers—explorers, appropriators and exploiters of a vast continent of extraordinary resources. It has been a California of '49, or a Klondike, on the scale of a continent and a century. The exploitation of resources which have always had an immediate world market and cash value, the appropriation of stores of capital and treating it as income has given our population a geometrically increasing purchasing power.

CONSUMERS' demand has kept ahead of and pulled along producers' capacity to satisfy the demand. We consumers have crowded about producers with outstretched hands full of purchasing power, begging them to give us something we could wear, eat, drink, parade before our friends, or otherwise enjoy. We have been drunk with a hoard of wealth and we have spent it like drunkards. As producers we bent every effort to satisfy this demand, and we have constructed for ourselves a tremendous productive equipment. As producers and distributors, we were willing to get while the getting was good.

AUTOMOTIVE INDUSTRIES regards this paper by Mr. Person as one of the soundest and most important discussions in the last two years of the necessity for shaping management to meet changed industrial conditions.

While he considers the subject from the viewpoint of industry in general, his observations and conclusions are peculiarly applicable to the automotive industry.

He points out that in the conservative buyers' market which will prevail for the next ten years, market analysis, master plans and budgets and skillful selling must be applied unless management is to fail in a welter of fierce competition.

There are few automotive executives who can afford to miss this valuable contribution to the literature on a subject which has not been given a tenth of the consideration which its importance warrants.

There were signs before the war that the industrial development of the United States was approaching that stage of evolution. Natural resources had become pretty well appropriated and capitalized, not only such resources as mines, forests and natural transportation routes, but also agricultural lands, for there was before the war an increasing proportion of tenant farmers, paying rent in cash or shares. Serious students were concerned over this tendency. Technical productive equipment was at the same time greatly increased, and there was no sign of a plan or even a clear intent to develop foreign markets.

President McKinley's turn, just before his death, toward a reduction of the tariff obstacle to the development of foreign markets made no impression on the dominant political party, and there continued a period of tariff policy which has culminated in the Fordney-McCumber bill. It seemed to thoughtful observers that the quarter century before the war was a period of conscious or unconscious eat, drink and be merry, for to-day we are getting ours and to-morrow will take care of itself.

Then came the war, which was a tremendous shock to the industrial system. On the one hand it caused a still greater development of productive capacity, financed out of future earnings through the mechanism of bonds and taxation, and caused a coincident decline in consumers' demand (the frenzy of 1920 was but an unsubstantial flare up) a decline which is likely to continue for some time because of the continuing heavy taxes and maladjustments caused by the war. In short, the shock seems to have hastened evolutionary tendencies which would have developed more gradually and with only relatively minor depressions, and to have thrown us suddenly upon a buyers' market which will last for some time and may be the beginning of a dominant buyers' market.

A buyers' market means, for competitive industries, a strife for the consumers' dollar which makes so-called competition on a sellers' market seem but a children's game. In view of all these considerations, I think you will agree with me that there was never a time when management should have more concern over future policy—and over the quality of its future management.

MANAGEMENT on a buyers' market is quite a different thing from management on a sellers' market. On a sellers' market selling is but order-taking; on a buyers' market it must be real merchandising. On a sellers' market production is but the hasty and wasteful process of giving material things a form or other quality which will satisfy insatiable and not over-critical demand; on a buyers' market it must be more precise and economical. On a sellers' market financing is largely borrowing on the assumption of unexploited natural resources or an unexploited upward market; on a buyers' market it is a borrowing on demonstrable future earned profits.

On a sellers' market the conduct of a business is easy and management is simple—in fact there does not have to be any real management. But now that you appear to be face to face with a buyers' market and the necessity of developing real management, if you are to be successful in a most intense competition, if your competitor, instead of yourself, is to be the one to disappear in some readjustment of productive capacity to consumer demand, it is expedient for you to inquire into the nature of that real management.

THE essential practical elements of the problem confronting that management may be summed up as follows:

On the side of supply there is a tremendous production capacity involving heavy investments of capital in more or less specialized equipment to preserve the value of which will require a continuation of the lines of activity for which it was designed. On the side of demand there is a conservative and hesitant market—in fact, a buyers' market—which will continue for a considerable period. This will mean intense competition on the part of management to find the individual consumers and to sell them. In that competition selling price and cost of production will be critical factors. The hesitant market will tend to force selling price down, while higher prices of certain elements entering into cost will tend to keep that figure up.

The fact cannot be disregarded that, as was the experience after both of our earlier great wars, wages have settled at a new high level, and that the strength of organized labor and new immigration policy seem sufficient to hold them there during such a period as will determine the success or failure of competing enterprises. It should be observed also that many of the basic materials of industry are more or less closely controlled, and that material costs are likely to remain high. Therefore, management will be faced by high prime costs in the face of great pressure to reduce the selling price of fabricated products. The way out for the successful competitor appears to be this:

To develop an inclusive system of management which will more than compensate for high prime costs by cost savings elsewhere, thereby effecting lower factory costs and making possible lower selling prices.

In the first place that management will give more attention to such problems as long run tendencies in the industrial environment. These matters will no longer be regarded as merely "theoretical"; they will be regarded as very practical. Certain major executives will give more thought to policy and general plans and not permit themselves to become too much absorbed in operating details and worn out by late afternoon worries. They will not confine their reading to the news headlines and market

PERSON says—

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"On a sellers' market the conduct of business is easy and management is simple—in fact, there does not have to be any real management."

"Management will provide for a more accurate judgment of the market with respect to the demand for the commodities it has to offer."

"Managers will learn that they cannot afford to misjudge demand, either with respect to what it wants or how much of that it wants."

"Management will set up in writing, on the basis of the data secured by market research, definite master plans, budgets and schedules of operations for a considerable period ahead."

quotations of newspapers, but will read under the headlines, search for the facts and do some thinking of their own.

That management, in the second place, will provide for a more accurate judgment of the market with respect to the demand for the commodities it has to offer, competitors' ability to supply the demand, and what share of the market it can have reasonable expectation of securing. It is with the consumer that the impulse for industrial activity begins—"the consumer is king"; but on a sellers' market consumers are so numerous and insistent that we forget the source of the impulse and come to believe that it starts with the producer. Under the competitive conditions of a buyers' market, managers will see that in true perspective.

Estimating Demand

MANAGERS will learn that they cannot afford to misjudge demand, either with respect to what it wants, how much of that it wants, or what share of it competitors will permit a particular enterprise to provide. Excessive inventories are fatal on a buyers' market. An enterprise must avoid that by some unit of the organization, whether it be an individual or a group, which will make continuous and precise analyses of the market and provide the data for master plans and schedules.

In the third place, that management will set up in writing on the basis of the data secured by market research, definite master plans, budgets and schedules of operations for a considerable period ahead, these being supported by definite and interdependent detail plans and schedules for the major operating departments—selling, production and financing respectively. These master plans and schedules, and these supporting departmental plans and schedules, will be standards of performance, goals to strive for, lines to which to hew. To do without such plans and schedules means guessing, taking chances, departments out of alignment, unbalanced inventories, higher costs—losses for which the consumer willingly pays the price on a sellers' market, but which, on a buyers' market become a loss to the producer which he cannot afford when competition is intense.

That management, in the third place, will have to conduct its selling operations with more skill than it has ever displayed before. On a sellers' market the consumer seeks the producer; on a buyers' market the producer must search out the consumer and sell him, in the midst of a keen competition both of other producers of the same commodity and other users of the consumers' dollar. Just as there must be no misjudgment of the market, lest there by unsold inventories; no failure to make precise plans and schedules, lest there be unsold inventories; so also there must be no failure to search out and sell to the estimated number of consumers or there will be unsold inventories.

Are we able to imagine the detail changes which are likely to follow the development of the new merchandising? Is it not probable that there will be less of that advertising whose object is to create new wants in satisfaction of which consumers would spend surplus dollars, and more of that advertising whose object is to convince concerning the quality of staple merchandise offered in competition for the limited supply of dollars?

Will not the work of salesmen be something besides either mere order-taking or mere psychological suasion; is not the salesman more likely to spend more time searching out prospects; calling on prospects as well as established customers; skilfully displaying the merits of goods; rendering intelligent—even scientific—service; planning and scheduling his work.

Will not the supervision of sales executives and their assistants be more comprehensive and more skilful—again, more scientific—than anything we have seen; salesmen better selected, better trained, their work better planned and scheduled and given more intelligent and effective support by the directing staff? Will not the channels of distribution be more carefully studied and more discriminately selected?

I have called attention first to market analysis, master plans and budgets and selling, as conspicuous features of the new management, not because they are superior in importance to other phases of management, but because they logically come first—the point of origin from which to lay out the operations of an enterprise being the consumer—and because in the sellers' market of the past, these phases have been most neglected. It is not to be assumed, however, that I attach less importance to better production methods of a feature of the new management.

There are some who assert that the production problem is solved and that we should now give most attention to other phases of management. I believe they are too hasty in their judgments, especially if we are thinking in terms of a severe competition on a buyers' market. The production problem is far from solved. It is true that we know more about good production management than about good sales management, and that we have a body of production management principles and practices at our command which, if utilized, would eliminate waste, reduce costs and permit cost and price reductions to an astonishing extent; but it is equally true that they are not generally utilized, and the educational task of bringing about their utilization in a plant is as difficult and time-consuming a task as developing market analysis and improved selling methods. Perhaps more so, for the development of market analysis, master planning and selling is the problem of a small group of specialists, while the development of superior production methods is a problem involving the precise co-operation of many individuals of varying capacity for co-operation.

Furthermore, the more severe the competition the more important become good production methods. For in the final analysis, no matter how accurately we gage the market, how precisely we prepare schedules of operations, how skilfully we sell, the greatest weapon in competition is the combination of a dependable product, a dependable service and a quotation lower than competitors, and it is superior production methods which contribute most to making this weapon possible. If you can safely and consistently quote a lower price for an identical commodity and have a reasonably good selling organization, your competitors will hold you in dread.

Accurate Production Necessary

IN the fourth place, therefore, the superior management of the next decade will develop the production department to a high degree of precision in accordance with principles and methods already formulated and available. As some strong merchandisers secure their profits by taking discounts, so strong manufacturers can take their profits by eliminating waste—the waste of useless or unused plant; the waste of useless, unused or inefficiently used equipment and tools; the waste of unsuitable, inadequate or lost materials; the waste of inefficient methods; the waste of improperly chosen, improperly assigned, improperly instructed and inadequately trained workers.

Investigations and experiments will be conducted which will disclose the best equipment, tools, methods and materials for the fabrication of the product and on the basis of the discovered best details will be established standards of product equipment.

Single-Sleeve Valve Engine Adapted to Various Automotive Uses

Burt and McCollum design, formerly known as Argyll, gradually attaining wider use in England. London General Omnibus Co. has secured good results with it in recent preliminary tests. Used for passenger car, truck, tractor and portable applications.

By M. W. Bourdon

THE single sleeve valve engine known variously as the Argyll, Burt and McCollum and, latterly, as the Wallace, was originally introduced in the Argyll car—a Scottish production—as far back as 1911. Although it has been continuously used in that make of passenger car from that time, only during the past two or three years has it made headway in other spheres, with the exception of its being also used since before the war in the Swiss Piccard-Pictet car.

Since the war the Burt and McCollum patent rights in Great Britain have been secured by Scottish interests, and as a result this valve design has been adopted and is now being made on a commercial basis for passenger cars, trucks, motor cycles, agricultural tractors, marine engines, house-lighting sets and portable power plants by various firms operating in the different spheres. In addition, the London General Omnibus Co., after testing a sample engine submitted to them—one designed for truck use—secured such good preliminary results that it has in hand half a dozen experimental engines of its own special design for bus work embodying this type of valve, the object being to try these engines out in

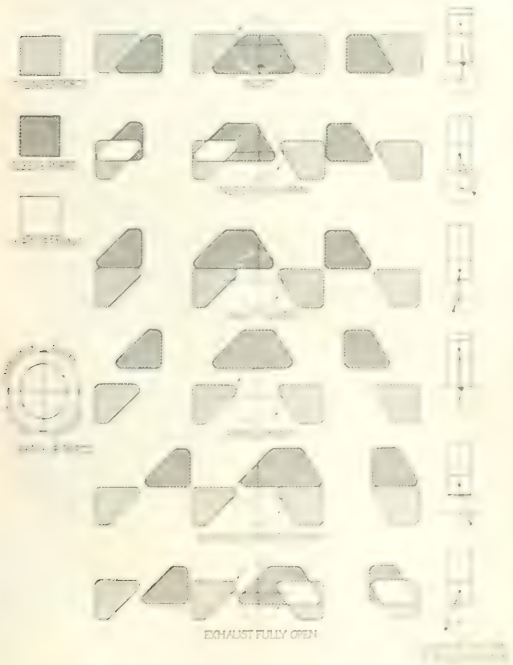


Fig. 1—Diagram showing development of ports and their positions during cycle of the Wallace single-valve engine

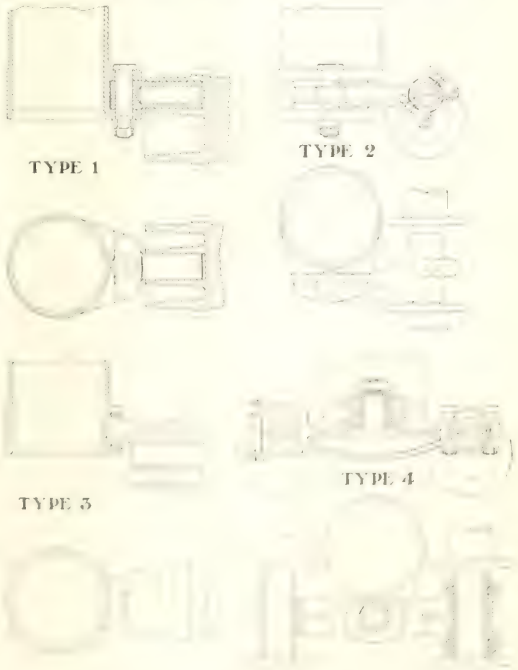


Fig. 2—Four types of actuating gear used in Wallace single-sleeve valve engine

actual service alongside the poppet valve engines now standard in London buses.

The L. G. O. is not in a position to allow the details of its own application of the principle, with the modifications which it considers are desirable for bus work, to be made public at present, nor will it commit itself to any definite opinion as to the possibility of this valve system being standardized for London bus work until it has conducted a great many more tests continuing over a lengthy period.

The essential difference in design between this single sleeve valve engine and the conventional poppet valve type lies in the valve and valve actuating mechanism; the parts are not necessarily different.

The sleeve valve has port openings cut on its circumference to correspond with ports cut in the circumference of the cylinder bore. By means of a suitable driving mechanism, a partly reciprocating and partly rotat-

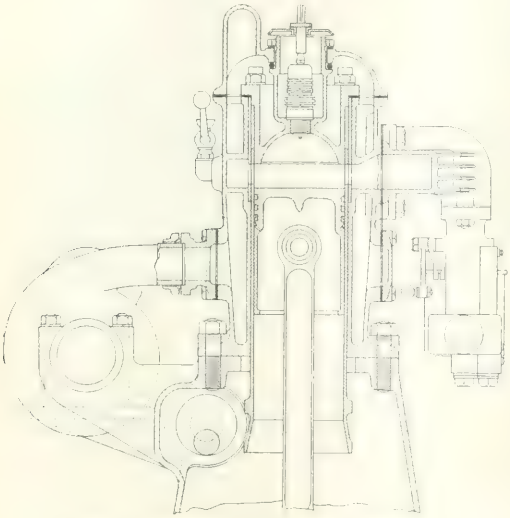


Fig. 3—Sectional view of an 80 x 130 m.m. engine embodying the Wallace valve

ing motion is imparted to the sleeve valve so that joints on it travel in a more or less elliptical path.

With the four-stroke cycle engine the sleeve valve is driven at half engine speed and the ports thereon are arranged so that during the first portion of the upward valve stroke the inlet ports uncover the corresponding ports in the cylinder wall. During the compression and power strokes the sleeve valve is at the top portion of its travel and the port end is covered by the water-jacketed cylinder head. On the last portion of the downward stroke of the valve the exhaust ports in the cylinder are uncovered and the cycle is completed.

The cycle of movement will be made clear on reference to Fig. 1, which shows a development of ports, with the relative positions of valve stroke to engine stroke indicated at the side. It will be observed that when the sleeve valve is subjected to the maximum pressure—that is, during the compression and power strokes—it is traveling in the same direction as the piston. During operation the valve never comes to rest, and at no time is there a sudden reversal in direction of travel.

The peculiar twisting motion of the valve has inherent advantages. The natural spreading of lubricant is said

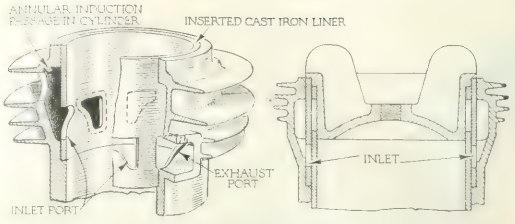


Fig. 4—Wallace valve arrangement in an air cooled cylinder

to reduce oil shear between the valve and the cylinder, and also between the piston and the valve, the latter, it may be noted, being devoid of oil grooves or scrapers. The motion, it is claimed, also helps in the transference of the heat lost to the cylinder walls and to some extent in baffling the gases against leakage. Junk rings are not fitted to the cylinder head as in most other sleeve-valve designs.

Large Water Spaces Provided

The cuts show the large water spaces which can be had at all points in this type of engine. Water passages are cast between the exhaust port cores to convey the cooling water from the bottom of cylinder to the top and at the same time to present a water-cooled surface to the edges of the valve exhaust ports as they pass between the cylinder ports. The exhaust ports are therefore in contact with water-cooled surfaces for three-fourths of the valve cycle. The top end of the cylinder is closed by the detachable head, which, being of the same diameter as the piston, and projecting into the cylinder, forms an annular space in which the upper end of the valve works.

Many different drives have been designed to actuate the valve, the principal of these being shown in Fig. 2. Type 1 is the original drive as fitted to the early Argyll engines; it gives good service but is somewhat heavy and expensive to manufacture. A valveshaft (not shown) geared to the crankshaft has a small worm wheel oppo-

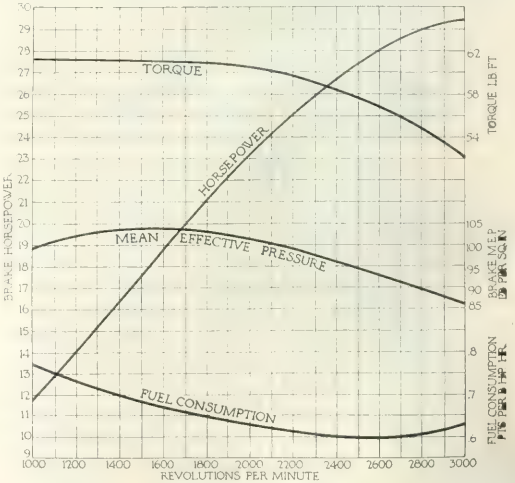


Fig. 5—Power, b.m.e.p., fuel consumption and torque curves of four-cylinder 68 x 103 m.m. engine of 5 to 1 compression ratio fitted with Wallace valves

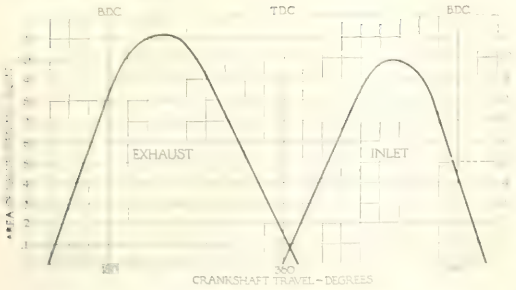


Fig. 6—Valve opening diagram on one engine using Wallace valve

site each engine cylinder; this wheel engages with a disk wheel which revolves at half-engine speed.

On the face of the disk wheel, parallel to and at a fixed distance from its axis, a hole which may be called the sleeve crank is located and in this hole an actuating pin is free to slide. The head of the pin is flattened and fits between the lugs at the bottom of the valve. It is held in position by a pivot pin which passes through corresponding holes in the actuating pin and sleeve-valve lugs. The actuating pin works in and out of the sleeve crank hole and sideways between the sleeve-valve lugs.

As the sleeve crank revolves with the actuating pin, it carries the sleeve valve with it, so that the valve itself, besides traveling up and down also travels sideways on either side of the cylinder axis.

Type 2, known as the link drive, obviates the use of gear wheels. A valveshaft or small thrown crankshaft is driven at half engine speed from the engine crankshaft. Opposite each cylinder is a crank pin and mounted on this is the actuating link. One end of the link has a bushel boss which is free to slide axially on the crankpin, while the opposite end is flattened and engages between two lugs cast integral with the sleeve. A pivot pin fitted through the lugs secures the link thereto but allows relative movement between the two in a horizontal direction.

In type 3 a ball-and-socket coupling, which obviates the accurate fitting of other drives, is employed. A half-speed crankpin driven from a gear shaft is inserted into the bore of sphere, which in turn is located in a fixed spherical housing at the lower end of the valve. As the crankpin revolves the valve is carried up and down as well as sideways. The ball coupling has a small reciprocative movement along the crankpin. It will be seen that this drive occupies less space and is lighter in weight than the others. It also gives a larger port opening for a given valveshaft stroke.

Type 4 shows the drive used for many years on the Piccard-Pictet cars. It is simply type 1 elaborated to give better lasting qualities.

Alternative Cylinder and Port Designs

There are certain alternative cylinder and port designs, and one of the former is shown in Fig. 3. Here, it will be seen, a separate liner is inserted in the upper end of the cylinder bore, the ports being cut in this liner while passages are formed in the cylinder block in such a way as to permit of placing inlet and exhaust manifolds on the same side. The latter feature can, however, be provided in any event, hence the separate liner is recommended as a rule only when a multiplicity or the small size ports makes direct cutting in the cylinder wall a somewhat difficult operation. A separate liner is used on experimental engines to enable various port settings to be tried with minimum outlay.

The number and arrangement of the ports in both cylinder and sleeve can be varied. In one type the inlet and exhaust ports in the cylinder are arranged alternately while the sleeve ports serve for both inlet and exhaust. An example of an air-cooled cylinder with this arrangement is seen in Fig. 4. A cylinder liner is used and the four exhaust ports lead to Y-branched exhaust pipe on each side of the cylinder, while the inlet ports are in communication with an annular passage above the port

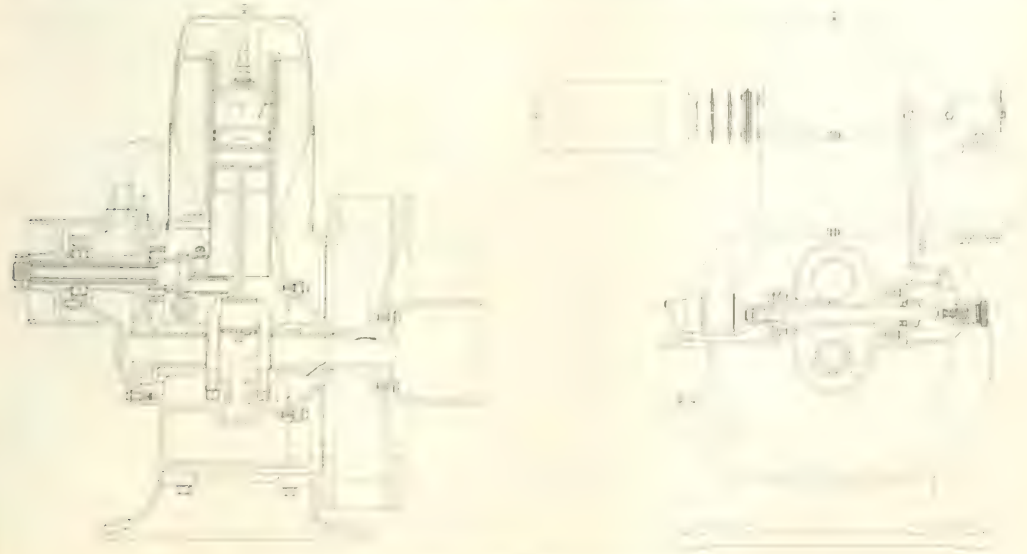


Fig. 7—3¼ x 4 in. single-cylinder farm engine using Wallace valve

line. This is an arrangement which is at present in production only on a racing motorcycle engine. It has advantages in absence of cylinder distortion due to the even distribution of heat, in the fact that the annular passage forms an integral induction pipe suitably heated to assist vaporization, and because the position of the ports promotes inlet gas turbulence and breaks up the exhaust. Incidentally, too, a smaller valve shaft throw is required for a given port area. The disadvantages are: intricate coring of the cylinder and the difficulty of collecting the exhaust gases into a common manifold when a multi-cylinder engine is in question.

Sleeve Valve Construction

A port which acts alternately as inlet and exhaust is advisable when maximum openings are desired, two single ports with a wall between would obviously use up more of the sleeve-valve circumference than a single double-purpose port.

The sleeve valve is usually centrifugally cast of good quality gray iron, and for engines up to 2¾-in.-diameter bore is made 0.1 in. thick, while for engines of 4¼-in.-diameter bore a sleeve 0.25 in. thick is said to be quite satisfactory.

The valve timing varies according to the type and speed of engine.

Simplicity, silence and sustained efficiency are the advantages claimed for the single-sleeve-valve engine compared with the poppet-valve engine. The sleeve valve alone does the work of two poppet valves, two springs, two tappets, etc., and in the case of overhead poppet valves two rockers and two pushrods.

The cutting of ports in sleeve and cylinder is said to be a simple and speedy mechanical operation. The open-ended cylinder has advantages both in molding, machining and assembling. Valve covers, etc., are unnecessary, as the valve gear is totally inclosed in the engine body. The machined compression space is devoid of pockets or corners.

The rapid opening of ports reduces wiredrawing of the charge at high engine speeds to a minimum. Being positively driven the valve timing is constant at all speeds. A valve-opening diagram for one example of ports is given in Fig. 6. This diagram was obtained by drawing one inlet and one exhaust port on an enlarged scale, superimposing one on the other and taking readings by planimeter at regular distances as the sleeve crank travels.

Power m.e.p., fuel consumption and torque curves relating to a 68 x 103-mm., four-cylinder engine are given in Fig. 5.

In addition to the passenger cars mentioned the engine is used in Caledon trucks and in tractor and portable power plants manufactured by Wallace, Ltd. A 3¼ x 4-in., single-cylinder farm engine made by this concern is shown in Fig. 7.

Westinghouse Develops Air Brake for Automobiles

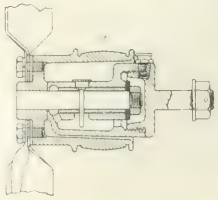
NEWLY developed Westinghouse air brakes are fitted on the Fageol motor coach which has recently been driven from Chicago to New York. The chassis of this Fageol bus was described in AUTOMOTIVE INDUSTRIES of May 11, 1922. Details of these new air brakes, which were developed by the Westinghouse Pacific Coast Brake Co., have not been available heretofore.

The brakes are fitted to the rear wheels. The axles are of Timken make, and on the rear axle there are the usual Timken dual brakes with brake shoes of quadrant form. Gases or combustion from the first and fourth cylinders are used, which are stored in a pressure tank. The brake operating mechanism is of the diaphragm type, there being one brake chamber on each side of the coach. These diaphragms are of rubberized fabric and against them the pressure of the gases acts. The travel range of the center of the diaphragm is 1⅞ in. One of the two sets of brakes can be operated by a pedal and the other by a brake lever in the usual way, while both are simultaneously applied by the air chambers.

The most interesting part of the air brake is the valve employed for applying and releasing it. This valve is known as an automatic lap valve. It gives a definite pressure for every position of the valve lever during both application and release. This feature insures flexibility of braking action. There are no definite steps in the variation of the pressure for a gradual increase and decrease and the pressure can be held at any value. The pressure valve is foot-operated.

During a demonstration the coach was driven at speeds exceeding 40 m.p.h. over New Jersey roads. Owing to the large pneumatic tires, the wide spring centers and the low center of gravity, the coach rides smoothly and steadily. The pneumatic brakes proved very effective, causing the coach to be pulled up from high speeds in remarkably short lengths without that unpleasant sensation sometimes experienced when brakes are jammed on and grab.

Radiator Fan with Ring-Oiling Bearing



Arrow radiator fan with ring-oiling bearing

THE Arrow Pump Co. has placed on the market an automotive fan fitted with the company's ring oiled bearing. In this construction, the bearing and oil reservoir are held stationary and only the shaft and pulley rotate. This, it is claimed, prevents the oil from being thrown out, as occurs where the lubricant is contained in the pulley, a rotating part. The chief advantages claimed are positive lubrication and dust-proof construction. The only opening in the bearing is shrouded by the pulley and a curtain of oil being constantly thrown off by the shaft into the oil recovery space precludes dust from entering the bearing. This bearing will be furnished with the different size fan blades at the holding end.

Argentine Show Breaks Records for Sales and Attendance

Passenger cars comprise large part of exhibit. All other automotive products, however, are well represented. Buying conditions favorable throughout the country. Many locally built de luxe bodies shown. Larger building for next year.

BUENOS AIRES, ARGENTINA, Nov. 24 (*By Cable*). NEW records in both attendance and sales were made during the fifth annual automotive exposition, which was held in the Pabellon de las Rosas here the ten days ending Nov. 19, under the direction of the Automovil Club Argentino and the Centro de Importadores de Automoviles y Anexos. Passenger cars, trucks, tractors, motorcycles, equipment, tires and lubricants were shown in such numbers that the main building was insufficient to house them and it was necessary to erect temporary structures to provide additional exhibit space.

The crowds in attendance were large at all times, this year setting new totals. This happy result is largely to be explained by the general expansion under way in the automotive development of Argentina, resulting from many causes. Crop conditions during the growing months have been ideal and practically all agricultural products give promise of bumper yields, for which good prices are anticipated. This has permeated the entire commercial and business structure of Argentina with a greater degree of optimism than has been the case for many months. Practically normal conditions are promised in regard to nearly all Argentine business, except that of the cattle and meat trades and, even here, there has been something of a betterment since the spring season set in.

In addition to the bettered business conditions, progress is being made in the development of highways and there is some increase in overland touring. Exchange is reacting more favorably to Argentina, enabling the distributors and dealers to quote better prices on nearly the entire range of automotive products. The old stocks of automobiles have been cleared out and, as a result, dealers are enabled to offer new models to their clients.

Passenger Cars Predominate

THE show this year was largely devoted to passenger cars, both truck and tractor makers having exhibited in but small numbers. In the passenger car lines, it was predominantly American, a survey of the exhibits showing twenty American, three French, four Italian, four British and four German lines, the American cars well outstripping in number all competing makes. Four American truck lines were shown, against five German and one British. The motorcycle section brought together three exhibits, two of them from America and the third from Italy. The equipment showing was large, including a number of accessories locally made. One section of the show was taken by the Ford company, which set up a miniature assembly plant. The output was sold as fast as the vehicles could be completed.

An interesting and significant feature was the large number of de luxe bodies of local make. This likewise was one of the high spots of last year's showing but this year it was even more pronounced. Body building plants here have been developed to a high point of efficiency and many excellent bodies were shown, these being mounted on all sorts of chassis.

Six-cylinder models, in point of numbers, somewhat exceeded the fours. Twenty cars were powered with sixes, against seventeen with the smaller engines. Five cars were shown with eight cylinder power plants, two of which were of the eight-in-line type and three of the V type. Twenty-five makes were equipped with high tension magneto. Four lines were offered with optional electrical equipment, of either magneto or battery.

Design Features

ENGINES with overhead valves totaled seventeen, as against twenty-five with valves in the side, and two were valveless. Only one car was equipped with two carburetors. Pump cooling was far in the lead, twenty-four engines using this type of circulation as compared with fourteen having thermosyphon systems. Multiple disc types of gearshifts were used on a majority of the cars. Only one air cooled model was exhibited.

Eighty local importers and dealers participated in the exposition. As regards the most favored type of car, statistics of the show revealed little, the 7-passenger phæton models numbering 20 and the 5-passenger models only one less. Two roadsters were shown.

The exposition, as it does each year, drew many distinguished visitors from Argentina and the neighboring countries. President Alvear, who has newly taken office as the head of the Argentine State, was in attendance, as were also the governors and officials of many of the provinces. The crowds were entertained by military bands and wireless concerts.

The success of the show had been anticipated beforehand and the results are such as to prove that all of these hopes were warranted. One result of this exposition will be an impetus to the erection of a larger and more commodious building to house future showing. This has been a demand of the automobile distributors, for some time, as they have long realized that the importance and size of the annual exposition warranted a better home. It is hoped that a new place will be provided by next year.

Hard Steering Result of Inaccurate Manufacture and Assembly

Faulty layout of parts outside of steering gear contributes to common defect in modern cars. Lack of alignment due to inaccurate machine work and improper assembly methods held to account for much of difficulty. Dissatisfied users result.

By E. M. Caskey
Sales Manager, The Lavine Gear Co.

THERE are many differences of opinion as to what constitutes an ideal steering condition. A timid lady driver, we believe, wants an exceedingly easy steering job, and is not so particular about the car holding the road at high speed, whereas, generally speaking, men who are driving a great deal, and especially at high speed, prefer a gear that will enable the car to hold the road well under all conditions. We have found it practically impossible to make a gear that will answer both requirements. In other words, where too easy steering is attained the job does not hold the road as well. This has been found to apply when ball bearings are used on the knuckle pivots. In many such cases it has been found that the car is exceedingly prone to shimmy. We believe the ideal arrangement is one that steers fairly easy, holds the road well and has a uniform feel on the hand wheel under all conditions. One item which makes steering hard, especially at high speed and more or less in turning, is the fact that the tie rod arms do not have the right pitch inward toward the center. These should be so placed that their two center lines produced meet at the center of the rear axle.

HARD steering is attributable largely to friction which arises from a variety of causes. King pins are often fitted too tight or are poorly aligned. The tie rod yoke and pivot axes are not always parallel. The holes in the axle ends are sometimes drilled improperly. The alignment of the axle yokes with the tie rod yokes is a particular job, and with many manufacturers, not half the attention needed is given. If this assembly is not properly done, an excessive bond develops on extreme turns. In some cases this is so pronounced as to cause a forward jerk and tendency to jump in the steering action.

Excessive friction is found when the drag link is not well oiled or is improperly fitted in the ball joints, or when the drag link is not in proper alignment in either the horizontal or the vertical plane.

Friction is found when the wheels do not have the proper toe in and caster; in fact, friction is very pronounced if these factors are not given due attention.

Hard steering results when front wheels are not castered properly. It also occurs when the drag link is not in proper alignment due to either too long or too short a ball arm on the steering gear, that is, to the axle arm not having a proper length in relation to the length of the ball arm used by the steering gear manufacturer.

Below is a table which has been computed by our engineer:

9 in. knuckle arm to 6 in. steering gear arm turning 36 deg. moves knuckle through 25 deg.
9 in. knuckle arm to 6½ in. steering gear arm turning 36 deg. moves knuckle through 26 deg.
9 in. knuckle arm to 7 in. steering gear arm turning 36 deg. moves knuckle through 28 deg.
8 in. knuckle arm to 6 in. steering gear arm turning 36 deg. moves knuckle through 27 deg.
8 in. knuckle arm to 6½ in. steering gear arm turning 36 deg. moves knuckle through 29 deg.
8 in. knuckle arm to 7 in. steering gear arm turning 36 deg. moves knuckle through 31 deg.

A Steering Gear Maker's View of the Causes of Hard Steering

EXCESSIVE friction is, of course, the chief cause for hard steering. Makers of steering gears attribute such friction to careless manufacture and assembly of parts of the steering system outside the steering gear itself. Beyond question there is just ground for such criticism as is here made. On the other hand, the steering gear proper sometimes suffers through faulty design and manufacture.

This article points again to a fact often emphasized in these columns, namely, that there is too much tendency to turn cars out rapidly without giving attention to small details which mar the performance of the car as well as the reputation of the maker. A little more care here and there would cost the maker less in the end through lower service costs and better satisfied dealers and users.

7 in. knuckle arm to 6 in. steering gear arm turning 36 deg. moves knuckle through 30½ deg.
7 in. knuckle arm to 6½ in. steering gear arm turning 36 deg. moves knuckle through 33½ deg.
7 in. knuckle arm to 7 in. steering gear arm turning 36 deg. moves knuckle through 36 deg.

Hard steering can also be caused by the rear springs not being of the proper stiffness. Some manufacturers have gone to a very limber rear springs and set the caster in the front axle when the car is not loaded in the rear. When passengers are in the rear seat the caster is changed to a degree which is detrimental in steering.

Different authorities do not agree as to the proper castering angle or the amount of gather of the front wheels, therefore, we cannot give any iron clad rule to cover these items. Caster and gather come under the same heading. We prefer on the average motor car using our gear that the axle have a caster of not over 2 deg. We are thoroughly convinced that with a ball on the tie arm with a cap on the tie rod similar to that on the drag link is the proper construction as this ball joint would then take care of any irregularity occurring in the arms.

It is impossible to get the caster right with no load on the rear of the chassis and a full load on the front. A happy medium has to be reached in this respect.

MANUFACTURERS of automobiles should watch closely the alignment of the tie rod arms, the toe in and the caster and should see also that the king pins fit properly and have the proper alignment. Many manufacturers do not pay proper attention to the assembly of steering parts. As a result many of the dealers throughout the country have become thoroughly disgusted. In some cases they even threaten to give up their contract before they can obtain assurance that the items referred to will be given the necessary attention.

Much of the hard steering prevailing at the present time is, we believe, an aftermath of the war, as more attention at that time was given to quantity than quality.

The improper attaching of the bracket holding the steering gear to the frame is also a factor in hard steering which is beyond the control of the steering gear manufacturer.

There is generally very little attention paid to the lining up of the steering column. In fact, in many factories it is a common practice to anchor the steering gear through the lower bracket and to bend the upper bracket to meet the cowl. We believe a large percentage of the hard steering is caused by this careless method of assembly. If assembly foremen do not watch their men they often clamp the attaching bracket tight, using a large wrench. This will cause a bind on the trunnion bearing. All manufacturers should watch these things closely enough to know that, with the front end jacked up so that the wheels do not touch the floor, very little friction occurs when the steering wheel is turned.

WE have seen many cases in which the steering gear worked perfectly freely before mounting, but after it was mounted in the chassis it took a good stiff pull to move the front wheels. The manufacturer should know that there is no use in shipping a car in this condition as it is certain to result in considerable trouble later.

In making a canvass of dealers we find that none of the larger ones permit the cars to go into the customers' hands after they come from the factory until they spend from 12 to 48 hours to get the car loosened up so as to make a proper job of it. This, in the writer's opinion, does not seem right. We believe that the car should be in shape to turn right over to the customer immediately upon leaving the factory.

None of the manufacturers will admit these faults unless they are driven to it by the parts manufacturer. In many cases, they come back at the parts manufacturer by saying that they employ certain methods of construction in their factory and that what they want is a steering gear which will steer their car under any conditions. This is a practically impossible condition to meet. In fact, the general practice of the manufacturer when he receives a unit for test is to turn it over to some driver who has no further interest in the proposition than to make recommendations, which, oftentimes, are made to suit personal opinion without due regard to the conditions under which the part is used. We believe that, in a test on any part, someone who is vitally interested should go over the matter in person after the tester's report is in and personally check up the findings, making certain that the test conditions are fair. We have found in many instances that prejudice enters into the reports which testers make.

High Temperature Causes Excessive Wear of Valve Seats

THE Bureau of Standards was requested recently to investigate the cause of excessive valve seat wear shown in a certain make of engine. These valve seats were in some instances sunk into the cylinder block to a depth of nearly ¼ in. In every instance the trouble was found in connection with the exhaust valve seat, but it only occurred in a small number of engines of a given type, and even in the same engine all the exhaust valve seats were not equally affected.

The metal (cast iron) of which the cylinder blocks were constructed was first examined, but this proved to be typical of the material usually employed in cylinder construction, and no difference was noted between the metal of the valve seats showing excessive wear and those showing normal wear. Next it was thought that difficulty might have been encountered in regrinding the valves, some of the valves not being affected by the grinding compound. This would result in the seat being ground away in a vain attempt to get satisfactory tightness. A few experiments were sufficient to eliminate this as a cause.

Attention was next directed to conditions of operation which might account for the trouble. To determine the effect of cam outline and spring pressure, a cam was designed which would give the valve about twice its normal lift and permit it to close very rapidly, thus striking the valve seat with considerable force; but operation with this arrangement failed to show an abnormal rate of wear. However, with valve and seat heated to a dull red color, conditions were changed and the rate of wear was amply rapid to explain the trouble.

It should be mentioned in this connection that a reducing flame was used in these experiments to avoid any possibility of rapid wear through oxidation of the metal. The temperatures reached in this experiment might result in actual operation from preignition or a very slow burning mixture, and it is probable that one of these conditions coupled with inadequate cooling of the valve seats was responsible for the abnormal wear in the engines under investigation. The results of these tests are of interest to all automotive engineers.

"Just Among Ourselves"

Show Time Advertising Copy Can Be Improved

WITH the show season only a few weeks away, it is none too early for automotive advertising managers to give a little thought to the copy they will use, especially during the New York and Chicago shows. There is plenty of room for improvement over that used last year. The copy supplied the metropolitan papers was devoted pretty generally to what one hard-boiled but thoroughly seasoned advertising man characterized as "extravagant claims and circus statements, superlatives and pretty phrases." There wasn't much meat except the prices and price was played up in the biggest type the space used would carry. American automobiles are good automobiles and even if every company does admit its product is the best it should be willing to present a few proofs without expecting the public to take its word for it.

Freight Traffic Congestion Hits Industry Hard

WE stated in AUTOMOTIVE INDUSTRIES of July 20 that "within the next three months it is practically certain there will be almost unprecedented freight congestion on the railroads." The traffic jam which was forecast then now has reached acute proportions. So long as business goes on at the present pace, the traffic jam will continue and even if there were to be a sharp decline in the volume of merchandise offered the carriers in the mid-winter months it would not offset the added difficulties which will result from snow, sleet and cold. No railroad can approach in winter its summer efficiency. This freight congestion will become increasingly serious for the automotive industry as it becomes more difficult to continue driveaways. In fact, it is even now practically impossible to make deliveries to the Pacific Coast and other sections far removed from the factories.

Really Constructive Publicity Would Aid Industry

ONE thing from which the industry is suffering is a lack of constructive publicity. Individual factories are getting a good deal of it, of one kind and another, but it is not calculated to aid the industry as a whole. A good deal of it might better be left unprinted. No well-planned and concerted effort ever has been made to present to the people of the country the automotive side of various national problems, such as highways, taxation, regulation, safety, fuel and research. A couple of the trade organizations have done some excellent work, but there has been nothing of an all-industry character.

There are some organizations, committees and boards doing research work from which it is practically impossible to extract information about what they have accomplished or are trying to accomplish. And yet these organizations are dependent upon contributions from trade associations or individuals for their support. Such support would be given much more gladly if they were willing to let the world know they are doing something worth while.

Impending Cotton Shortage Will Hit Tire Makers

CONSIDERABLE concern is being shown, and with reason, by the tire industry over the probability of much higher prices for cotton fabric before another crop is harvested. Persons thoroughly conversant with the situation assert that a serious cotton shortage is likely in the near future and such a condition inevitably would force prices up. With steadily rising crude rubber prices and a scheme worked out in Great Britain to restrict output, it is difficult to see how American tire manufacturers can escape higher prices to the public. Tires cost less now than they ever did, but standards of quality have not been maintained universally. It may be that higher prices will help to eliminate some of the evil practices which have grown up in the industry. If such is the case they will not be an unmixed evil.

Little Defects Often Serious for Dealer

A GOOD many passenger car manufacturers are inclined to scoff, on general principles, at the suggestions made by their dealers and distributors. Obviously, not all these suggestions are good, but some of them are. A big distributor in Cleveland makes one which has a lot of meat in it.

He contends that manufacturers don't realize, as they should, that every time a family buys its first car it marks an epoch in the history of that family, especially for the feminine members of it. They don't know much about machinery, but they love their car. They polish it tenderly and scrub it as gently as they would their most cherished piece of furniture. When they find a defect in the painting or a spot of grease on the upholstery it means more to them than a knock in the engine.

This dealer contends that when companies are striving for big production they are inclined to slight inspection. If the inspectors are holding up the assembly line they are likely to get a jolt

More or Less Pertinent Comment on Topics of Current Interest to Men in the Industry

and be told not to be quite so fussy. If they slacken their vigilance, however, it may mean disgruntled buyers and endless trouble for the dealer. In the long run, a multiplicity of little things count as much as a few big ones.

New York Police in Despair Over Traffic Problem

POLICE COMMISSIONER ENRIGHT says the New York police are at the end of their rope "as regards traffic control under present conditions." He recommends the razing of the Sixth and Second Avenue elevated structures to provide lateral thoroughfares which would carry heavier traffic as well as the construction of an elevated roadway or viaduct from the Battery to Fifty-ninth Street as another measure of relief. This statement, coming from such a source, gives emphasis to what every one has been saying about the terrific traffic congestion in New York. Similar conditions prevail in every large center of population.

The traffic problem undoubtedly is retarding sales and it is one to which the entire automotive industry should give careful, constructive thought.

Finding New Markets for Parts

SOME parts makers with surplus factory space are cutting down overhead by developing new fields for their products where it can be done without the installation of expensive new machinery. We know of one, who makes bearings, who has gone into the industrial field and is getting a good many orders, most of them small, from industries other than the automotive.

Another company which makes tubing has found a profitable market in the bedstead manufacturing field. Exactly the same sizes can be used and it has not been necessary to put in any new equipment. Sales effort along this line has not been expensive. Much of it has been by mail.

There are comparatively few companies which could not do a little more in this direction. It would help mightily in a time of depression.

Consolidation of Sales Efforts Considered

A GOOD many parts makers are becoming convinced that the time is not far distant when they will have to consolidate sales organizations and sales efforts to hold down costs and get the widest possible distribution. Some progress already has been made in this direction and more is in prospect. Actual consolidations of companies are not so probable as sales and service alliances. Such a system might result in a smaller margin of profit on each unit, but it would increase the number of units sold and thereby maintain the volume of profits.

Trade Names of Standing Not Likely to Perish

CREDIT men representing parts manufacturers are giving thoughtful consideration to the possibility that some of the smaller vehicle companies may not be able to stand the strain of competition in 1923, but most of them believe that trade names will be extinguished slowly and that a great many different makes of cars and trucks always will be manufactured even though a comparatively few companies get the lion's share of business. Some companies in financial difficulties are turning out products of sterling worth and these names probably will be preserved, although the companies making them may be reorganized. So far as units, accessories and equipment are concerned, many new devices will be marketed every year.

Contract Cancellation Evil To Be Surveyed

UNTIL business got back on its feet, the automotive industry, in common with every other line of trade, was suffering from the indiscriminate cancellation of contracts. It is interesting to note that a group of farsighted financiers and business men is giving serious consideration to means by which the evil can be reduced when hard times come again. Plans are under way for a searching analysis which is expected to disclose constructive remedies. It involves a business as well as a moral problem of primary importance. Trade cannot proceed confidently unless faith can be placed in the sanctity of contracts.

Elimination of Waste Will Keep Prices Down

IN an era when competition is as keen as it is at present, one of the aims of every manufacturer must be to eliminate every waste and give the public the benefit of every saving by offering the lowest prices consistent with legitimate profits. The margin of profit in the various stages of distribution must be watched carefully so that the ultimate expense to the user will not be out of all proportion to the production cost. There is an intimate relationship between the costs of manufacturing and of production. This applies with special force to replacement parts. Car owners must be satisfied and satisfaction is impossible when they are convinced, as many of them are to-day, that they are being "gypped" every time repairs or replacements are required. J. D.

An Executive View of Automotive Electric Standardization

Business men of automotive industry have not given adequate support to creation and use of standards. Needless variations in detail result in higher costs and many service complications. Cradle or foot-mounted generator with separate stub shaft favored.

By G. B. Griffin
Manager, Automotive Equipment Department, Westinghouse Electric and Mfg. Co.

IT has been the object of some years of effort on the part of electrical manufacturers of automotive equipment, operating with certain designing engineers as joint committees of the A. E. A. and S. A. E., to bring about standardization to a degree beyond what heretofore seemed possible. It has always seemed to the writer that the executive and commercial branches of the automotive organizations have not given this movement the whole-hearted support and determined backing that it should have, as in reality the attempt to standardize, if measured by results that should be had, is of greater moment and benefit to the commercial organizations and manufacturers of automotive equipment than it is to the engineering branch of the industry.

Electrical standardization possibly was not of such prime importance in years prior to 1914, as the number of electrically equipped cars in the field were extremely low as compared with those now in service. I think it is entirely probable that there are 9,000,000 electrically equipped vehicles in the United States. It is obvious, therefore, that the prompt servicing of these electrical equipments is of great importance.

Electrical equipment manufacturers have for many years past put forth individual and joint efforts to build up and maintain service departments and agencies in hundreds of cities throughout the country and in many foreign cities as well. The obstacle in the way of still further increasing the number of these stations lies in the direction of complexity and therefore the cost of the proper renewal parts stock that should be carried to give service of value to the manufacturers, dealers and users. A difficulty which is enhanced in the securing of these agencies is the fact that men who have the necessary detailed electrical knowledge, and of the general mechanics and theory of the gasoline explosion engine and who have adequate financial responsibility to take on and carry out this important electrical service, are few in number.

IN solicitation of this class of field representation, one is immediately impressed with the bewildering minor variations in details of electrical structures made necessary by the idiosyncrasy of design of the engines by the vehicle manufacturers or suppliers.

The aforementioned variables are seemingly of little importance, and to the vehicle manufacturers' representatives are not variations from other structures sufficient to raise objection to their being supplied. These matters are such details as the variation in the length of the armature shaft, the location of the coupling pin hole in relation to the shaft end, variations in tapers of the shaft, various keyways, various size and types of threaded nuts on the shaft ends. But, since the structure of an armature begins with its shaft, it is plain to be seen that each one of these mentioned variations—and there are several more—means that the manufacturer and service agent in the field must carry an armature to meet each one of these variations.

Again there are variations in the methods of mounting or bolting on the generator and motor to the engine structure. We have to contend with cradle mountings, foot, or bracket mountings, flange mountings and sleeve mountings with variables in each and every one of these various types.

In addition to these, we have the so-called inboard and outboard bracket fittings for starting motors with all sorts of variables in the distances between the flange faces and the shaft ends.

WHILE we have accepted the S. A. E. and A. E. A. standards for flange and sleeve mountings, it seems sometimes that the vehicle designing engineer will go out of his way to make a variation in the location of the flange, the position and size of bolt holes and other like variations, but investigation shows, in many cases, that the manufacturing organization is equally at fault. A little more forethought and study would have made some one of the standards entirely satisfactory for the installation.

The point that the writer wishes to make is that it is costing the industry directly or indirectly a very large sum of money each year to supply and service such a wide range of variables. This is economically wrong. Further, it hinders prompt and efficient field service by limiting the number of points at which stocks can be carried.

The statement is frequently made that "a vehicle producer purchasing 10,000 equipments a year has the right to set up his own standards to which the supplier should not object." This is true only provided that the purchaser is willing to assume the additional cost burden either direct or through the ultimate users that servicing a product with special dimensional details always entails.

The A. E. A. committees co-operating with the electrical committees of the S. A. E. should be able to bring about better general conditions by agreement, but the agreement, if arrived at, will not necessarily mean the adoption of the proposed standards unless the executive officers of the vehicle manufacturer and his suppliers insist that engine designs shall be laid out so that standards only shall be used. The proposed standards that have been published from the results of the operation of the A. E. A. committee seem to hold within them possibilities of success so far as the engineering of the devices is concerned. The next problem is the adoption, not by the engineering associations only, but by everyone connected with the industry.

IN the writer's opinion, the committee has put forth in its suggestions a greater number of frame sizes than is desirable and it is possible that some of the intermediate sizes can later be dropped out and a considerably larger size added than is now contemplated to take care of especially large lighting loads, such as overland highway buses, double deck street buses and the like. Also, the number of proposed standards should, if possible, be reduced.

I have always felt that the most desirable application in the electrical generator unit is the double extended shaft, cradle or foot mounted machine, coupled to an independent stub shaft connected to the driving mechanism of the engine and supported upon its own bearings. The difficulty is in securing a satisfactory small flexible coupling and, in addition, making accurate within the limits of commercial practice the alignment between the driving stub shaft and generator shaft. The flange mountings, barrel or sleeve mountings are, in the writer's opinion, a delusion when considered as a saving and convenient for the industry to use. If a coupled generator of the type referred to was used the terrific stock of flanges, armatures, brackets, etc., now having to be carried in the service departments and field service stations would be entirely done away with to the benefit of all concerned. I also maintain that, in the end, the engine would be just as cheap to construct and much easier to renew the electrical equipment upon.

As an example, one of the present-day popular passenger car engines has a generator with a flange mounting and a gear, mounted on the generator shaft and meshing into a drive chain on the front end gear case of the engine. This generator has shaft extension on the opposite end which carries a tumble shaft driving pump through flexible couplings on each end of the tumble shaft. In taking off this generator for any purpose, a considerable amount of unnecessary work has to be done. Anyone who attempts it will be aggravated to find that, to avoid taking off the radiator and gear case cover, it is necessary to wire up the drive chain so that, when the generator gear is removed, the chain will not fall down into the gear case and make a partial dismantling of the engine necessary to readjust it. This wiring up, again mounting the generator in its proper position, getting the chain into mesh and withdrawing the wires inevitably takes a great deal of time and the service station operator receives complaint for the amount of the charge made for the repair. This time would be cut down 70 per cent in most cases if a foot or cradle-mounted generator had been used with stub shaft drive as suggested in preceding paragraph.

It is the continued reaching of the industry for the paring off of the last cent that has brought about service complications. It is the writer's belief that the time has come in the industry when an attempt should be made to provide a vehicle that has the maximum amount of accessibility for repairs and replacement of parts rather than continued attempts to save the initial cent at the sacrifice of the ultimate dollar in upkeep.

I am highly pleased to see some of the thinking men of the industry giving attention to these matters and have noted the suggestions of Col. J. G. Vincent, who has done much for the industry in giving support and assistance to the adoption of many useful standards. I will not here undertake to discuss all of the points mentioned by Vincent, most of which are very pertinent, but in regard to that referring to the ten-tooth motor versus twelve-tooth motor of like stalled torque rating, I would say that, on account of the demand for cranking speed rather than high stalled torque, or in other cases the reverse of these demands due to variation in engine design and operation it is difficult to come down to the one motor and change the number of gear teeth as Vincent suggests. Still my heart is with him in this suggestion, and it would appear that some happy medium could be agreed upon and obtain both satisfactory cranking speed and stalled torque ratings from the same motor.

Somebody Pays for Non-Standard Details

SOMEBODY always pays the cost of unnecessarily diversified details in design. A manufacturer who builds 10,000 cars a year may create his own "standards" if he desires, but in so doing he complicates service problems and makes it necessary for hundreds of service stations to carry special parts for which someone must pay.

To the electrical equipment maker it sometimes seems that the engine designer goes out of his way to make a minor variation in flange location, size and position of bolts, etc., but investigation has shown that the manufacturing branch of the organization is often equally at fault.

These are some of the significant points brought out in this article by an executive connected with a prominent electrical equipment manufacturer.

IN connection with George A. Green's letter pointing out the necessity of larger machines, I agree that there is some necessity in cases such as he points out and which I have already mentioned. In regard to a device to prevent overcharging of the battery, the company which I represent has developed the voltage regulator system which positively will do this.

I am glad to see AUTOMOTIVE INDUSTRIES giving support and assistance in this movement and hope it will keep up the good work and continue to give space in the "Forum" to the matters under discussion.

A TOTAL of 87 concerns were engaged in the manufacture of aluminum during 1921, and manufactured $45,822,000 worth of that product. Compared with 1919 the total value of the aluminum manufacturer's product was $75,273,000, representing a decrease for 1921 of 39.1 per cent in the value, according to census figures on the aluminum industry, which have recently been made public.

New Multi-Spindle Chucking Machine for Automatic Production

Many car and truck parts can be handled on six-spindle model designed by Baird Machine Co. Adapted to pieces up to 6 in. in diameter and 6 in. in length. Equipped with 8 tool slides.

By P. M. Heldt

AUTOMOTIVE production men have recently been taking a new view of their machine tool problems. They are beginning to look at the machine tool entirely in its relation to unit production cost. Some of them have decided that the time saved by a special piece machine does not always make for efficiency when overhead and repair costs are considered. More attention is being given to tools that can be adapted to several purposes as production needs require.

Tool builders are recognizing these new demands from the automotive field. An interesting example of this trend in the direction of a multi-purpose tool, specially adapted to quantity production work, is given in the new six-spindle automatic chucking machine, recently announced by the Baird Machine Co. This machine will handle parts up to 6 in. in diameter and 6 in. in length and, having six spindles and eight tool slides, is specially adapted to the machining of parts requiring a multiplicity of operations.

The machine has a turret carrying all of the six spindles, which are arranged in a circle concentric with its main axis. When in operation, five of the spindles revolve around their respective axes, while the sixth, which is said to be in the loading position, is stationary. Two of the spindles are vertically above and below the main axis of the machine, respectively, and the loading spindle is the one next to the topmost toward the operator. All of the working spindles rotate in the same direction, namely, left-handedly when looked at from the right hand end of the machine.



Operating side of Baird multi-spindle chucking machine

Method of Operation

Directly below the loading position is the first working position. It will be understood that each of the five working spindles carries a piece of work in its chuck and all of these pieces are being operated upon simultaneously, while from the chuck in the loading position the finished part is removed and a new blank inserted. Special chucks or fixtures will probably be used in most cases, to suit the shape of the part worked upon. The turret is indexed by means of a Geneva motion which rotates it through an arc of 60 deg. It is locked securely in the working position by means of a cam actuated finger which engages slots in its periphery. In the first working position the part can be operated upon by tools carried by two tool slides, one of which has a radial (cross feed) and the other an axial (longitudinal feed) motion. Each of these tool slides can carry one or more tools.

All feeds are automatic. The radial feed is controlled by the inner cam on the cam plate on the right hand end of the machine, whereas the longitudinal feed is controlled either by a pull rod extending through the axis of the machine or by a sleeve surrounding same. These two feed rods derive their motion from cams on a cam drum at the left-hand end of the machine. The rod has a range of motion materially greater than the sleeve, and each of the longitudinal feed tool slides can be operated from either the rod or the sleeve, according to the length of cut the tools carried by it are required to take. The cam drum, in addition to the feed cams, carries quick return cams by means of which the tool slides are quickly brought back to the starting position after the cut is completed. The pull rod and pull sleeve are provided with a six-armed spider, the arms having slots in their outer ends into which may engage lugs carried by the tool slides.

While the work is in the position be-

low the axis of the turret (the second working position) it can be operated on only by tools having longitudinal feed. In the third working position there is again both a cross feed and a longitudinal feed, the same as in the first position, with the difference that here the tools in the radial feed slide are reversed in position, being at the back of the work instead of in front of it, and, therefore, having their cutting edges turned down. In normal operation the tools in this position are most likely to be used for finishing operations, while those in the first position are used for roughing cuts. The cross or radial feed slide of this position is controlled by the outside cam on the cam plate. For working positions Nos. 4 and 5 the tools have only longitudinal feed, with a choice of two ranges of motion.

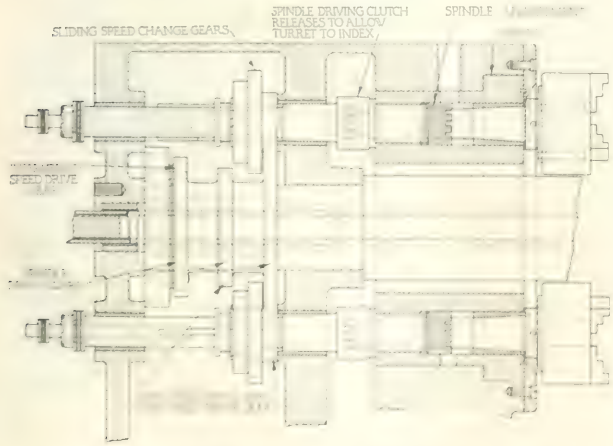


Rear view of machine. Note feed drum with cams on right

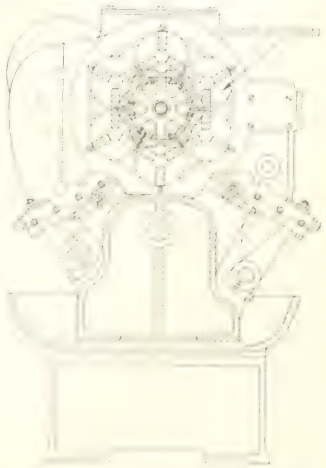
The machine is controlled by means of a horizontal lever convenient to the operator's left hand. This lever, which controls the feed drum drive shaft clutch, can be held in the working position by means of a latch. The machine will then function continuously. With the latch disengaged the machine will complete its functions in proper sequence but once, the driving clutch being automatically thrown out. If the disengagement takes place while a cut is in progress, the cut will be completed and the tool slides return to the points at which their strokes begin and will remain there. The spindles will keep on revolving but will not index. This feature is of value if the operator attends to a number of machines and in consequence may not be able to load and unload a chuck in the interval between indexing motions.

An interesting feature of the machine is the wide range of cam drum speeds obtainable. This cam drum or feed drum has 15 different speeds, ranging, for a driving pulley speed of 800 r.p.m., from 1¼ r.p.m. to 2-2 5 r.p.m. which is at the rate of one revolution in 14 minutes or one revolution in 25 seconds respectively, the latter speed being thrown in automatically for quick indexing of the turret. It will be understood that the time required for one revolution of the feed drum is the time required to finish one piece, hence the capacity of the machine ranges from 2-2 5 pieces per minute to one piece in 5 6 of 14 minutes plus 1 6 of 25 seconds, or 11$^{13}/_{24}$ minutes, approximately, at 800 r.p.m. of the driving pulley. Still greater capacity than the maximum quoted could be obtained by speeding up the drive. The feed changes are made by means of four levers at the front of the machine; each position of each lever is marked by a letter cast on the frame, and a chart is furnished with the machine which tells the set-up man what combination to use for any given rate of feed. The feed drum is driven by a pinion meshing with an internal gear cut integral with the drum and the changes of speed are obtained through heat-treated steel gears which are fully inclosed and flooded with lubricant.

A large range in spindle speeds is also provided. The two levers on the front side at the left hand end, together with the horizontal lever directly above them, permit of changes in the speed of a central three-step spindle drive



Vertical longitudinal section showing spindles and change gears



Cross section showing cross feed tool slides

gear. In addition there are three different spindle speeds which may be used in connection with a given spindle drive gear speed. On each spindle there is a three-step sliding gear that is adapted to engage with the central three step spindle drive gear. The sliding gears can be pulled into any of the three positions of mesh by means of pull knobs at the left hand end of the machine and are held in the working positions by spring pressed plungers whose rounded points engage in grooves on the pull rods. The spindle speeds obtainable with a drum speed of 800 r.p.m. range from 28.5 r.p.m. to 440 r.p.m. There are eight different spindle drive gear speeds and these with the three changes of speed for the individual spindles give a range of 24 speeds for each spindle. In operation all of the five working spindles may have any one of three different speeds in the range corresponding to a particular lever and pull knob setting. A chart is furnished with the machine for use of the set-up man similar to the chart mentioned for feed changes.

The crank handle seen at the front near the bottom serves to turn the machine by hand for tool setting. Its shaft extends clear through the machine and the crank can be applied at either side. The frame is mounted upon a pan underneath which are two reservoirs, one for lubricating oil and the other for cutting compound. The pan catches the cutting compound, which is not allowed to come into contact with the oil. Rotary pumps for circulating lubricant and cutting fluid are arranged at the left hand end and are driven by belt. Lubricant is positively fed to all bearings and the change gearing through copper tubes.

Electric drive is provided for, a 5 hp. motor being required, which can be placed either on the floor or above the machine, the drive being by belt. The motor also may be mounted on top of the machine and the drive made direct through gears or silent chain. The starting rheostat and circuit breaker are mounted on a panel on top of the machine handy to the operator.

There are undoubtedly many automobile parts that can be handled to advantage on a machine of this kind.

The Effect of Heat Treatment on Cast Iron

IT is now very common to apply some form of heat treatment to steel used in machinery construction, and of all of the steel that goes into the manufacture of automobiles there is very little that does not receive some such treatment. On the other hand, very little seems to be done by the way of heat treating cast iron. There is, however, a certain amount of research work available that permits of fairly accurately predicting the effect of a certain heat treatment on the physical properties of cast iron. Some work along this line was done in France by Charpy and Grenet, and recently a note on the subject was presented to the French Academy of Sciences by Jean Durand. Charpy and Grenet consider cast iron to be constituted of a mixture of steel and graphite. If this theory is accepted it follows that the mechanical characteristics of cast iron are affected by the physio-chemical state of the steel as well as by the distribution of the graphite, the latter being in the form of inclusions.

So far only the effect of annealing on cast iron has been investigated to any extent. In Durand's note are given the results of some tests relating to the change in the mechanical qualities of the cast iron due to annealing. These tests were made on cast irons of the following compositions:

	Total C	Graphite	Silicon	Manganese	Sulphur	Phosphorus
A	3.200	2.720	1.180	0.536	0.048	0.208
B	3.250	2.500	1.087	0.432	0.056	0.131
C	2.960	2.400	0.823	0.840	0.048	0.149
D	3.060	2.740	1.195	0.504	0.041	0.257

In order to be able to compare the results of the heat treatment with those obtained in regular practice, the tests, and particularly the shock tests, were carried out according to technical specifications of the French railroads, notwithstanding the fact that these methods do not furnish numerical results capable of easy interpretation and that the shock test in particular involves the measurement of an amount of energy under conditions which reduce the accuracy the greater the magnitude to be measured. The tension test pieces, in series of 12 for each composition, were poured in sand to a diameter of 1 in., after treatment machined to $\frac{5}{8}$ in. and normalized. The test was made in a Maillard machine.

The shock test specimens were cast in sand, 1 9/16 by 1 9/16 by 10 in. in dimensions. The bar was placed between two knife edges $6\frac{1}{4}$ in. apart. A tup weighing 26.5 lbs. was dropped from an initial height of 11.5 ft., the height being increased 2 in. at a time until the test piece was broken.

The annealing process adopted consisted in heating to 1650 deg. F. for 45 minutes in an electric muffle, cooling right in the furnace. The results of mechanical tests before and after the treatment are summarized:

	Average Tensile Strength, lbs. per sq. in.		Average Height of Drop, in.		Total Energy of Shock Test, lb.-ft.	
	Before	After	Before	After	Before	After
A	32,800	23,000	26	24	303	247
B	36,100	22,500	22	24	195	247
C	29,000	23,300	22	20	195	147
D	36,100	22,800	26	24	303	247

It will be seen that the resistance to shock is greatly affected by the annealing although the height of drop breaking the specimen was not changed much. The reduction of the resistance to shock is due to the separation of graphite in the annealing process, as is brought out by the chemical analysis, the results as follows:

	Graphite Content				
	Before	After		Before	After
A	2.720	2.920	C	2.400	2.520
B	2.500	3.000	D	2.740	3.050

GLASS manufacturing concerns in the United States, numbering 328, during 1921, employed 59,705 persons, and produced $212,593,000 worth of manufactured products, according to census report on the glass industry just made public by the Department of Commerce.

During 1919 there were 371 concerns manufacturing glass, employing 83,656 people and produced $261,884,000 worth of products. The percentage of decrease in the value of their product in 1921 was 18.8 per cent while the number of concerns engaged in the industry was reduced 11.6 per cent.

Getting Better District Managers

Part II.

Obstacles to training must be overcome. Not enough good men have been born; some must be made. Payment is usually on straight salary basis, but sales managers seek suitable bonus system. Specialized traveling men are future possibility.

By Norman G. Shidle

THE functions of the traveling man have been outlined in a general way. More detailed and specific definition of the job is necessary. Only in a few instances have there been any actual definition and outline of what the district manager is expected to do. Frequently, the factory sales manager, in the past, has taken on district managers and sent them into the field without adequate knowledge of just what was expected of them. It is not enough to tell a man that he has "general supervision" of his territory.

A detailed, written job analysis of the position of district manager should be available in every factory for the use and instruction of district managers. One big company has just made such an analysis, after operating for years on "general principles," and is already finding that job analysis very valuable. Besides being necessary for the district manager, such an analysis serves to clarify in the mind of the factory sales manager just what he does expect in the work of his territorial representatives.

Increased dissatisfaction with the work of the average district manager has led most factory sales managers to the conclusion that training of some kind will be necessary in the future. Little has actually been done along this line.

The point seems to have been reached where everybody thinks training is necessary, but no one has yet studied the problem enough in detail to actually map out and put into operation any practical plans.

IT is customary to keep a new district manager at the factory for several weeks before sending him out into a territory. Usually these factory weeks are devoted chiefly to making him familiar with the various policies of the company, getting him acquainted with the manufacturing organization and methods, and permitting him to become thoroughly familiar with the product itself.

SUCH information, of course, forms a necessary part of any training plan. It does not form, however, a complete education for a branch manager. Granting what experience has proved—namely, that few men can be obtained who are expert enough on all sides of the work—it appears to be necessary in the future to provide some training which will round out the knowledge of the new man.

Suppose the new manager has had his experience almost entirely on the sales firing line. He is probably a bit hazy about finance, accounting and other administrative work, concerning which he will be expected to help distributers and dealers. Some manufacturers think that such a man could be put through a brief training course which would give him a foundation of principles along these other lines. Upon these principles he could build further knowledge by later experience.

The great lack of good men for district manager positions makes some such scheme almost a necessity. It is useless to point out the many difficulties that lie in the way of working out a practical and workable training plan.

Efficient men are needed and a way must be found to get them. Whatever the difficulties, some of them can certainly be overcome. Progress can be made and conditions can be materially improved. It is not practicable to refrain from trying to perfect a plan, simply because there are obvious limitations to the possibilities in training.

Only one or two men, usually, are taken on by a company at any one time. This makes training almost an individual matter, and causes some important difficulties.

THIS second article completes the discussion about district sales managers.

The purposes of these two articles have been to summarize the existing problems, to bring together a digest of what various sales managers are doing to better conditions, and to promote the further exchange of ideas on this important subject.

Last week the general functions of the district manager were outlined, as viewed by representative sales managers, and details of operating practice were given.

This article tells what some prominent executives are thinking about training men for district managerships and points out possible and probable future trends. We will be glad to have further comments from the industry.

One sales manager says, for example, "If I were going to put on fifteen or twenty men, I would be in favor of a training school at once."

An individual training system is possible, however, and present methods could certainly be improved without installing any expensive systems. Another alternative might be some sort of co-operative training course, in which the district managers of various companies could participate. This course might deal with the fundamentals of the district manager's position and functions. To this could be added the training in individual company policies which is now commonly given.

It is impossible to turn out seasoned district managers from an intensive training course of a few weeks. No sensible man would propose or expect such a thing. It would seem possible to improve present training methods, however, to the extent of rounding out the picture of duties and methods for the new district manager—or for the old ones for that matter—in a more specific and detail way. Certain companies already have some definite plans under consideration.

MOST district managers are working on straight salaries at the present time. Certain forms of bonus have been used, but are not common among the more important companies. The bonus systems thus far tried have involved chiefly a bonus per car. Such a method of payment obviously offers many disadvantages, as well as advantages. A bonus per car is likely to make the district manager think too much of getting rid of cars immediately, and too little of making dealers better merchants.

Most experienced sales managers, however, favor a bonus system of some kind and have refrained from installing one chiefly because they have not yet been able to work out a method that will be satisfactory from every point of view.

More and more specialized knowledge is becoming necessary in the merchandising field. District managers are being called upon for a greater detailed knowledge of widely different phases of business. This trend is on the increase rather than on the decrease. Practically all the important factory sales managers are in agreement on this point. Practical speculations will have to be made soon as to what changes in factory territorial representation will be necessary to take care of these new conditions.

A larger number of efficient district managers probably will be necessary. They are likely to cover smaller territories with more intensive effort and attention. This seems almost inevitable.

Another line of possible development suggests itself, however, which is more nearly in the realm of pure speculation so far as actual present intentions are concerned.

Perhaps factory traveling representatives will be developed along special function lines, instead of being assigned to geographical territories as at present. Perhaps it will be worth while to consider the development of a service specialist, a sales specialist, a financial specialist, etc., each of whom will go about giving practical aid to distributers and dealers in connection with problems arising in his special field. These men might cover large territories, each one visiting a given distributer less frequently; some one of them, however, visiting each distributer about once a month, as do the district managers at present.

Special factory service men have traveled about for a number of years. These special service men have not been just the type of special representative described above, as they have been almost entirely concerned with mechanical problems of service. Their presence, however, indicates that in one division of a specialized field, special representatives have been necessary.

The suggestion of one big company that it may send out special financial representatives from the factory to help put dealers on a better financial basis is another straw pointing in the direction of specialized representation.

THERE are not enough examples of this tendency to indicate a trend. The idea is simply mentioned here as a speculative possibility. If such a development should begin, however, it should be planned and worked out; not allowed to "just grow." Specialized representatives in any appreciable numbers cannot be added to district managers, as the aim of all efforts toward improvement must be to definitely decrease, rather than increase even slightly, unit marketing costs. Every new plan must be judged on a unit cost basis.

Aircraft Warning Signal

DETAILS of an invention by the Bureau of Standards that will warn flyers and balloonists of their rising or falling, have been made public by the bureau, which has been at work on the problem for many months.

A sylphon chamber is provided which can expand or contract a great deal with a very slight change of air pressure. Its motion is magnified until a change of altitude of 30 ft. is plainly visible, no matter how slowly it may occur. This chamber is normally closed to the atmosphere, and thus records the difference between the pressure outside and the pressure at which it was last opened. When it reaches the limit of its motion in either direction (i.e., up or down) an electric contact is closed, and a valve is opened connecting the chamber to the atmosphere and restoring it to zero.

The pointer moves to the right or left, its rate of motion depending on the speed of rise or fall, and when it reaches the end of its motion it jumps back to zero and starts again.

Such an instrument will be of value to balloonists, who have heretofore had to depend on barometers and other means of measuring altitude, none of which were sensitive enough. Use of the instrument will tend to save a great deal of gas, due to the fact that in ballooning the pilot discovers the fact that he has gone a considerable distance up or down, only after he has attained a high degree of velocity of ascent or descent. It is then necessary to let out a lot of gas or throw over a lot of ballast in order to stop the motion, whereas, if it had been discovered sooner less gas or ballast would have been required.

Moderate *vs.* High Speed Passenger Car Engines

Ricardo and Strickland debate relative merits at meeting of Institution of Automobile Engineers. Better fuel economy in high speed type, Ricardo says, but his opponent thinks this is offset by disadvantages, such as increased bearing pressures.

UP to the present time the development in automotive engines, and particularly passenger car engines, has been steadily in the direction of higher operating speeds. About 1905, when the old A. L. A. M. horsepower rating formula was adopted, piston speeds of stock engines ranged around 100 ft. p. m. The movement toward higher speeds was led by designers of racing engines. At a comparatively early date the cylinder bore of racing engines was restricted by competition rules, while later the piston displacement was limited instead. Under these circumstances designers sought to increase engine output by increasing the speed. In those days the racing chassis of one season was frequently the stock model of the next, and it is therefore not to be wondered at that the piston speeds of stock cars increased in conformity with those of racing engines, though they naturally always lagged behind to quite an extent. According to a chart of French origin, the average piston speed of stock car engines increased comparatively uniformly from 800 ft. p.m. in 1902 to 1300 ft. in 1912 and then at a more rapid rate to 1800 ft. in 1914.

At first the object in going to higher piston speeds in touring-car engines was to increase the ability of the cars, and to thus obtain machines that were more responsive to the throttle. This latter factor, of course, is entirely a matter of engine output in proportion to total weight to be moved, and to-day practically any degree of "liveliness" desired can be obtained with what has come to be known as a moderate speed engine. Hence the desire for a more lively car is hardly any longer a legitimate reason for increasing engine speeds.

TO-DAY designers of cars in Europe, where the high-speed engine has probably attained its highest development, have to bear constantly in mind two conditions with which car users are confronted. One is that fuel prices in all European countries are unprecedentedly high, which makes fuel economy an important desideratum; the other that high annual taxes are levied on passenger cars abroad, and these taxes are always based either on the cylinder bore or on the piston displacement; hence it is desirable to make the bore or the displacement of the engine as small as possible, consistent with the work which the car is expected to do.

Recently high speeds of revolution have been employed, especially in light car and cycle car engines manufactured abroad, which in many cases have piston displacements commensurate with those used on the larger sizes of motor cycles here. The chief advantage of these engines is that they are economical as regards fuel consumption, and inasmuch as the cost of these small machines is less than that of full sized, more liberally powered cars, they have been meeting with considerable favor in those countries where after-war conditions compel economy in expenditures.

On the other hand, from the standpoint of operating convenience, these engines are not nearly as satisfactory as those more liberally dimensioned in respect to the weight of the car and load, and operating at more moderate speeds. In England there has recently been an outcry against the method there used for determining the tax on cars, which fosters the development of engines of small bore and high angular speed, a type of engine that is not wanted by purchasers in the colonies, it is said.

THE question of moderate speed vs. high-speed engines was debated recently before the Institution of Automobile Engineers, F. Strickland taking the part of the moderate speed and H. R. Ricardo the part of the high speed engine. Strickland based his opposition to the high-speed engine mainly on the extremely high inertia forces at high speeds, which subject practically all of the working parts to increased stresses. Assuming certain proportions for the chief working parts and an explosion pressure of 400 lbs. p. sq. in., Strickland showed that in a four-cylinder 3.15 by 5.92-in. engine the bending force on the crankshaft at the end of the exhaust stroke increases from about 1000 lb. at 1400 r.p.m. to 8100 lb. at 4000 r.p.m.; that the bending force during the explosion stroke decreases from 2950 lb. at 600 r.p.m. to zero at 2400 r.p.m., and then increases to 5000 lb. at 4000 r.p.m. The tension on the connecting rod bolts increases in the same proportion as the bending stress on the crankshaft at the end of the exhaust stroke.

One of the arguments advanced by Ricardo in favor of the high-speed engine was that although up to 1890 the low-speed steam engine was pre-eminent, all attempts to build high-speed engines previous to that time having failed, when the Willans central valve high-speed engine appeared it swept the field within a few years, only to be displaced later by the still higher-speed Belliss engine. Strickland also made reference to steam engine history, but pointed out that the steam engine was not an apt example, for the reason that in such an engine the inertia forces can be taken up on a cushion of steam at the end of the stroke, which is not possible in a gasoline engine, except at end of compression stroke.

Strickland stated that the sizes of such parts as the crankshaft are often determined more by the amount of bearing surface required than by the stresses on the parts, and he therefore gave a chart showing the in-

crease in bearing pressure with speed. At high speeds the pressures on the center bearing of a three-bearing crankshaft grow enormously according to this chart. At 2000 r.p.m., for instance, which is not a low speed, the load on the center bearing of the engine considered is about 2100 lb., but at 4000 r.p.m. it is about 9400 lb.

THE pressures on the crank pin and rear main bearing increase in similar proportions, though they do not attain the same absolute values as that on the center bearing. These figures, Strickland argues, show that as the speed of the engine is increased, the dimensions of the shaft and the length of the bearings must be increased, and above a certain speed this increase must be very considerable. The valves and valve gear must also be made larger, and the greater weight of the valves, together with their higher speed, increases the strain on the valve gear very rapidly. The timing gear and its cover will also have to be made larger and heavier.

Strickland next proceeded to make the same comparison on the basis of engines of the same output instead of the same cylinder size. He assumed that a cubic inch of piston displacement will give the same output and took engines with bore and stroke equal, so that the bore and the stroke vary inversely as the cube root of the speed. This leads to the conclusion that an engine of 2.22-in. bore and stroke, for instance, when running at 4000 r.p.m. develops the same output as an engine of 6.23-in. bore and stroke running at 500 r.p.m. This comparison also shows that at the higher speeds the bending forces and the bearing pressures are much higher in the high-speed engine.

Taking all these points into consideration, Strickland arrives at the conclusion that increase in speed beyond a certain point, accompanied by a decrease in cylinder size, entails increased weight. The exact speed for minimum weight depends upon many points, but with the weights assumed in the examples given it appears to lie between 1200 and 1500 r.p.m., corresponding to a cylinder of from 3.62 to 4.05-in. bore. Strickland admits that as the speed is decreased the flywheel must be made heavier, but he contends that this is not a serious matter, as the flywheel in any case constitutes only a small proportion of the whole weight, especially in six-cylinder engines.

Aside from questions of weight the moderate speed engine seems to have every advantage. Since the reciprocating parts need not be cut down to the same extent the pistons can be given larger wearing surfaces, making them more durable.

Ricardo approached the problem from a somewhat different angle, holding that the chief requirement at the present time is for increased fuel economy. This can be attained by increasing the compression ratio. High compression is desirable from every point of view, for an increase in compression increases the power output and the fuel economy and decreases the cooling water temperature and the heat strain on such parts as valves and plugs. This may sound contrary to established facts, but Ricardo quotes results obtained with his variable compression engine to bear out this point. When increasing the compression ratio from 60 to 95 lb. p. sq. in. the length of exhaust pipe maintained at red heat was greatly decreased and the exhaust valves also became cooler. At 98 lb. compression the first traces of detonation were observed, and at 102 lb. detonation was very pronounced. Increase in the compression to this valve was accompanied by a marked decrease in power and economy and a decided increase in the temperature of the cooling water. When operated under these conditions for 15 minutes the engine would pre-ignite, owing to the high temperature attained by the spark plugs. By retarding the spark it is possible to increase the compression still further, but this is done at the cost of a considerable loss in economy and increased heat flow. Enriching the mixture also permits of increasing the compression pressure, but also at the expense of economy.

Ricardo said that he recently had on the test block two engines which were representative of the two types. One was a T-head engine with spark plugs over the inlet valves, operating at a compression pressure of 75 lb. and designed to run at about 1200 r.p.m. The other was a valve-in-head engine with spark plugs in the center of the cylinder heads, operating at 115 lb. compression and designed to run at about 3000 r.p.m. Both delivered about the same power per cylinder. When operating under wide-open throttle on the same gasoline, one knocked alarmingly, the other not at all. The high compression engine gave a brake mean effective pressure of 130 lb. p. sq. in. and consumed 0.51 pints (about 0.48 lb.) per horsepower-hour; the other had a b.m.e.p. of 80 lb. p. sq. in. and consumed 0.76 pints (0.73 lb.) per hp.-hr. As to smoothness of operation, Ricardo stated that anyone seeing the two engines running side by side would have made quite a wrong guess as to which was the high compression one.

THERE has been a steady trend toward higher engine speeds in passenger car engines for many years. The average piston speed of stock car engines increased from 800 ft. p.m. in 1902 to 1800 ft. p.m. in 1914.

Many advantages have been gained from this increase, but some engineers believe that they do not much more than offset the disadvantages which have accrued.

Two well-known British engineers recently debated this point before the Institution of Automobile Engineers. Both brought out a number of interesting points, which American engineers will want to know about. This article discusses the question in general and gives a brief summary of what the debaters had to say.

IN order to obtain the same life as with the moderate speed engine, the load factor on the bearings must be kept down to nearly the same figure. A slightly higher load factor is permissible because of the lower oil temperature in the high speed engine, which tends to keep down wear. Owing to the much higher m.e.p. much smaller cylinders can be used. This makes the reciprocating weights much lighter, and, with a shorter stroke, the connecting rod proportional length, and therefore its angularity can be reduced. As a result the inertia forces need be little if any greater than in the low-speed engine.

In a four-cylinder engine Ricardo uses three bearings with substantial long webs. This leaves plenty of space for liberal crankpin bearings while still keeping the length of the engine within the limits set by the cylinders. The center bearing needs to be rather large and long, but this is the only increase which affects the length of the engine. Bearings should be so proportioned that

the load factor is the same on all, and if this is done it need not be more than 20 per cent greater than on the low-speed engine, which will insure about the same useful life, according to Ricardo. At the same time the engine is shortened almost in the proportion of the cylinder bores.

Ricardo dismisses the argument that difficulties are encountered with the valve gear of high-speed engines as of no weight. He says that in order to insure perfect combustion at high speeds, turbulence is essential, and to induce turbulence the gas speed through the inlet valves must be made high. It is not necessary to use unduly large valves, for if carefully designed passages are provided, valves can be used of a size which can be operated perfectly satisfactorily at 4000 r.p.m.

There are three general causes of vibration in an engine of the four-cylinder type, namely, the secondary unbalanced force due to the angularity of the connecting rod; fluctuation in crankshaft torsion, and torque reaction. As regards the first, the reciprocating weights need be but little greater, and as the connecting rod length, owing to the presumably shorter stroke of the high-speed engine, can be made greater, there will be little to choose between the two types in this respect. Crankshaft torsional vibration is likely to be a serious fault, unless provided against by the use of a heavy crank, a Lanchester vibration damper or, best of all, placing the flywheel at the center of the crank. If no such provision is made the first critical speed is likely to fall well within the operating speed range of even the low-speed engine. In Ricard's opinion torque reaction is the most serious cause of vibration; it cannot be eliminated by such simple devices as Lanchester's vibration damper and is greater in the low-speed than the high-speed.

ONE advantage claimed for the high-speed engine is that it materially reduces what has been called "rolling losses" by Dr. Riedler and what Ricardo prefers to call hysterisis in the tires, that is, the flexing of the tire material under non-uniform driving torque. This loss can be reduced by the use of a heavy flywheel, but such a flywheel makes a car sluggish, and this is one of the worst faults a car can have.

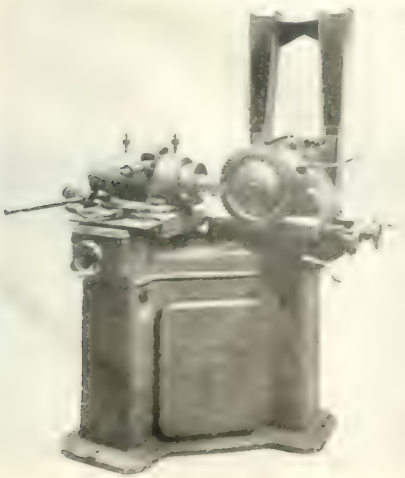
Ricardo thought it significant that for the London-Paris air service the two highest speed aircraft engines so far known had been chosen, namely, the Rolls-Royce Eagle and the Napier Lion, the former turning at 1900 and the latter at over 2000 r.p.m., a truly terrific speed for a 450-hp. engine; yet these engines were chosen, in preference to the lower speed types, the former entirely and the latter almost entirely on the grounds of reliability and durability.

Bevel Gear Burnishing Machine

THE machine here illustrated is intended for burnishing the tooth profile of bevel pinions. When in operation, a hardened gear is mounted on the driving spindle and revolves at high speed with a soft pinion. A novel rocking action of the pinion spindle in combination with a vertical adjustment of the gear spindle is claimed to result in evenly distributing the burnishing effect along the entire tooth surface.

No stock is removed nor any abrasive used, hence the generated tooth-form is not distorted. The complete operation can be performed in a few seconds. The standard machine is belt driven but it can also be arranged for motor drive if so specified.

This development is not offered as a means of eliminating all gear cutting trouble. Burnishing will not compensate for incorrect cutting, but it will produce smoother running gears by "ironing out" the small facets, or tool marks, which compose the tooth profile of any generated gear. The machine is of special advantage when used for automobile rear axle gears and pinions in which quietness and smooth running are essential. It is manufactured by the Gleason Works and is already in use in quite a number of automobile and parts factories.



Gleason 15-in. bevel gear burnishing machine

New Make of Engine Bearing

THE Oakland Motor Car Co. is now using the Chadwick bronze back babbitt bearings in the Model 64. These bearings are interchangeable, the bearing materials being cast by the low pressure die casting method directly into the bronze backs. It is claimed that this method produces a very dense structure, the density being under control, thereby giving uniformity and also allowing the use of a pure tin bond which melts at 610 deg. Fahr. The interchangeable feature is, of course, obtained by accurately machining the bronze back and also the crankcase into which it fits. The bronze back bearing is made of a bronze shell, on the bearing side of which is cast a 1/32 in. thickness of babbitt metal (S.A.E. specification No. 11). The total thickness of the bearing is 3/16 in., the other 5/32 in. being taken up by the bronze. As compared with the all-babbitt type, superior strength and longer life are claimed for this bearing. It is also claimed that it has a greater heat conductivity (66 per cent more) than the plain babbitt bearing and that it runs cooler in consequence and better maintains the lubricating qualities of the oil.

How to Secure Proper Illumination of Rear License Plates

Experiments prove that better light distribution is more necessary than increasing candlepower. Color and design of plates affect visibility. Many rear lamps of poor design on market. Suggestions offered for producing satisfactory unit.

By J. A. Summers and W. G. Morrison
Lighting Service Department, Edison Lamp Works

THE laws or regulations of many of the States require that the rear license plates of automobiles shall be so illuminated during the hours of darkness that the number can be read at distances varying in the different States from 50 to 100 ft. The average requirement is between 50 and 60 ft.

The illumination actually provided is notoriously poor, so that the purpose of the regulation is defeated. It is practically impossible to read the numbers on moving automobiles after dark, and this has resulted in bitter complaint from all classes of officers entrusted with traffic regulations and law enforcement.

Since the motorist sees no personal advantage in improving this lighting, and perhaps anticipates personal inconvenience from it, it is not surprising that he makes no effort to rectify matters, so long as he is not compelled to do so. On the other hand, he cannot be severely criticised for his neglect, because much of the equipment supplied on automobiles cannot comply with the law without mechanical changes, and further, the regulations have been so worded that one cannot readily determine just how much light should be supplied to insure compliance.

Massachusetts is the first State to take definite steps toward rendering the regulations effective. A law has been passed which requires the approval of the Registrar of Motor Vehicles, on all the rear lamp equipment used on motor vehicles on the highways of the State.

At the request of the Massachusetts Motor Vehicle Department and the corresponding officials of several other States, the Illuminating Engineering Society's Committee on Motor Vehicle Lighting, and a committee of the S. A. E. have been studying the question, and undoubtedly these committees will bring forward good, constructive recommendations.

Determining Necessary Foot Candles

In order to handle the problem intelligently, it is necessary to first determine the strength of illumination (foot candles) necessary to provide for satisfactory vision. This is no easy matter, since there are so many possible factors to affect the result. Individual observers vary as to eyesight and quickness of perception, direction of view varies, lights in the field of view may introduce more or less glare, the motion and vibration of the vehicle will affect readability, and then the plates themselves vary as to size, color, contrast, size of figure, etc.

Any kind of observations made in the street are subject to a variety of local conditions which will affect the results. In order to provide some data which would serve as a basis of analyzing the problem, we have run a series of tests in a dark room. It is the purpose of this article to discuss the problem, and present the indi-



Fig. 1—Shadows cast on number plate with lamp above plate

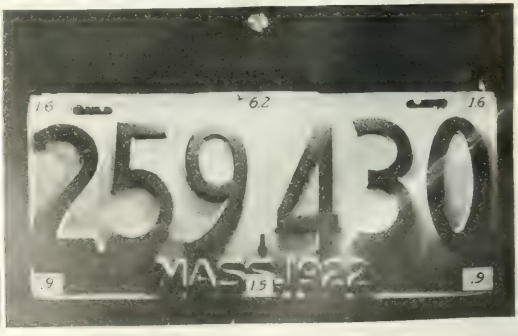


Fig. 2—Illumination of number plate with type of rear lamp suggested

cations resulting from these tests, with the view of helping toward the realization of an effective solution.

First let us consider the requirements of the plates themselves. It is a well-known fact that the minimum angle of discernment of the eye is one minute, that is, the eye can distinguish separate objects if they are one minute of angle apart. At 60 ft. this would be 0.21 in., which is the minimum width of stroke and spacing of figures permissible, even under ideal conditions. However, as actual conditions are far from ideal, the minimum would not be advisable. It was the opinion of all observers present at the test that a fairly thin stroke—3 8 to 7 16 in. wide—well spaced figures, ½ in. or more, was more legible than a wide stroke and wide spacing or any kind of a stroke with a narrow spacing. If the stroke is too wide, the figures have a tendency to run together. Every effort should be made to make the figures stand out clearly, as they can then be read with greater speed and with less illumination.

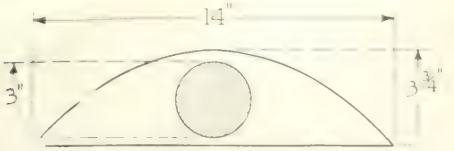


Fig. 3—Form of tail light reflector suggested.

The shape of the figures should be such that they are not readily confused. In the block letter so frequently used, the 3, 6, 8 and 9 are often confused when viewed hurriedly, while letters of the shape used on the 1922 Massachusetts and Ohio plates are much more legible, largely because of the greater opening of the figures.

Contrast between figures and background should be maximum. Black and white are the best colors, and no difference in visibility could be detected, whether letters were black on a white background or vice-versa. Other dark colors, such as dark blue and dark green, when used with a light contrasting color, are also quite good.

Test of Visibility

In order to secure an average condition, license plates were secured from every State possible. Thirty-three States responded, and tests were run on each one of the plates. The plates were set up against a black background at 60 ft. from a group of observers. An even intensity was thrown on the plates and raised in steps until all the observers could read the numbers. It was found that the intensity in foot-candles required varied from 0.10 for the plates of Maine, Rhode Island, Texas and Utah, to 0.30 for the plates of Alabama, Florida, Kentucky, Minnesota, Montana and North Dakota.

In the first test no time limit was set for the reading, and the observers could study the figures as they could on a standing car. However, if the car were moving, a definite time limit would be set, depending on the speed of the car, in which the plate would be visible. Assuming a speed of 20 m.p.h. a car would travel the 60 ft. in about 2 sec. It was, therefore, assumed that an intensity sufficient to read the plates in 2 sec. was a minimum. Starting with the intensity at which the plates could be read when plenty of time was afforded, the intensities were increased until all observers could read the figures in 2 sec. The results showed that the plates of North Carolina, Pennsylvania, Texas and Utah required only 0.20 foot-candles, whereas those of Montana required 0.60 foot-candles, these being extreme values.

Investigation of the available types of rear lamp equipment disclosed a deplorable lack of good design. A very high percentage of cars use the familiar small bull's-eye type, 3 in. in diameter, with an opening an inch wide, cut in the side. The opening does not cover a sufficient arc to light the entire plate, and, being covered with mica or celluloid, after a short period of use absorbs a high percentage of the light. Fig. 1 shows the shadow cast with the unit mounted over the center of the plate, and the intensity in foot-candles secured at various parts of the plate, using the standard 2-c.p. Mazda lamp.

Light Distribution

The first thought, naturally, is to use a larger lamp to get more light, but this is not a solution of the difficulty, as it is a question of distribution of light more than quantity of light. There is plenty of light available in the standard 2-c.p. Mazda light, if it is properly distributed over the plate, and there is no reason for alarm that there will be an additional drain on the battery.

It is a very simple matter to design and there are no commercial difficulties in the way of building a unit at a low price, which would satisfy the most rigid requirements likely to be imposed. Only the most elementary principles of reflector design are necessary to produce a satisfactory unit. In order to demonstrate this, a unit was built in the laboratory and even this crude model gave a distribution of light which would furnish more illumination than the tests would indicate to be necessary. Figs. 2 and 3 illustrate this unit with the intensities in foot-candles at various parts of the plate secured with a 2-c.p. Mazda tail light.

The face of the unit is a section of a parabola 14 in. long, 3¾ in. deep and 1½ in. thick, and painted on the inside with flat white enamel. The illumination with this unit (or with almost any unit) would be materially increased if placed about an inch above the plate and tilting either the plate or the unit so that the lower edge of the plate would come to the same line as the front face of the unit.

To draw any definite conclusions from these preliminary tests, it would be necessary to assume that a State would supply license plates of a fair degree of contrast between figure and background, and well spaced numerals. With this assumption, the test would indicate that a minimum intensity of illumination of 0.5 of a foot-candle at any part of the plate would satisfy all average conditions, due allowance being made for such moderate depreciation as would naturally occur during the year.

Gummy Deposits in Gasoline

A STUDY of various methods of evaporation and oxidation of cracked gasolines made by the Bureau of Mines leads to the conclusion that gummy and resinous deposits are caused by oxidation, and have no direct relation to unsaturation as determined by solubility in sulphuric acid.

In the investigation made by the Bureau a new and convenient method was developed for determining "gum" in gasoline. The study of gums and their formation leads to the conclusion that they are polymerized aldehydes, which probably are formed by the oxidation of olefins, etc. Storage tests confirm the above conclusions.

Details of the investigation made by the Bureau of Mines are given in Serial 2394, a pamphlet entitled "Gum-Forming Constituents in Gasoline," which has recently been issued by the Bureau.

Builders of Closed Bodies Assured of Big Business in 1923

Output will average about 35 per cent of total. Increase in demand is not likely to be sensational. Sport types also have strong appeal. Plan must be made to get dealers models they want when they want them or sales will suffer.

CLOSED-CAR production for 1923, so far as it can be estimated from the tentative schedules of the leading companies, will show a substantial increase over 1922, but the growth in demand will not be so sensational as it has been this year in comparison with 1921.

Taking the output of the entire industry for 1922, the percentage of closed cars probably has averaged between 27 and 28. On the same basis, the percentage for next year probably will average from 33 to 35.

According to price classifications, the closed car production for next year probably will be between 25 and 30 per cent in the low-priced lines; between 30 and 40 per cent in the medium field and between 40 and 60 per cent in the high price class.

The big business in closed cars this year has been due in large measure to the development of low-priced models early in the year by two or three far-sighted companies which sensed the trend of public demand. When it became apparent that with a sharp reduction in price there would be large sales of closed models, practically all companies went after a share of the business.

Notwithstanding the heavy sales of closed cars this year, there is a strong feeling in Detroit that 1923 will bring a pronounced demand for special sport models and that public interest will be centered on them. Until the last few months, prospects have had to make their selections, for the most part, from standard open models, low-priced closed jobs or standard closed cars.

PRACTICALLY all manufacturers have made haste recently to get into the sport model field. They have found that such cars possess a strong appeal for the purchaser and that the price differential of $100 or more over the standard open line does not appear to have limited the demand in the least.

It remains to be seen whether this estimate of demand is entirely correct. It may be that the sport models will prove to be more or less of a fad, although there probably will be a strong demand for them in the spring. It undoubtedly will be found in the future, as the prices of closed models are brought steadily nearer to those of open cars, as they will be, that the volume of closed car sales will approach more closely the total of open model business and ultimately exceed it to a considerable degree.

When there is no great difference between the price of a touring car and a coupe or sedan, it will be found that the average purchaser in cities and towns where the weather is not mild the year 'round, will favor the closed model. There always will be, however, a big field for the sale of open cars in sections of the country where there is no real winter and among farmers.

The sport model, or anything "different" also will have a strong appeal to many persons, especially the younger generation and there is substantial reason for expecting a heavy sale of such cars.

It unquestionably is true that the shortage of bodies has held down the sales of closed cars all this year and some of the companies making popular lines are far behind on deliveries even now. The demand for closed models, at reasonable prices, was underestimated early in the year and a great many people who actually preferred them have had to be content with something else because they could not get what they wanted. When they come into the replacement market the chances are that they will still want a closed job.

SOME system must be worked out in the automotive industry under which people can get what they want when they want it. It is comparatively easy to buy closed cars in the spring and open cars in the winter, but no plan has been devised under which dealers and prospects can get an ample supply of the kind of vehicles they desire at all seasons. Dealers in the more popular lines have been far behind in deliveries of closed cars all year and this fact has cost them many sales.

When a dealer or a distributer can sell more closed cars than he can get in November and December it doesn't soothe his temper to have his factory sales manager tell him what a noble thing it would be for him to stock a lot of nice, new open cars for spring delivery so his customers won't have to wait. The sales he's going to make in the spring don't pay overhead in the winter.

It should not be forgotten, either, that when he stocks open cars for spring sales, he has to pay cash for them and if the factory decides, before the spring selling season opens, to reduce prices the dealer has to pocket a loss instead of make a profit in a good many cases.

FACTORIES are going to have increasing difficulty in convincing dealers that it's their patriotic duty to pay cash for cars and then warehouse them for three or four months just so they'll have a stock on hand when they get a chance to sell them. They'll contend that it's the business of the factories to make prompt deliveries of merchandise when it can be sold to the best advantage.

They will point, for example, to the clothing industry, in which summer clothes are made in winter and winter clothes in summer.

One outstanding reason for the shortage of closed cars this year has been the inadequate body building capacity of the country. This condition will be greatly improved

by the beginning of 1923 and manufacturers generally seem to have provided for their needs.

Ford, in its own factory at River Rouge, can build about 1000 sedans daily and the Briggs Mfg. Co. gives it 500 coupes a day as well as about 200 of the new four-door sedan type. Chevrolet, soon after the first of the year, will complete body plants at many of its car manufacturing and assembly plants which will give it adequate body supply to meet any demand. The body plants will be operated by Fisher.

PRACTICALLY all the closed bodies for General Motors cars are being built by Fisher, though there are exceptions in which they are made by companies outside the corporation. Fisher is operating upward of thirty plants in and around Detroit and Cleveland, and except for General Motors is building only closed bodies. Approaching completion is a huge plant in Detroit which will give Fisher an additional 1,000,000 ft. of space for its body manufacturing requirements.

Dodge Bros., now making all their own bodies, will complete soon after the first of the year a large addition which will be used almost exclusively in meeting body requirements. Dort makes all its own bodies and declares its plant facilities adequate to meet demand. Hupp controls its source of body supply and is prepared to meet increased business. Maxwell-Chalmers has its own body plants and while these have fallen down badly in meeting closed body demand this fall, their facilities are being extended to meet additional requirements.

STUDEBAKER operates its own body plants and is extending them to provide for a larger closed car business. Hudson-Essex has been hard pushed to meet demands for its coach models, but has kept abreast of them fairly well because of simplified assembly. The Hudson sedan body is made in Amesbury, Mass., and the business has outstripped the body factory production capacity. Hudson has not announced plans for more adequate supply, but undoubtedly will make them.

Lincoln bodies are being made by custom body builders exclusively and output is consequently limited. The completion of an addition to the Lincoln plant now under way is expected to provide for the building of some body types there, so that production in these models will be greatly increased. Gray bodies are being made by the Kelsey Wheel Co., which has facilities to manufacture any number of any type required.

Packard gets its closed bodies from the Towson Body Co., Detroit, and its open bodies from the Pullman Co., Chicago. Both of these companies are equipped to handle any increase in Packard business which may arise. Paige-Jewett bodies are made by the Wilson Body Co., which is making a large increase in its factory space.

The Durant body supply for Stars and Durants is not anywhere near ample to meet the production requirements they have outlined, but plans have been made to meet requirements by the organization of new companies.

CLOSED-CAR demand is now running about 33 per cent with Ford and Chevrolet; Hudson and Essex, with their coach popularity, are exceeding 50 per cent. The same is true of cars like Cadillac and Packard, whose demand is close to 75 per cent. Similarly, the General Motors companies with low-priced closed models with Fisher bodies are having a closed business approximating 50 per cent. This figure probably is an average for all medium-priced cars now. Many factories, however, are not able to get closed bodies up to this figure. Sport cars now are winning buyers who otherwise would be in the closed-car market, easing the situation somewhat.

Now that provision has been made for meeting the body needs of the industry, there will be less legitimate excuse for those manufacturers who fail to fill orders promptly.

CONCEDING that it will be impossible at the beginning of each year for factories to establish arbitrary production schedules for models of various types, they can determine more definitely than they have in the past, by scientific sales analysis, what the probable demand will be.

It is perfectly logical to assume, for example, that inasmuch as the major part of automobile buying this year has been in the larger cities and industrial centers, it will switch in 1923 to the agricultural sections which possess 45 per cent of the country's buying power. This would include the Middle West, the Northwest, the Southwest and the Southeast.

The farmer, generally speaking, is not addicted to the closed car. He wants not only open cars, but open cars without frills, so he is not an enthusiast over sport models, either. He is the man to whom the Ford is sold without starter or demountable rims. He prefers to turn the crank and save $95. He buys with an eye to economy.

While it is logical to assume that buying will shift to the rural districts in a few months, buying ability isn't going to be equal in all such sections. This is one illustration of why careful market analyses now will mean profits a few months from now. What seems on the surface like a perfectly logical conclusion does not always work out in practice.

BODY design and body production methods are becoming increasingly important. Body changes and refinements rather than chassis improvements will be featured at the New York and Chicago shows.

No matter how long the strides which may be taken in body design and production, however, they will not attain their full measure of importance unless manufacturers can work out better than they have in the past the problem of getting into the hands of dealers a plentiful supply of the models prospects want when they want them.

New Hardening Method for Steel

A NEW method of treating steel, which is claimed to permit of obtaining a higher degree of hardness than has been attained before, has been patented in France by the Swenska Kugellager Fabriken. After the steel has been hardened in the usual way, by heating and sudden cooling, it is subjected to a mechanical process, such as pressing, shearing, hammering or drawing, under such conditions that the elastic limit of the hardened steel is exceeded, so as to produce a permanent deformation. By varying the pressure employed and the time during which the treatment is continued the effect can be caused to penetrate more or less deeply into the metal.

Truck Rating Must Be Standardized to Avoid Unjust Legislation

Commercial vehicle a carrying tool, not a measuring implement. Overloading often due to improper basis of classifying chassis. Simplified and unified lighting laws necessary. National Highway Traffic Association convention brings out many good points.

CLASSIFICATION of motor trucks as measuring tools rather than carrying tools has been responsible in a large measure for the inauguration of regulatory statutes in many States, David C. Fenner, manager of the public works department of Mack Trucks, Inc., told delegates to the convention of the north central division of the National Highway Traffic Association in Grand Rapids last week.

Fenner's talk, with a paper on "Lights for Highway Vehicles," by David Beecroft, directing editor of the Class Journal Co. and vice-president of the North Atlantic Division of the National Highway Traffic Association, featured the meeting.

Roy D. Chapin, president of the Hudson Motor Car Co. and Michigan director of the National Highway Traffic Association, was chairman of the afternoon session and spoke at the evening session on financing of State highways. Arthur H. Blanchard, president of the National Highway Traffic Association, spoke on the "Economic Value of Highway Transportation Franchises," and George H. Pride, treasurer of the National Highway Traffic Association, spoke on "Regulations covering speeds, weights and dimensions of motor trucks, tractors and trailers."

On the subject of overloading, Fenner said: "We are handicapped for lack of standards for truck rating and classification so no comparisons can be used. A motor truck is a carrying tool but not necessarily a measuring tool. It should be in the same general classification with the shovel and wheelbarrow and not with the quart, peck and bushel basket. Truck overloading is due in part to the improper basis of rating and classifying the motor truck chassis in terms of the manufacturer's rated pay load capacity. The user soon learns that this does not mean anything.

"He attaches a body which may or may not fit either the chassis or the commodity he carries and loads it to suit himself. The motor truck body is the real measure of capacity which determines the size of the chassis which must be used to carry it loaded with the commodity to be handled.

Truck Buyer's Needs Must Be Studied

"IN the sale of motor transportation the successful salesman conducts a survey which convinces the customer that a certain type, capacity and weight of body is necessary to fill his transportation requirements. He sells the customer this body and then he is in a position to sell the proper type and size chassis to carry this body loaded to capacity with the particular commodity.

"Truck manufacturers have suggested that State motor vehicle commissioners should refuse a license for any motor truck which is not equipped with a manufacturer's caution plate properly stamped with the actual weight of chassis, body and load. Manufacturers are now preparing to go a step further and include in the plate the maximum load for the front and rear axles, the maximum speed and the distance in which the vehicle loaded to capacity can be stopped with each set of brakes operated independently when running at the above speed on a hard, dry, level roadway.

"The information on this caution plate will give the owner the data he needs for painting the weight and carrying capacity on the side of the vehicle to comply with the State laws. It will also enable the enforcement officers to check up weight distribution, speed and condition of brakes. A similar plate for home-made trucks can be issued by the State Department."

Sane Laws Desirable

PROFESSOR BLANCHARD said that responsible operators of motor-driven vehicles would welcome the passage of the laws relative to highway franchises making for improved service. Operators, he said, have nothing to fear from commissions composed of men of vision, with a broad general knowledge of transportation and without prejudices against any form of transportation. He suggested a board of five as the proper number on which would be a highway transport man, a highway engineer, a business man familiar with large commercial problems, a banker familiar with bonding and State Attorney-General as an ex-officio member.

Accidents on highways due to faulty lighting of motor vehicles were supplemented in many instances by improper road conditions, Beecroft said, due to poor highway illumination, curves and other dangerous conditions. The A, B, C of highway lighting is yet to be written, he said, and experimental work now being done gives promises of excellent results.

Traffic conditions now demand that all vehicles using highways should carry lights, he declared, and said the unlighted horsedrawn vehicle was a menace to itself and other users. Furthermore, these lights should be standardized so that a knowledge of the district would not be necessary to interpret the lights. Good lighting on vehicles should be simplified in every instance rather than made more intricate.

Pride said there would be 60 per cent more trucks on the highways than now if weights are limited to three tons, meaning an increase in traffic congestion and accidents. It would increase by 40 per cent the cost of hauling the additional ton or two that might be accommodated on a five-ton vehicle.



Air and Water Cooled Engines Compared

Test data quoted to show that there is no great disparity between the two types in respect to maximum temperatures, fuel consumption, output, or valve and piston reliability.

Editor, AUTOMOTIVE INDUSTRIES:

Mr. Ludlow Clayden rightly claims that the accumulated knowledge of water-cooled engines is vastly greater than than of the air-cooled type. However, most of the data on water-cooling concerns temperature conditions within the jacket rather than within the cylinder walls, and, since the latter have the major influence in performance, it would seem that much of the knowledge is superficial.

As regards cylinder wall temperature conditions and the effect thereon of variations of mixture strength, compression ratio, spark advance and cooling medium supply, etc., very little published data are to be found concerning water-cooled engines. In fact, only three or four such investigations are known to the writer. Relatively, the air-cooled engine is in a much more advanced state, as all the above variations have been the subject of careful and extensive research.

There is no parallel in water-cooled engine data to the published results of Gibson's classic investigation of air-cooling at the Royal Aircraft Establishment,[1] and the writer has no hesitation in claiming that in fundamental knowledge of cooling, the air-cooled engine is in a much more advanced condition than the water-cooled type.

The relatively large amount of existing data on wall temperatures in air-cooled cylinders is mainly due to: first, the necessity for such investigation as a preliminary to the production of air-cooled cylinders of high output and efficiency; second, the facility with which such temperature conditions are determined; and third, because the effects of bad thermal design are readily apparent, the air-cooled engine designer having no convenient equivalent of a water jacket with which to cover his sins.

In the article on "The Evaporating Type of Cooling System" reference is made to temperatures of over 400 deg. Fahr. in the jacket. It would be of interest to know if these temperatures were measured in the jacket (not in direct contact with the cylinder wall) or were cylinder wall temperatures. If the former be the case, there is little doubt that the wall temperatures would be considerably in excess of 400 deg. Fahr.

MR. CLAYDEN states that the temperatures in air-cooled cylinders are far in excess of anything existing with steam-cooling. While this may be so, the writer is very much inclined to doubt it, particularly in view of the deliberately sluggish circulation used with steam-cooling, especially in side valve engines on account of the restricted tortuous passages available for the steam flow around the valve ports, seats, etc.

The average water-cooled engine exponent is satisfied with the assumption that, under normal conditions, the maximum cylinder wall temperature is only slightly in excess of that of the water at the jacket outlet. This assumption, while comforting, is unfortunately not in accordance with the facts of the case, at least for aircraft engine cylinders, and, if the writer is not mistaken, still less so for the average automobile engine, particularly if fitted with thermo-syphon circulation.

Tests by the Engineering Division on a "Liberty" cylinder have shown that, under the best conditions at full throttle (normal speed and water temperature), the combustion chamber wall at the hottest point is 140 deg. Fahr. above the temperature of the water at outlet and that when the walls become covered with scale this temperature difference may rise to over 250 deg. Fahr. Owing to deflection of the cylinder head under explosion pressure, the scale in the Liberty does not much exceed 0.025 in. in thickness before it flakes off. If a temperature difference of 250 deg. Fahr. be obtained with such a thin coating of scale, it can well be imagined that the temperature difference between cylinder wall and water will be far higher in designs in which the scale builds up to ⅛ or 3/16 in., a thickness by no means unusual. Direct determinations of thermal conductivity of scale appear to be lacking. However, in normal scale calcium sulphate is the predominant constituent, and the thermal conductivity of this, in the form of made up plaster of paris, is .0012 in C.G.S. units.[2] As this shows 100 times the resistance to heat flow of that of cast iron, it is sufficient to indicate the order of the effect of incrustation, even if, thermally, plaster of paris is somewhat unlike scale.

IT may be well to emphasize here the fact, that fairly heavily scaled cylinder walls are the normal condition of the average water-cooled engine.

The tests of the Engineering Division have shown that the wall temperature of the Liberty cylinder is not greatly affected by boiling. This, however, is by no means the case for all engines, particularly aircraft engines with thin walled steel cylinders, having the jacket space and outlets restricted in such a manner as to allow of the formation of permanent steam pockets. The formation of a steam pocket often results in the cylinder wall in the vicinity of the pocket becoming red hot, and such conditions have given considerable trouble in aircraft engines in the past and are by no means unknown in thermo-syphon cooled automobile engines.

[1] Air-cooling of Petrol Engines. Proceedings of the Institution of Automobile Engineers, XIV.

[2] Dictionary of Applied Physics, vol. I, Glazebrook.

As a comparison between water-cooled and air-cooled cylinder wall temperatures, it may be of interest to quote figures for a Liberty single cylinder (5 in. bore by 7 in. stroke) running at 1700 r.p.m. and an Engineering Division type J air-cooled cylinder (5⅝ in. bore by 6½ in. stroke) running at the same speed.

The Liberty cylinder, when scaled up (average normal condition), shows a wall temperature of 430 deg. Fahr. at the hottest point of combustion chamber with a water outlet temperature of 170 deg. Fahr. The type J cylinder when running for long periods at full throttle in a 90 m.p.h. blast shows an average wall temperature of about 450 deg. Fahr., usually nearer 400 deg. Fahr.

WITH regard to mean cylinder wall temperature, there is probably no great difference between air and water-cooled types; the water-cooled, undoubtedly, being somewhat the lower with normal water temperatures.

With air-cooled cylinders in the neighborhood of 160 cu. in. capacity, mean wall temperatures of the order of 300 deg. Fahr. are fairly readily obtainable at continuous throttle and in 60 cu. in. sizes, 250 deg. Fahr. or less is easy to attain with maxima under 500 deg. Fahr. in each case.

While the maximum permissible cylinder temperature in an air-cooled engine is not fully determined, it is, however, fairly well accepted that around 500 is a desirable aim for large cylinders operating continuously at full throttle.

For automobile engines short periods of high temperature at full throttle cause no damage. The writer has measured a maximum cylinder temperature of over 600 deg. Fahr. while mountain climbing on the road. This temperature caused no damage and did not produce poor running beyond somewhat increasing engine noise. In an automobile engine the fuel economy between three-quarters and full throttle is not of great importance, and by using a specific consumption of 0.7 lb. or more per b.h.p. hour in this range, much can be done to secure automatic temperature control and further to reduce detonation, etc., arising from any hot spots that may develop.

Mr. Clayden cites piston and exhaust valve trouble as primary difficulties of air-cooled engines, and in this connection it may be of interest to cite the results of a recent endurance test carried out by the Engineering Division on a Type J cylinder. This test was for exhaust valve endurance and consisted of 100 hours on full throttle at 1700 r.p.m. After the first 50 hours the fuel supply was cut down and the spark advanced to such a degree as to cause more or less continuous auto-ignition, this with a view to increasing the severity of the test as much as possible.

AT no time during the test was the exhaust valve given attention other than inspection and at the conclusion was only slightly scaled on the seat to an extent which could readily have been removed by grinding. At the conclusion of the test the exhaust valve seat in the cylinder and the exhaust valve guide were the only portions of the cylinder body requiring attention, and throughout the run the only troubles experienced were with worn parts in the valve operating gear. During the last 50 hours of the run, the fuel consumption averaged less than 0.5 lb. per b.h.p. hour and for one 5-hour period was 0.45 lb. (compression ratio 5.25 to 1, fuel 80 per cent aviation gas with 20 per cent benzol).

WITH regard to piston trouble, it is the writer's experience that piston burning is and has been much less prevalent in air-cooled aircraft engines than in water-cooled types of similar size and performance; in fact, it has been almost unknown in the air-cooled aircraft engines.

The piston used for the last 50 hours of the test cited above, at the conclusion, showed only the very slightest of pitting, and this confined to a very small area. The majority of water-cooled engines after such a test, especially with so much auto-ignition, will show deep and heavy piston pitting.

ENGINEERS whose experience is chiefly confined to water-cooled engines are apt to regard the air-cooled type as one in which the temperatures are necessarily much higher than are those encountered in water-cooled practice.

Comparative data in this regard are meager, but those here given tend to indicate that both the mean and the maximum temperatures in air-cooled engines are little if any higher than in many water-cooled types.

We had occasion, several months ago, to ride in a new car fitted with an air-cooled engine which is soon to be placed on the market. This engine stopped immediately when the ignition was shut off after long hard pulling. Relatively few water-cooled engines will do the same after similar handling.

The writer, while acknowledging that a vast amount of work has yet to be done on the air-cooled engine, would suggest that the foregoing figures tend to prove that no great disparity exists between the water and air-cooled types, as regards mean and maximum temperatures, fuel consumpton, output, or valve and piston reliability, etc.

The question of wall temperature in water-cooled cylinders is still under investigation of the Engineering Division and will be adequately dealt with later by others more competent to discuss water-cooling than the writer. S. D. HERON.
Power Plant Section,
McCook Field.

New Model Russel Truck Axle

A NEW model of internal gear drive axle to take the place of the Model 8500-I of the series brought out something over a year ago has been announced by the Russel Motor Axle Co. It has a 2½-ton rating and is to be known as Model 82. As compared with the former design the pitch diameter of the bevel gear has been increased from 6 to 7.2 in., the number of the teeth in the gear from 24 to 27 and the face width from 1⅛ to 1⅜ in. A much larger differential with drop-forged, heat-treated housing (instead of a cast housing) is now used, and the differential gears, pinions and spider are also heavier.

The jackshaft pinion bearing has been increased from No. 1407 to 1408 and the number of teeth in the pinion from eleven to twelve. Chrome nickel steel has been substituted for nickel steel (No. 2320). The bearings on the bevel drive pinion shank have also been increased from Nos. 1408 and 308 to Nos. 1409 and 309, and the large end of the taper on the shaft from 1⅜ to 1½ in. diameter. Larger differential bearings have also been adopted. These changes have necessitated numerous other minor alterations. The weight of the axle has been increased 55 lb., all of which additional weight is in the driving mechanism.

Siam Has Again Begun to Buy Automobiles

Four groups of potential purchasers constitute one-ninth of population. Chinese merchant class largest. Roads good. Small market for trucks. Tractors needed for hauling and some cultivating.

OF the 9,000,000 inhabitants of Siam, more than 8,000,000 are hopeless as purchasers of automobiles. There are, however, four groups of potential buyers. The largest of these is the Chinese merchant class and many of this group, 500,000 strong, have the ambition to buy the best type of car of which their purse is capable. The European residents, totaling about 2000, are practically to a man buyers, especially if their period of residence extends over a number of years.

State officials constitute an important buying group, though many of them, like the Chinese, cannot aspire beyond a motorcycle. Lastly come the Siamese nobility, prompted by the King himself to indulge in the best types of car on the market. Medium and light makes, however, are most popular in Siam.

Siam depends much on the rains for its prosperity. Sufficient water cannot be got to its paddy fields, and shallowed waterways hold up the deep sinking teak. Motor exporters, it is feared, do not take sufficient notice of agricultural and commercial forecasts in various countries, especially in those whose fortunes depend almost entirely on one or two commodities.

Weather Conditions Govern Sales

SIAM is one of these countries. In 1920 trade was bad owing to drought. The export of rice was forbidden and the teak could not be floated down to Bangkok or Moulmein. The result was stagnation, and, though imports had not been excessive, the motor market became overstocked. Last year the rains were normal and business in rice and teak was good. The result has had its reflex in the motor market and the majority of the surplus vehicles have now been absorbed.

During the war the United States made a determined effort to gain a virtual monopoly of the Siamese motor market. To a degree it was successful, but the revival of European competition, combined with the unsatisfactory harvest in 1920, have induced America to relax its grip. It is a mistake to attribute the decline in demand for American motor products during 1921 to the national lack of roads, lack of capital, high operation costs, and oriental conservatism. As a matter of fact, the value of cars and parts increased last year and matters have so far improved that it is stated that Siam is now absorbing 50 cars a month.

At the beginning of 1922 it was estimated that 1483 passenger cars were in the country. Five per cent of these cars were fitted with straight-side inch (Michelin) tires; 20 per cent with inch clinchers and the remaining 75 per cent with metric clinchers. Most of the tires came from the United States, Great Britain, France and Italy.

The United States and Canada combined sent 167 motor vehicles to Siam last year, the average price of each being $1,480. The Canadian exports were mainly the products of American branch factories. Against these, Great Britain sent 64 passenger cars and 67 motorcycles, the unit value being $2,880 and $363 respectively, while France sent 35 passenger cars, each of which averaged $2,917 in price. Both Germany and Belgium showed signs of regaining a footing in this market.

Chief Cities of Distribution

SINGAPORE is best endowed to be the main distributing center for the territory, although Manila, 1400 miles from Bangkok, and nearer to United States ports than Singapore, has a strong claim. At either of these ports, not only reserve stocks but supplies of spares should be kept, ready to be forwarded as desired to agents in Bangkok, for Central Siam; Chiengmai, for Northern Siam; and Singora, for Siamese Malaya. The best method of doing business with Siam is on the credit basis of from 30 to 90 days. The endeavor to inforce the cash against documents system of payment has proved unpopular.

Three points in favor of motor transport in Siam are:

1. Running conditions are ideal—1908 types still operate in Bangkok in perfect condition;
2. Labor is said to cost more here than in any other country of the Far East;
3. The high rate of exchange temporarily gives the tical more buying power.

In addition, it is the Government's policy to foster the wide introduction of motor transport by constructing suitable roads with all the speed that finance will permit. Cement is made in the country, road construction material abounds in the north and south, modern equipment has been introduced, while the walls of many of the ancient towns are being pulled down to supply road materials for immediate local use.

The demand for trucks will be limited until the country is opened up away from railroads and waterways. Tractors are wanted for hauling teak and, where suitable, for cultivating rice.

THE firm of Gordon, Frazer & Co., Ltd., Colombo, states that the rubber solution used in road making consists of ordinary low-grade scrap rubber heated in a cauldron until it becomes liquid. The lowest grade of rubber is suitable for the purpose. Earth scrap, cuttings from low-grade crepe or sheet, or any other refuse rubber may be used. Earth scrap rubber is now being sold in Colombo for about fifteen Ceylon cents a pound.

Growing Demand for More Flexible Production Equipment

Percentage increase in total new car demand growing smaller yearly. Industry becoming more susceptible to outside business conditions. Manufacturer must learn to make profit on fluctuating production program. Readjustments demand flexible equipment.

By Harry Tipper

As the curve of new production requirements in the automotive field becomes flatter and flatter, the immediate surrounding economic circumstances will affect the industry more closely, so that the fluctuations in actual sales conditions produced by these varying economic circumstances will affect the individual manufacturer in the stability of his production arrangements. Up to the present, except in the deflation period through which we have just passed, the automotive field has been in a position where short crops, poor business in one industry or another, have had little effect upon its production program. From the curves of production which have appeared in AUTOMOTIVE INDUSTRIES, it is obvious that the industry itself is approaching the flat part of the curve of growth where the percentage of increases per year becomes smaller and smaller in proportion to the total volume.

This condition increases the susceptibility of the industry to outside influences. A reduction of the farm market, bad business in the textile, steel, or other basic lines, will react upon the industry more directly than heretofore, and will operate to reduce the sales below the maximum production point temporarily. The new business percentage will not be sufficient to provide a profit for the manufacturer in itself, consequently, it will be necessary for him to learn how to make a profit on a production program which may go below 90 per cent of capacity for a considerable portion of his production year in case the outside industries are less than maximum themselves in values and volume.

This problem worked its way into the production meeting of the Society of Automotive Engineers in Detroit and found expression in a sharp reaction in the opinions of some of the production men against inflexible production equipment. It is obvious that the production plant which is extremely specialized in its arrangements for one particular purpose on the basis of a full day's run in each department is not in a position to rearrange its processes so that profits may be made on a portion of the production volume.

Great Britain has been obliged for a good many years to make money on a production requirement less than maximum capacity in some of our industries. Except for the period of the war, on very few occasions in the last 25 or 30 years, has the full population of Great Britain been employed in the manufacturing and trading necessities of her markets. Because of her world-wide trade, her industrial fabric has been extremely susceptible to fluctuations, and this susceptibility has found its expression in a shortening of trade in one quarter or another. Consequently, manufacturers, traders, transportation companies and all sorts of organizations, have been obliged to learn how to make money on a fluctuating production which was about maximum capacity only occasionally.

While the problem is not acute in this country, and particularly in the automotive field, nevertheless the curve of growth shows that we are definitely in a flatter part of the curve, so that the percentage of increase will not be enough in itself to provide a continuous employment of all the manufacturing facilities in the face of fluctuating economic conditions outside of this industry.

The situation is complicated by the fact that, as the curve of growth reaches the flatter part of its development, competition becomes keener and the reflection of this competition upon prices demands a closer consideration of costs in order that a profit may be secured. All the problems of manufacturing are involved in this situation, but the two most important problems are the effect upon production methods and the effect upon marketing necessities.

THE curve of production requirements which was recently published in "Automotive Industries" shows that the percentage increases per year are becoming smaller and smaller in proportion to the total volume.

Harry Tipper discusses in this article the effects which this flattening out in the growth curve will have on the industry as a whole. He shows that economic conditions will play a greater part and cause fluctuation in production requirements.

Business will not be had in sufficient quantities to keep all manufacturers working at capacity the year around. The manufacturer who makes a profit must do so when working at below capacity. Tipper points out that an adjustment of processes leading away from the use of the one-purpose machine may be expected.

The automotive field has been engaged in supplying a market already overdue when the automobile arrived. The pressure from this market was so great that the important problem has been to establish a more rapid rate of production speed.

Speed of production can be accomplished most readily by standardization and subdivision, with special equipment for the processes arranged as nearly as possible automatically and highly specialized in character. Consequently, the production of automobiles has been worked out so that it has entirely revolutionized the practice in the metal trades field. Special machinery devoted to one purpose has been produced and used in unheard of quantities and standardization has been carried out to a degree far in advance of any other metal trades industry, even as the practice stands to-day.

THESE methods are very valuable in providing a speed of production capable of meeting the pressure of a large virgin market. Their value as we approach the flat part of the curve and are subject to the small percentage of increase is not so clear. At any rate, the factors are different and the production problem must be examined from a new standpoint.

Where an industry has reached its maximum possibilities—that is, when it has reached the point at which its future development is dependent upon the general growth of population and wealth—the process of manufacturing must be sufficiently flexible so that a profitable business can be done under the marketing requirements which frequently demand much less than the maximum production capacity. This flexibility requires a rearrangement of the processes and assemblies so that the elimination of a percentage of the workers will not leave the fixed overhead charges and equipment costs of the idle part of the factory sufficiently large to absorb the profit on the rest of the processes.

The pressure of the market and its demand for speed in production place the emphasis on time, so that the production engineer will solve his problem by the reduction of the time required in the working out of any of the processes of manufacture. Where the plant may be subject to market requirements fluctuating below, as well as above present capacity, the cost of the investment in equipment, the cost of the idle time and the variation between the overhead of the machine and the wages of the worker assume greater importance than the single factor of time saving in the operation.

Much of the specialized machinery going into metal trades manufacturing to-day, and particularly in the automotive field, costs a great deal more per hour in space, investment, idle time cost, etc., than the wages of the worker. Sometimes this cost is several times the wages and, as a consequence, a comparatively small percentage of idle time will take the profit out of that individual process entirely. As a result of this, the variation between all the factors of expense entering into the individual operation, and the possibility of profit from that operation, become vastly more important to the manufacturer. Business approaches the maximum and the curve of future growth becomes flatter.

It is to be expected that some adjustment of the processes leading away from the entire use of the one-purpose machine will take place in a good many factories in the future, and that a larger use of jigs and fixtures will be introduced in order to turn more flexible equipment into the one-purpose requirement, so that they may be adjusted more readily to the fluctuating necessities of the manufacturer without absorbing so much cost in the fixed factors entering into the cost of the operation. It is important, however, that this analysis should be conducted with due reference to the character of the labor common to the automotive field.

The automotive industry is the largest metal trades industry; in fact, probably the largest industry for the manufacture of a single finished product. The processes are more varied than in any other line of metal trades manufacturing and the volume of machinery used is much greater. Consequently, the automotive field absorbs a very large percentage of the skilled mechanics of the country. It has very largely trained its own mechanics by virtue of necessity. These mechanics have been trained in the standardized methods used in the field and a very large percentage of them are accustomed to working semi-automatic or automatic machinery. Only a small percentage of them are skilled mechanics in the older sense where they were capable of taking a simple standard tool, operating it on a number of different jobs, using various fixtures and jigs in connection with the work and turning out accurate results regardless of the actual operation.

Although some of the factories in the automotive field work almost entirely upon standard tools, depending upon the jigs and fixtures to turn these tools to the purpose required, it would be impossible for the industry as a whole to rearrange its methods to any great extent because of the labor condition involved. Of the skilled mechanics in the country at the present time, it is safe to assume that a large majority of them are skilled mechanics only in the operation of one-purpose machines, either entirely or semi-automatic in character.

THE problem before the production manager, therefore, is likely to involve the equipment of machinery somewhat different from the present one-purpose tools and, at the same time, require less versatility and width of skill than the operation of standard tools would require. Whatever the outcome, it is evident that the future manufacturing necessities in the field will demand an analytical consideration of production costs and methods involving all the factors entering into the cost, and particularly considering the possibility of periods of less than maximum capacity and the amount of profit which can be made in the face of competitive prices under those conditions.

Armour Bushings for Spring Eyes

A NEW type of bushing for spring eyes and shackles has been brought out by the American Bronze Corporation, under the trade name "Armor" bushing. It comprises a steel jacket and a hard bronze lining, the two being so locked together that there is absolutely no chance of their working loose, it is claimed. One of the advantages of this new bushing is that the necessity for broaching or reaming after assembling in the spring or shackle is eliminated. The contraction of the bore for a given press fit is constant and can be allowed for in advance. The thickness of the bronze lining is sufficient to take care of all permissible wear, and it is said to be much harder than the usual cast bronzes. The bushings are self-contained units, and their mechanical strength is claimed to obviate installation difficulties.

While chiefly intended for spring eyes and shackles, the field of these bushings is not limited to these parts but may be adapted to other uses.

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Remedies for Piston Slap

PISTON slap is due to the reversal in angularity of the connecting rod when the crankshaft passes through the dead center positions, at which moments, of course, the horizontal component of the connecting rod thrust also changes in direction. As the crank passes through dead center, the piston normally breaks contact with one side of the cylinder wall and establishes contact with the opposite side.

In endeavors to devise means for overcoming slap, two general lines have been followed. One consists in trying to always keep the piston in contact with one side; in other words, in opposing some superior force to the horizontal component of the connecting rod thrust, while that component is in a certain direction. Since the thrust is least during the upward strokes, at least at low speeds, it is undoubtedly best to have the counter-thrust contrary to the connecting rod side thrust during these strokes. The aim apparently is not to keep the piston over its whole length in contact with one side of the cylinder wall, but only one end, thus producing a so-called "cocking effect." The question that arises in connection with this method is whether it is possible to produce a cocking effect sufficiently strong to achieve the desired result.

The other method referred to consists in so shaping the piston that it will fill the cylinder, even when cold, to such a degree that there can be no appreciable slap and that at the same time there is sufficient flexibility or yield in the skirt that it cannot bind in the cylinder when the engine works at its maximum temperature. This latter method is undoubtedly the most promising.

What the Elections Meant

TWO strikingly different views of the effects on business of the recent election have been voiced in the past few days. One of them betrays a lack of confidence in the American electorate which we do not share.

The National Founders Association, as might have been expected, "views with alarm" the victories of radicals at the polls and fears that they will be more dominant in the next Congress than the agricultural bloc was in the last.

"November 7 was a bad day for big business," was the way one member expressed it.

A much more hopeful view of the situation is taken by the National Business Service, which usually is sound in its deductions and which does not seem to have gone far astray in the present case.

"One of the answers which we read in the results," it says, "is that if your profits are in any way dependent on political favors and 'protection,' this election was detrimental. If, on the other hand, your profits are measured only by the merits of your products, the honesty of your purposes, and the sincerity of your desires to render to your fellow-citizens a real service, you can count this election as being beneficial.

"It has been said that the voice of the people is heard only when the load becomes onerous. During the past two years the present Congress has given small consideration to the will of the majority. True, they have shifted the load to some extent, but very little has been done to reduce its size. Then they gave the country a tariff which certainly favored a few to the detriment of the whole.

"We do not see in the returns of this election a tendency toward radicalism or any other kind of ism. If you feel that this country is drifting into dangerous water—creating situations which are dangerous to your business—we suggest that you take an inventory. Check off the conditions which appear dangerous to you and then set about to adjust your business so that it will travel with instead of against normal developments.

"When viewed under the white lights of analyzed facts, this election did little more than prove that this nation is a democracy in practice as well as in theory."

Regulating Motor Vehicle Common Carriers

INCREASING use of motor vehicles as common carriers, both of passengers and freight, has made the question of their regulation a live legislative issue in practically all States whose laws do not already cover the subject. Nearly half the States—22 to be exact—now have some such status.

Sentiment in favor of State regulation is gaining ground steadily and it is likely to become practically universal whether motor truck manufacturers want it or not, although there are substantial arguments against such a system as well as in favor of it.

So far as the public generally is concerned, the contention most frequently heard is that some means must be found to fix responsibility for highway accidents. It is a reflex of the indignation which is rolling up with the steadily lengthening casualty list. Asserting that the number of accidents is not increasing as rapidly as the number of motor vehicles in use is like telling a man who has just had one leg broken that he should be perfectly satisfied because it wasn't both.

With the public in this frame of mind, it is not surprising that the skillful and persistent propaganda of steam and electric railroads for rigid regulation of motor vehicles and higher taxation for them, has been given a willing ear. The campaign was started by the carriers but the work has been carried ahead by an army of volunteers.

No really serious or concerted effort ever has been made to combat this propaganda and present the real facts to the public. There have been just enough of truths and half truths in it to make it serious. The industry could well afford to launch a counter offensive, with facts only for ammunition, which would reach every corner of the country.

The railroads, steam and electric, contend that if they are to be regulated, there is no reason why motor vehicle common carriers shouldn't be. The traction lines, which now have taken up seriously the use of buses as adjuncts or feeders for their lines, may be hoist by their own petard, but legislators generally are bent on State regulation.

There are those, even within the industry, who believe that sane regulation wouldn't be a bad thing and they are convinced that it is coming, willy nilly. Such being the case, it is incumbent upon the industry and motor vehicle operators to agree upon some program which will be reasonably fair for all concerned.

If there is to be State control over motor vehicles which are common carriers, that control should be vested in State bodies such as public service or railroad commissions. Nothing would be gained by setting up new machinery. This may seem to be playing into the hands of the railroad interests, but as the members of such commissions become more familiar with the need for highway transport and the real demand for it, they probably will become more sympathetic in their attitude.

In most states it is necessary for a steam or electric road to obtain a certificate of convenience and necessity before it is permitted to open new lines and some such procedure should be followed, if State control is adopted, in the case of motor bus and freight lines except those already well established. If indemnity bonds are required the burden should be no heavier, in proportion, than that imposed on other forms of transportation.

Provided the States are to exercise control, they should not pass on supplementary powers to municipalities. Multiplicity of regulation does not increase efficiency, but it does add to confusion.

It is only logical that responsible persons who desire to operate independent bus or freight lines should be given exactly the same consideration and treatment by State commissions as is accorded to steam and electric companies desiring to go into this form of transportation.

If additional burdens in the form of taxation are to be imposed on motor vehicles used as common carriers they should not be so onerous that they will make profitable operation impossible. It may be conceded that vehicles which use certain streets and highways regularly should pay a greater proportion of the expense of maintaining them than vehicles which use them only occasionally, but there can be no possible excuse for taxing them off the highways.

The motor truck industry and motor vehicle operators may as well prepare for State regulation and make plans to have it established upon a basis as nearly fair to them as possible. Fighting indiscriminately against all the measures proposed does not promise the greatest degree of success. If the bills presented would impose unbearable burdens they should have some reasonable substitute prepared to offer as an alternative.

Most legislation is a compromise.

Industry Breaking Record of 1920

Output in 11 Months May Reach 2,313,000

No Let-Up in Demand—None of Major Companies Tapering Off Their Schedules

NEW YORK, Nov. 27—The automotive industry will enter December with all records in its production history broken. The eleven months' period of 1922 is expected to show an excess of approximately 100,000 cars and trucks over the output for all of 1920, which year established a record not surpassed up to this time. Estimating the November output at 200,000 at least, the aggregate for the eleven months will reach 2,313,000 compared with the 1920 total of 2,205,000. Based on this estimate the production for the full year will closely approach, if it does not reach, 2,500,000.

There is no apparent let-up in demand. Shifting of sales efforts from sections where there has been a slight decline to districts where interest is keeping to a high level has equalized sales so that a good general average is being maintained. None of the major operating companies has tapered off its production schedules, with output centering around the closed car. The demand continues strong for this type although there is evidence of renewed activity in sections where the open car carries a special appeal.

High Prices Help in South

On the Pacific Coast and in the South conditions are particularly encouraging. High prices for cotton and other farm products in the Southern States have been accompanied by a growing demand for cars which is making this section one of the most attractive in the sales field.

While dealers have not yet made serious efforts toward stocking up cars there is a trend in this direction to prevent a possible shortage in the spring. This movement probably will take more definite shape as soon as transportation facilities can be diverted from immediate needs.

No improvement is noted in the rail situation. Deliveries of cars are still behind and greater difficulty is being experienced in getting through steel shipments from producing centers. The lack of adequate shipping facilities, aggravated by the approaching season for the closing of navigation on the Great Lakes, continues to be one of the chief obstacles confronting the industry.

(*Continued on page* 1100)

Business in Brief

NEW YORK, Nov. 30—Cooler weather has stimulated buying and there is a marked shift in activity to jobbing and retail lines. Holiday purchasing gains steadily with the regular fall trade. Mail-order houses and department stores report more activity.

Demand for freight cars is still far in excess of supply. California reports heavy losses in grapes from scarcity of cars and bad weather. Movement af grains has improved.

Car loadings for the week of Nov. 11 were 40,918 less than the week previous, making a total of 953,909. The falling off, which began the week of Nov. 4, seems to prove that the peak loadings were in October.

Coal loadings were close to the year's record. Prices of soft coal have been easier on account of heavy production. Buyers in the West are indifferent. Supplies for the Northwest have been aided by the open weather. Buying of anthracite is better, with stiffer prices.

Higher grain prices have helped marketing of the crops and the South is benefiting by good prices for cotton and tobacco. Live stock brought generally lower prices.

Iron and steel production is running at a high figure and little price change is noted. Pig iron and scrap material were lowered again. Increased purchasing power in the centers of the coal mining regions has been shown as a reflection of higher wages.

Employment on the whole is good. Farm laborers are absorbed into mines and mills. Building industry is active.

Stocks were irregular. Announcements of stock dividends served to steady the market. Bonds were quieter but showed weakness in railroad issues.

Gray Gives Contract for Canadian Sales

Company May Decide to Build Car There Eventually for Trade in Dominion

DETROIT, Nov. 27—Gray Motor Corp. has closed a sales agreement with William Gray Sons Campbell, Ltd., of Canada, whereby the latter company will take over the sale of the Gray cars in all parts of Canada, and will distribute them through its dealer organization. In addition to the Gray the Dort line is now being handled together with other products of subsidiaries of the parent holding company.

The closing of the contract does not indicate that the Gray car for the Canadian trade will be made at once in the Chatham plant of the Gray-Dort company, but Gray officials declare that such a policy may be instituted in about two years.

For the present the cars will carry the 35 per cent duty imposed by the Canadian tariff which will bring the price on the open models close to $700 delivered. This will not conflict with the Gray-Dort line however, the prices on which approximate $1,200 on the four and $1,500 on the six.

William Gray Sons Campbell, Ltd., is second only to Ford in the manufacture of one line of cars in Canada. It was organized in 1855 by William Gray as a wagon company and entered the automobile field about seven years ago when an arrangement was made with the Dort Motor Car Co. for the manufacture of this line in Canada, under the title Gray-Dort. The company has been successful and has built up a strong distributor organization which will now be given the advantage of handling a low priced line.

In Full Swing by Jan. 1

F. L. Klingensmith, president Gray Motor Corp., will attend a big distributor convention of the Gray-Dort organization at Chatham this week at which the addition of the Gray line will be announced. No time will be lost in beginning the sale of the Gray through the Canadian organization and by Jan. 1 business is expected to be in full swing.

It is estimated that $1,500,000 worth of cars will be placed in the Canadian market in 1923. The name Gray entering into the Canadian company title and the title Gray Motor Corp. is only a coincident, the two families not being directly connected. The William Gray Sons, Campbell company, is now headed by Robert Gray, a son of the founder. William M. Gray, vice-president of the company, closed the sales agreement.

Predict Better Year in Closed Car Sales

Replies to Parts Questionnaire Also Show Faith in Future of Industry

NEW YORK, Nov. 27—Continuing the symposium which is gathering the opinions of those in the industry relative to next year's prospects, the Motor and Accessory Manufacturers Association this week reports that in answer to the question as to the sales outlook that the consensus of opinion is that a marked increase in the demand for closed cars and a broader distribution of medium priced and low priced vehicles will be the two principal features of 1923.

Although a few executives expressed the opinion that there will be no increase over the 1922 figures, a larger group concedes a maintenance of the present high level of business and some definitely expect a larger market for automotive products.

The representative vehicle manufacturers, whose opinions were sought, indicated a sound faith in the continuance of good business during 1923.

The opinion of Alfred Reeves, general manager of the National Automobile Chamber of Commerce, as to sales and markets, is:

I can see nothing to prevent next year's production being as big as this year's at least, with an increasing number of trucks. Renewals should require at least 1,800,000. Besides the farmer market, which should come very strong next year, we should also have the export market.

Sees Same Market in 1923

Representing the majority middle-of-the road viewpoint is the following statement from a representative unit manufacturer in close touch with the principal car and truck builders of the country:

While we look for good business during 1923, we feel that there is going to be eliminated a number of the weaker concerns, with increased sales for the established manufacturers. Approximately the same, if not better, market should exist in 1923 as in 1922. We believe it conservative to figure on about the same market.

Sales of automobiles and motor parts generally will be determined fundamentally by the agricultural situation and the adjustment of conditions in Europe, declare most of the officials making statements for the symposium.

An automobile body builder for national distribution says:

We are looking forward to large sales and a very good market for 1923 and in the body business we are particularly optimistic with reference to the demand for closed bodies for 1923.

One of the largest accessory manufacturers sums it up this way:

The sales outlook for 1923 is about the same as 1922—volume will go to the most aggressive concerns offering the biggest dollar for dollar value.

Speaking on behalf of the manufacturers of equipment who sell to automobile supply houses, one New York official takes this view:

We are looking forward to considerable increase in the replacement and accessory business, basing it on the fact that the majority of cars this year were sold on a credit basis, and by the spring of next year practically all of the cars will have been paid for, and the car owners will have some surplus cash to fix up their cars, both from the standpoint of appearance and utility. We find along this line a considerable increase in the sale of numerous items.

In giving out this summary of opinion, M. L. Heminway, general manager of the Motor and Accessory Manufacturers Association, points out that these predictions have particular value because the 423 manufacturers affiliated with the association were asked to reply candidly without resorting to vague generalities based on hope rather than fact.

A similar survey made one year ago by the association, predicting a substantial increase in business for the automotive industry during 1922 along sane and conservative lines, has been substantially borne out by the developments of the current year.

STEEL BUYING HEAVY

PITTSBURGH, Nov. 27—Reports from the steel market show that there is heavier inquiry for automobile material and the producers expect that March will see more cars built than any month this year.

Manufacturers Should Cultivate Markets Near Home While European Conditions Are Unsettled

By J. H. TEAGAN,
Export Manager of the Hupp Motor Car Corp.

Detroit, Nov. 28.

CHANGING political situations abroad will have an important effect on export business for 1923, and business as a whole should continue to show general improvement, the best trade coming from Australia and South America, with the British Isles and the Scandinavian countries doing well.

American car producers must study the changing political conditions as having an important effect on their business. Ireland and India normally would present a large market for cars were conditions stabilized in these countries but the open spirit of unrest in the one and the brooding disquiet in the other prevent manufacturers from going in and developing the market.

India to a large extent controls the business situation in that part of the Far East, and the Indian situation is affected to a large extent by the Near East. Were England and France able to unite on a policy, they could readily restore order in this district, and restoration of peace there would bring about a much better feeling throughout the East.

As a whole, the situation in the British Colonies is better than at home. The heavy after-war burden under which England is laboring is retarding greatly the sale of automobiles but improvement is being made. The most important forward step that has been made in the British motoring trade is the clearing out of many of the former agents who brought odium on the cars represented and their replacement by reliable men.

With the establishment of American branches in England and the development of better men in charge, credit conditions will be benefited and this will make more business. Financing companies working along lines similar to those in the United States will make the purchase of cars easier to handle, and better service will increase owner satisfaction and security.

Banks in Great Britain have been unfavorable to the industry because of the heavy losses they were compelled to take in the after-war period in connection with the liquidation and refinancing of many of the British manufacturing companies. This ill feeling has been responsible to a large extent for the slowness of the industry to make a new start. Without large production the British manufacturer is unable to meet the competition of American makers even with tariff restrictions, and they have been handicapped also by the number of manufacturers in the field.

As in America there will be a considerable weeding out of manufacturers in England and the Continent. Makers abroad will be compelled to standardize their product more than they have been in the interest of lower prices, and American manufacturers will find that standardized vehicles will be more in favor than formerly for the same reason.

American manufacturers will do well to cultivate the markets near home while conditions remain unsettled in many countries. There is a large market slowly developing in South American and Latin-American countries in which it is well to build for the future. Similarly, much pioneer work is possible in other countries, notably China, in which some part should be taken, but it is not wise at this time to undertake to do business in countries where conditions are insecure.

Body Making Plants Work at Full Blast

Probably Will Be Compelled to Run at Maximum Capacity Through Winter

MILWAUKEE, Nov. 27—While there has been a seasonal let-down in the activity of passenger car manufacturers in Milwaukee and vicinity, the manufacture of parts is going forward with much smaller shrinkage of schedules than had been expected. Shipping directions have fallen off, but production is well maintained, for the period of suspension or partial suspension at factories doubtless will be brief, and the reserve stocks now being accumulated will be needed within a relatively short time.

Parts manufacturers supplying Buick, Nash, Ford and a number of other quantity car producers are making shipments virtually on the same extensive basis as before. There is, of course, the expectancy present that declines will come, for the annual inventory season is at hand, and most factories sooner or later will call an intermission for balancing inventories and getting set for production for 1923 deliveries. Up to now, however, the manner in which patronage of parts makers has been sustained is unusually gratifying.

Slight Decrease in Employment

Taking the automotive industries of Milwaukee and immediate vicinity as a whole, employment shows a decrease of only 10.1 per cent during the past 30 days, according to the statistical department of the largest local bank. In former years the decline was steady, from the end of September to Jan. 1, and amounted to a great deal more than that noted this fall.

Shops manufacturing passenger car bodies are running full blast, with schedules calling principally for coupé and sedan types. Phaeton and roadster bodies are at present in rather negligible production, due to the tremendous call for the closed types, which has increased rather than subsided, with nearly all manufacturers still behind on deliveries of so-called closed cars. It is believed that body makers will be compelled to run at a maximum capacity all through the winter. Plant extensions as a rule will not be available much before early spring, when the additional capacity is expected to be fully occupied by the renewal of demand for open bodies.

Slight improvement is noted in railroad traffic conditions, but the unfavorable situation remains a check on deliveries all along the line.

Local Conditions

It is a source of wonderment that the retail movement of passenger cars throughout November is so active as it has proved to be. While not approaching the record demand of May and June, the sales volume in the Milwaukee territory has held its own with September and October in a dollars-and-cents way, although perhaps the number of cars sold was somewhat smaller. This is due to the fact that the demand in the past month has been principally for closed types and sport models, which command premiums and thus sustain the money volume of trade.

Some dealers say that if it were so easy to get delivery of closed cars and sport types as it is to get roadsters and phaetons, they would feel that they had little trouble to contend with. The scarcity of coupés and sedans is actually acting as a check on selling, for prospective buyers are inclined to be very insistent upon getting their cars right away. At the same time local dealers continue to book satisfactory orders for delivery as quickly as possible. Customers are not doing as much shopping as last spring. A majority have made up their minds on the make of car and do not rush to a competitor to buy his make.

50 Applications Filed for Space in Body Show

NEW YORK, Nov. 27—More than 50 applications have been filed for space in the second national automobile body builders' show, which will be held in the Twelfth Regiment Armory, here, Jan. 8 to 13. The names of the exhibitors thus far announced are as follows:

American Chemical Paint Co., American Motor Truck Co., Art Works Shop, Charles C. Blackmore Co., Black & Decker Manufacturing Co., Blocksom & Co., Boyriven, Bridgeport Coach Lace Co., Brunsone Co., A. S. Campbell Co., Carr Fastener Co., George R. Carter Co., Cleveland Hardware Co., D'Arcy Spring Co., Doehler Die Casting Co., W. H. Duncan Co., Inc., Dura Co., Eagle-Ottawa Leather Co., Eberhard Manufacturing Co., O. M. Edwards Co., Inc., English & Mersick Co., E. V. B. Manufacturing Co., Fleetwood Metal Body Co., Fitz Gibbon & Crisp, Inc., Haskelite Manufacturing Co., Holbrook Co., Hume Body Corp., Laidlaw, Inc., Larrabee-Deyo Motor Truck Co., Manning Abrasive Co., McGraw-Hill Co., Inc., Minnesota Mining & Manufacturing Co., Mitchell Specialty Co., Murphy Varnish Co., National Seal Co., Oxford Varnish Corp., Pantasote Co., Parsons Manufacturing Co., N. A. Petry Co., Inc., Radel Leather Mfg. Co., R. E. Rodriguez, Russell & Erwin Manufacturing Co., Sherwin-Williams Co., Soss Manufacturing Co., Standard Textile Products Co., Textileather Co., Vacu Signal Co., E. J. Thompson Co., Valentine & Co., Ware Bros. Co., Waterloo Body Co., Willoughby Co., Zapon Leather Cloth Co., Automobile Trimmer & Painter, and the Class Journal Co., New York City.

AUBURN DRYING DEPARTMENT

AUBURN, IND., Nov. 28—Auburn Automobile Co. has increased the capacity of its factory by the installation of a department for drying paint on bodies. The addition of this drying department gives the factory a thoroughly modern painting system. This comprises, in addition to the body drying department, a complete enameling department and a moving line of chassis through steam-heated ovens.

Ford May Build 7000 Cars Daily in Spring

Unfilled Orders on Hand Is Reported Greatest in History of Company

DETROIT, Nov. 27—Ford production next spring may run as high as 7000 to 8000 cars a day as compared with the record-breaking 5380. At present, it is said that Ford has more unfilled orders on hand than ever before in the history of the company, while the Lincoln plant is reported to be booked for two years ahead and making money at the rate of $1,000,000 annually.

In an interview, Ford declared that his price reduction of $50 a car on a production of 5000 daily, which represents a decrease in gross of $250,000 a day, has not resulted in financial loss and he referred to his unfilled orders as proof.

Ford plans are said to include operating the plant at capacity the year round, making cars principally in the second and third quarters and in the first and final quarter keeping busy with the manufacture of parts for stock and replacement.

Coal for blast furnaces is being obtained at the mines at an average of $4, while there is a proportionate saving made on steam coal. Ford believes these prices are the result of his closing his plants for four days.

Judgment Is Returned Against S. C. Pandolfo

ST. CLOUD, MINN., Nov. 28—A judgment of $431,865 against S. C. Pandolfo, organizer of the Pan Motor Co., has been returned here by Judge John A. Roeser in favor of the bondholders, who financed the corporation. Foreclosure will begin on several buildings, houses and land to satisfy the claim. In the original organization Pandolfo issued $350,000 gold mortgage bonds.

The Pan Motor Co. later was taken over by St. Cloud citizens, and is separate from the Pandolfo Manufacturing Co.

The foreclosed property includes residences and sites in the Pan addition to St. Cloud and the Pandolfo company. On Aug. 31 the United States Circuit Court of Appeals sustained the conviction of Pandolfo, sentenced to serve 10 years in prison and to pay a $4,000 fine for alleged misuse of the mails in promotion of the Pan motor schemes.

NEW CARLISLE SALES POLICY

STAMFORD, CONN., Nov. 28—Operating under a new policy, that of doing away with the distributor and dealer entirely, and selling its tires direct to buyers through branches, the Carlisle Tire Co. has just opened its third branch, this one at Boston under the management of F. G. O'Reilly, for 10 years with the Goodyear Tire & Rubber Co.

Rickenbacker's Year to Show 5000 Output

Company Declares Cash Dividend of 5 Per Cent to Be Paid on February 1

DETROIT, Nov. 25 — Rickenbacker Motor Car Co. will complete its first year of operation with a total business of about 5000 cars, a record which is considered entirely satisfactory. The output will be doubled in the coming year. These figures on the business of the company were furnished by President B. F. Everitt in a statement accompanying the announcement of a five per cent cash dividend to be paid Feb. 1.

The declaration of the dividend evidences the financial return that the company has enjoyed despite the heavy expense of tooling-up and the overcoming of initial production losses.

Everitt declared that the company is carrying out a dividend policy of distributing a substantial part of earnings among stockholders, and that the company would guard against over-expansion by this policy. "Our plan is to build a quality car in conservative volume," he said. To further its plan for increasing its output in 1923 the company is remodelling the former shell plant which it has taken over and which will be placed in operation soon after the first of the year.

New Process May Double Manufacturing Capacity

SYRACUSE, Nov. 27—Construction of a new building to double the capacity of the present plant is being planned by the new owners of the New Process Gear Co. The details of the expansion have not been announced, but it is expected that when a survey now underway is completed a definite program will be announced.

The present plant, employing 800 men on gears for the Durant and Star cars, is not large enough to permit the manufacture of transmissions, which, it is said, T. W. Warner, Durant official, proposes. C. R. Burt, president of the local company, has been in conference with Warner.

The proposed plant will occupy the site of some of the buildings built by the original Raw Hide Gear Co., established by the late Thomas W. Meachem.

The factory has been working at capacity for many months, and in some departments night shifts have been operating in order to meet the demand. Reorganization of the company since its purchase by Durant interests is still under way.

SPERRY INSTRUMENT SOLD

NEW YORK, Nov. 27—Pioneer Instrument Co., Brooklyn, has purchased the entire aircraft instrument business of the Lawrence Sperry Aircraft Co. and has acquired an exclusive license under its aircraft instrument patents. Licenses under certain patents of the Sperry Gyroscope Co. have also been secured. The Sperry company will continue its manufacture of airplanes at Farmingdale, L. I. The manufacture of both Sperry and Pioneer aircraft instruments will now be handled exclusively by the Pioneer company.

Nearly 52,000 Cars Built by Durant in 14 Months

NEW YORK, Nov. 27—Durant Motors reports a total of nearly 52,000 automobiles built in Durant plants within the last 14 months. Of this total 5600 were Stars. It is pointed out that the three months production of Stars is greater than the first three years of the Ford Motor Co. The Durant plant at Elizabeth, N. J., will be given over to Star production exclusively until the first of the year. The Long Island plant will continue to make both Durants and Stars.

The first New York delivery of Mason Road Kings, the Durant truck, was made Nov. 22 to the Poertner Motor Car Co., there being eight trucks in the shipment.

Columbia Aims to Build 27,000 Cars Next Year

DETROIT, Nov. 28—Columbia Motors Co. is scheduling a production of 27,000 cars for 1923 and will start operations on that basis the first of the year, according to a report to stockholders mailed this week.

Many new sales connections have been made in important cities, the statement declares, and these with the development of merchandising plans will absorb production.

Among the cities in which dealer contracts have been signed are Atlanta, Chicago, Indianapolis, Milwaukee, Philadelphia, New York, Brooklyn, Portland, Ore., Seattle, Spokane, Boston, Detroit, St. Paul, Portland, Me., and Bangor.

A strong foreign sales organization is being formed, the company states. Tentative contracts are being closed and sample car shipments made to more than 35 export territories.

SHOW LIST CHANGES

NEW YORK, Nov. 27—A revised list of national show exhibitors reports that 83 manufacturers will display cars at New York. Two have canceled their spaces—the Standard Steel Car Co. and the Templar Motors Co.

Several additions have been made to the accessory list, the newcomers including the M. L. Bayern Co., Inc., New York; Cord Tire Co., Chester, W. Va.; Grigsby-Grunno-Hinds Co., Chicago; S. S. McClelland Co., New York; T. A. Marine Co., Inc., Bridgeport, Conn.; Norling Rotary Engine Co., Chicago, and Walker Axle Co., Chicago.

Dort Debts Reduced 50 Per Cent in Year

Payments Were Made in Advance of Agreed Dates, According to Treasurer

DETROIT, Nov. 27—The Dort Motor Car Co. during the year has made a 50 per cent reduction in its indebtedness of more than $1,500,000, according to a statement by F. A. Aldrich, treasurer, to financial and commercial companies. This is regarded as highly satisfactory by the company in view of depression at the outset of the fiscal year, Nov. 1, 1921.

Besides operating with satisfactory volume and caring for current business, the company paid out $832,329 on its old indebtedness, payments being made in advance of the agreed dates. It also paid the matured installment of $200,000 on its bond issue together with interest on the entire issue.

Total money paid including current operating disbursements and other expenditures approximated $1,250,000, all of which came out of liquidating inventories and ordinary operations except $300,000 from the sale of new stock. The bond issue was reduced another $100,000 by the sale of unused and obsolete machinery.

1922 Dividends of Hall Lamp Total 25 Per Cent

DETROIT, Nov. 24.—With a 5 per cent dividend to be paid to stockholders on Dec. 15, the C. M. Hall Lamp Co. will have made a total cash dividend payment of 25 per cent during the year. Earnings for the first ten months have approximated $500,000 before provision for taxes. Net earnings for the year are expected to approximate more than 50 per cent on the company's capital stock of $1,000,000.

The balance sheet as of Sept. 30 showed total assets of $1,637,201 with current assets of $1,145,011 against current liabilities of $43,067, a ratio of 26 to 1, and indicating a net working capital of $1,101,944. Of current assets $119,388 was in cash, $200,000 in U. S. treasury certificates, and $122,000 in bonds. Bills receivable were $299,135 and inventories $389,664.

Unfilled orders on the company's books Sept. 30 were $809,690 and business already lined up will require capacity operations through 1923.

SHOP EQUIPMENT CREDIT PLAN

CHICAGO, Nov. 27 — Canedy-Otto Manufacturing Co. of Chicago Heights, manufacturer of shop equipment, has put into operation a credit plan that permits the sale of its equipment by jobbers on time payments. The plan is underwritten by the Continental Guaranty Corp., New York.

Cut Made in Prices of Cadillac Models

Reductions Due to Increased Business During Year, Says President Rice

DETROIT, Nov. 24—The Cadillac Motor Car Co. has made reductions of $215 to $265 on open styles and from $150 to $260 on closed models, effective Dec. 1. The new prices are declared by President H. H. Rice to be the result of largely increased business during the year and to anticipations of still further increases in 1923.

In connection with the price change, the company declares that the type 61 will be continued without change.

The new and former prices are as follows:

	Old Prices	New Prices
Roadster	$3,100	$2,885
Phaeton	3,150	2,885
Touring	3,150	2,885
Coupe (5-pass.)	3,925	3,750
Victoria	3,875	3,675
Sedan	4,100	3,950
Suburban	4,250	3,990
Limousine	4,550	4,300
Imperial Limousine	4,600	4,400

Under the new scale, the company places all of its open models in a price class under $3,000, and brings its four largest production models in the closed car type under $4,000. The company has been extending its sales and production with this thought largely in view. Sales in the first ten and a half months of the year have exceeded any best previous year. With extensions to plant and increased personnel, facilities for production in 1923 will reach a new high point.

Stutz Produces Closed Models as Part of Line

INDIANAPOLIS, Nov. 27—For the first time in its history, the Stutz Motor Car Co. is producing closed bodies as a regular part of the line. The two models are a touring sedan at $4,450 and a four passenger coupe at $3,490. The touring sedan carries four passengers and is of a four-door type with square cornered doors. The front doors hinge forward and the tonneau door hinges at the rear, giving a drawing room effect when the doors are open.

The seating arrangement is conventional with a one-piece cushion, both front and rear, allowing for an extra passenger. The windshield is of the wide vision type, with a leather sun visor. The design provides for a trunk deck and built-in luggage rack in the rear.

The upholstery is covered with a special Windsor weave material of strong texture. The springs are Marshall. The body frame is made from ash and elm and the body to the belt line is covered with 14 gage aluminum.

The door windows are raised and lowered with Ternstedt window regulators. The tonneau windows have lifts of the Dura notch type. The tonneau has foot hassocks built, and doors to these hassocks conceal carrying spaces for jack and tools.

The coupe is of a four passenger type and has two full doors hinged at the rear. The seating arrangement is staggered, the driver's seat extending ahead of the passenger seat, which seats two people. One person is accommodated on a single leg auxiliary seat which folds under the instrument board when not in use. The deck is built similarly to that of the roadster to carry extra tires. A special equipment for spare tires can be set on the rear end of the frame and the trunk, which carries two suitcases, can be put in the deck.

Highway Research Board Holds Its Annual Meeting

WASHINGTON, Nov. 28—The Advisory Board on Highway Research held its annual meeting here Nov. 23 and 24. Tractive resistance,. traffic conditions, highway finance and wind resistance tests were among the chief topics of automotive interest discussed.

The board aims to co-ordinate and summarize the results of highway research throughout the country, but does not actively conduct research activities.

Haynes Price Increases Range from $55 to $280

KOKOMO, IND., Nov. 27—Price increases ranging from $55 to $280 on six of its models have been announced by the Haynes Automobile Co.

The revisions are as follows:

"55" Standard

	Old Price	New Price
5-pass. phaeton	$1,495	$1,695
5-pass. sedan	2,395	2,595

"55" Sport

	Old Price	New Price
5-pass. phaeton	$1,895	$1,950

"75" Standard

	Old Price	New Price
7-pass. phaeton	$2,395	$2,595
5-pass. brougham	3,095	3,350
7-pass. sedan	3,395	3,675

"75" Sport (New Model)

	Price
7-pass. phaeton	$2,700
4-pass. phaeton	2,700
5-pass. brougham	3,475

G. M. SERVICE MEN ORGANIZED

DETROIT, Nov. 27—Service managers and other men interested in the service problems of General Motors divisions have formed an organization to discuss individual questions and to pool their knowledge for the benefit of the service station and the customer. Under the chairmanship of M. W. Franklin, the organization has already held its first meeting.

Bessemer Cuts List on 2 Lighter Models

Reduction Announced of $285 on 1-1½-Ton and $405 on 1½-2 Ton Truck

PHILADELPHIA, Nov. 27—Bessemer Motor Truck Co. announces price reductions on its two light models. The reduction amounts to $285 on the 1 to 1½ ton model and $405 on the 1½ to 2 ton model.

Ralph D. Mock, general manager of the company, states that these reductions are not accompanied by any change in chassis specifications.

Complete new prices for all models are as follows:

	Old Price	New Price
1—1½ ton	$1,735	$1,450
1½—2 ton	2,395	1,990
2½—3 ton	2,895	2,895
4—5 ton	3,695	3,695

The Bessemer plant reports greater sales in November than in any preceding month this year and also the appointment of a number of new dealers and distributors. The Bessemer policy of maintaining factory branches in certain principal cities will be continued and the number increased. All factory branches will carry new trucks in stock for the convenience of dealers.

Preparations are now being made for occupying the company's new plant at Holmesburg Junction in Philadelphia, and additions to the personnel will be made in line with the enlarged production program which will be carried out in 1923, now that the merger with the American Motors Corp. of Plainfield, N. J., is proposed.

Maxwell Builds Sport Roadster and Phaeton

DETROIT, Nov. 28—Two sport models are added to the Maxwell line. A sport phaeton at $985 and a sport roadster at $960. The bodies are painted Chester hunt red with running gear and disk wheels in black. The additional equipments include drum-type head lamps and tie-rod and parking lamps. The radiators, Moto-Meter and door handles are in nickel, the latter having a black aluminum inlay. An aluminum bead runs around the hood at the cowl.

The upholstery is long-grained patent leather and the top is olive drab with rubber insert. The equipment also includes a spare cord tire which is encased in an envelope type olive drab duck tire cover. The left front fender of the phaeton model is designed and countersunk to receive the tire.

On the roadster the extra carrier is on the rear. Nickeled spring bumpers are furnished both front and rear. An innovation is the assurance against theft of the Moto-Meter for one year.

The phaeton is equipped with a large trunk and dust cover mounted on nickel plated trunk rack at the rear.

No Decline Evident in Parts Business

Activity Expected Through Winter—Car Makers Ask Immediate Deliveries

NEW YORK, Nov. 27—The healthy condition and prosperity of the parts makers of the country are indicated in the reports received from members of the Motor and Accessory Manufacturers Association, which tell of many orders, good collections and a promise of continued manufacturing activity throughout the winter.

Car makers are buying closely, it is true, but inasmuch as there is no break in the continuity of purchasing, the parts people are well satisfied that their own plants will not lack for business during what is generally looked upon as the dull time of the year. A particularly gratifying sign is noted in the filing of orders from car makers. In many cases these orders are followed by telegrams asking for immediate delivery, which indicates that the builders of automobiles intend pushing production as fast as possible.

October was a particularly good month for the parts makers. Reports from members of the M. A. M. A. show that the purchases for that month amounted to $38,753,800, an increase of 3.90 per cent over September business. This brings the total of sales for the 10 months of 1922 to $347,609,220, or $132,916,148 more than for the corresponding period of 1921. This October produced $16,700,473 more business than did October, 1921.

Past due accounts in October show a decrease of 17.93 per cent over September, while total notes outstanding have decreased 2.09 per cent.

SALES BY M. A. M. A. MEMBERS SHOW INCREASE OF 3.90 PER CENT OVER SEPTEMBER

NEW YORK, Nov. 27—Reports from members of the Motor and Accessory Manufacturers Association show that sales in October, 1922, increased 3.90 per cent over the preceding month and that for the first 10 months of this year the total sales amounted to $347,609,220, or $132,916,148 more than for the corresponding period of 1921.

The following table shows the sales by members of the association, the total past due accounts and the total of notes held for all the months of 1921 and the first 10 months of 1922:

1921	Total Sales	Per Cent Change	Total Past Due	Per Cent Change	Total Notes Outstanding	Per Cent Change
January	$6,264,587		$8,099,727		$4,359,871	
February	10,408,962	66.15 Inc.	6,717,165	17.07 Dec.	6,069,118	39.08 Inc.
March	20,120,386	93.30 Inc.	5,603,992	16.57 Dec.	5,069,877	16.38 Dec.
April	26,746,580	32.93 Inc.	5,352,271	4.49 Dec.	5,371,086	5.94 Inc.
May	26,781,350	.13 Inc.	4,505,176	15.64 Dec.	4,460,355	16.77 Dec.
June	22,703,414	15.19 Dec.	4,720,973	4.79 Inc.	4,012,670	10.37 Dec.
July	23,096,214	1.68 Inc.	5,242,046	10.79 Inc.	3,690,154	7.90 Dec.
August	23,397,640	1.31 Inc.	4,348,790	17.06 Dec.	3,494,510	5.30 Dec.
September	23,141,891	1.09 Inc.	4,358,545	.22 Inc.	3,677,500	5.24 Inc.
October	22,053,327	4.70 Dec.	4,512,680	3.54 Inc.	3,463,500	5.82 Dec.
November	18,998,490	13.85 Dec.	4,352,000	3.56 Dec.	3,661,900	5.73 Inc.
December	14,349,750	24.47 Dec.	4,220,450	3.02 Dec.	3,384,250	7.58 Dec.
1922						
January	17,320,000	20.61 Inc.	4,450,000	5.45 Inc.	3,146,000	7.02 Dec.
February	22,720,000	31.17 Inc.	4,070,000	8.57 Dec.	3,483,000	10.74 Inc.
March	28,670,000	26.14 Inc.	2,890,000	28.86 Dec.	2,657,000	23.69 Dec.
April	33,830,000	18.07 Inc.	3,000,000	2.00 Inc.	2,500,000	1.05 Dec.
May	43,700,000	28.06 Inc.	2,900,000	2.75 Dec.	2,450,000	6.05 Dec.
June	42,000,000	3.85 Dec.	2,840,000	1.25 Dec.	2,320,000	5.00 Dec.
July	41,001,670	2.42 Dec.	3,423,850	20.42 Inc.	2,217,670	4.49 Dec.
August	43,700,000	5.00 Inc.	3,705,000	8.21 Inc.	2,398,350	8.15 Inc.
September	37,300,050	13.36 Dec.	4,220,400	13.91 Inc.	2,658,800	10.86 Inc.
October	28,753,800	3.90 Inc.	3,463,850	17.93 Dec.	2,603,100	2.09 Dec.

Moreland Motor Truck Enters Electric Market

LOS ANGELES, Nov. 27—The Moreland Motor Truck Co. of Burbank has entered the electric truck field. It will produce assembled units in one, two and three-ton sizes. The electric trucks embody General Electric motors and controllers and Hobbs batteries, the latter made in Los Angeles.

Only the one-ton model is now on the market, but the other sizes will follow soon. The company intends to maintain service and charging stations at all its branch points.

CORRECTION

A dispatch from Syracuse published in AUTOMOTIVE INDUSTRIES Oct. 12 in connection with the Covert Gear Co., Inc., securing an order from the State Supreme Court setting aside a judgment of $42,747 obtained by the New Process Gear Co., stated that "both concerns are in bankruptcy." An error was made in this statement, in that the Covert Gear Co. is not in bankruptcy and never has been.

The judgment secured by the New Process Gear Corp. was obtained by default due to the absence from his office of President Gloetzner and the company's failure to reply in the time alloted in the bill of complaint. Covert Gear's explanation to the court reopened the case, and the company filed a counterclaim for $40,651.

The Covert Gear Co. is a concern long and prominently identified with automobile construction, and one whose financial integrity never has been questioned in courts. It was one of those included in the recent merger of automotive interests into the Associated Motors Industries, Inc.

Builder of Many Detroit Plants Dies in Accident

DETROIT, Nov. 25.—W. E. Wood, head of the E. E. Wood Construction Co., which built many of the important automobile plants of the district, and widely known in the industry, was killed when his car skidded into a ditch near Flint.

He founded the Wolverine Tractor Co., which operated in Saginaw several years ago, and besides his construction work, was interested in or owned, several large parts companies and warehouses.

He is credited with the construction of the Ford and Dodge Brothers plants, Detroit; the Buick plant, Flint, and several other large automobile factories. He was an intimate friend of W. C. Durant and was a part owner with him in a large tract of cut-over timber land which they used as a private hunting reserve.

Government Starts New World Survey

WASHINGTON, Nov. 28—A new world automobile survey of foreign markets for American made automobiles has been undertaken by the automotive division of the Department of Commerce.

The primary purpose of the survey is to eliminate the uncertainty of foreign markets in the automotive field and to establish the dull and active seasons in the purchase of automobiles and accessories in any given country.

To do this the Department has sent out questionnaires to more than 1000 representatives of the Department of Commerce in foreign fields, with a request that they secure data showing the number of automobiles imported, the absorption each month and general information as to trade customs, etc.

To make the service practicable it is the plan of the department to have this world survey supplemented each three months by additional reports. These reports when received are then to be sent to automobile exporting concerns.

The questionnaires have been sent out and the returns, it is expected, will begin to come in about March 1, so that the world market survey can be begun on July 1. From that date on the survey will be brought up to date every three months.

BARLEY TREASURER DIES

DETROIT, Nov. 24 — Charles E. Stephenson, treasurer of the Barley Motor Car Co., died this week at his home in Kalamazoo after a short illness.

Wills and Creditors Agree to Receiver

Company, Declared Solvent, to Continue Production—Liabilities $8,000,000

DETROIT, Nov. 28—The financial difficulties of C. H. Wills & Co., manufacturers of the Wills-Sainte Claire car, culminated to-day in the appointment of the Security Trust Co. of this city as receiver. The action is understood to have been taken by agreement between C. Harold Wills, president of the company, and bank and merchandise creditors. It followed recent meetings of creditors in this city and Cleveland.

No recent statement of the assets and liabilities of the company is available. The total liabilities are estimated to be between $8,000,000 and $9,000,000, including stock issued to outsiders, bank and merchandise bills. It is understood that the banking indebtedness approximates $5,500,000. The principal creditors are Kidder, Peabody & Co., the Old Colony National Bank and the National Shawmut Bank, all of Boston. It was reported several months ago that the Wills company had arranged with the Boston bankers for a revolving fund of $2,400,000, which was expected to meet their needs for some time.

Wills Says Company Is Solvent

In a statement in reference to the receivership, Wills declared that the company was solvent and that court action was taken as a preliminary to rehabilitating it and placing it on a strong financial basis. He asserted that production would continue without interruption.

Wills has devoted practically all his time for several weeks past to the financial affairs of his company. He had several conferences with Henry Ford, and these led to frequent reports that the Ford interests proposed to take over the Wills company. This was later denied emphatically by Henry Ford himself, although he had a conference with Wills and the company's bankers. Ford holds a strong personal friendship for Wills, who became widely known throughout the industry because of his excellent work for the Ford company.

Incorporated in 1920

C. H. Wills & Co. was incorporated in Delaware July 6, 1920. Its plant is located on the St. Claire River, near Detroit, at Marysville, which was built by the Wills interests as an industrial suburb. The plant has a capacity of 20,000 cars a year. A large number of the Wills-Sainte Claire cars have been sold, and they have given the utmost in satisfaction to their owners, but the company was unfortunate in getting under way just when the depression began two years ago.

The capital stock of the company consists of 300,000 shares of common, no par value; $5,000,000 in first preferred and $5,000,000 in second preferred. The stock outstanding includes all the common, $2,000,000 of preferred and $2,000,000 of the second preferred. The company has no funded debt. All the second preferred and part of the common are held by Wills and his associates. First preferred to the amount of $1,000,000 was offered at $100 par in July, 1920, with a 50 per cent bonus in common.

The officers of the company are: C. H. Wills, president; J. R. Lee, first vice-president; K. B. Alexander, second vice-president; Charles Morgana, third vice-president; F. D. Stone, secretary and F. P. Book, treasurer.

Tire Makers Not Likely to Import Liquid Rubber

NEW YORK, Nov. 27—Will the American tire manufacturer continue to import his rubber in blocks and sheets or will he use the new method just reported from Holland, by which it will be possible to ship rubber as a liquid? The answer seems to be that for the next few years at least he will make no change.

Public attention was called to the new idea by a cable to the *New York Times* from The Hague, which reported that rubber growers have perfected a process whereby it is possible to keep rubber in the liquid state in which it comes from the trees by adding an anti-coagulating substance, thus obviating the working operation of the rubber into blocks and sheets later on by the rubber estates.

This is called the Stephenson process and is not unknown in this country. Several of the tire manufacturing concerns are experimenting with it, but there seems little chance of its adoption at present. The opinion appears to be that, even if the process has merit, it would be too costly to junk the expensive machinery now used to handle rubber in blocks and sheets, even though the saving amounted to two or three cents a pound with liquid shipments.

Industry Breaking Output Record Established in 1920

(*Continued from page* 1094)

Trucks are moving forward steadily in production, light delivery vehicles meeting with the greatest popularity. Conditions in this branch of the industry are showing marked improvement. Tire manufacturers are moving toward increased output, to establish stocks of the finished products. Parts makers report conditions excellent with orders booked far in excess of their expectations for this season.

While the fuel situation has eased greatly there is still a lack of bituminous coal, which calls for the greatest economy in its use, but this shortage is not so serious as to be the cause of great concern.

Pierce-Arrow Names Forbes As President

Succeeds Col. Charles Clifton, Who Will Continue Chairman of Board

BUFFALO, Nov. 28—Continuing Col. Charles Clifton as chairman of the board, the Pierce-Arrow Motor Car Co. has named Myron E. Forbes president of the company, thus relieving Col. Clifton of the detail work and leaving him a free hand to map out and direct the policies of Pierce-Arrow. Forbes has been prominently identified with the company as treasurer, vice-president and chief executive. Under his direction the company has shown gratifying progress, inventories having been reduced to normal and overhead cut materially. He will be succeeded as treasurer by S. O. Fellows, formerly comptroller.

This division of labor is interpreted to mean that Col. Clifton has completed his work of reconstruction undertaken two years ago. Prior to that time he had retired from the presidency to become chairman of the board alone, but the affairs of the company were in such shape that the directors prevailed upon him to return to the head of affairs and reorganize things. With that in mind he has put in a busy two years. Now, it is said, the company is in good shape, and the Colonel feels that he can give up the presidency and remain as chairman of the board.

Col. Clifton is greatly interested in public welfare work in Buffalo and desires more time for his work. He also will continue to serve as president of the N. A. C. C.

Industry to Recommend Nation's Road Program

WASHINGTON, Nov. 28—Unanimous support of the nation's highway construction program is to be urged by the constituted representatives of the automobile industry at the forthcoming convention of the American Association of State Highway Officials in Kansas City Dec. 5.

The industry will be represented at the meeting by the Conference Committee of the N. A. C. C., composed by O. J. Russell, president of the board of Mack Trucks, Inc.; Windsor T. White, president, White Motor Co.; Roy D. Chapin, chairman of the committee and president of the Hudson Motor Car Co.; Alvan Macauley, president of the Packard Motor Car Co., and Pyke Johnson, Washington representative of the N. A. C. C.

CAROLINA CHEVROLET BRANCH

CHARLOTTE, N. C., Nov. 27—Carrying out the program of expansion that has been adopted by the Chevrolet Motor Co., a factory branch to handle the distribution of all cars for North and South Carolina will be opened in Charlotte.

Men of the Industry and What They Are Doing

Stalnaker Heads Earl Sales

W. E. Stalnaker, formerly distributor for the Premier Motor Car Co. in Chicago and vice-president and sales manager of the former Pathfinder Co., Indianapolis, has been named general sales manager of Earl Motors, Inc., by President George C. Scobie. He has assumed immediate charge of the sales department and is mapping out plans for 1923 which are designed to give Earl the most extensive representation it has had. Territories both East and West will be carefully mapped out, and many important dealer connections will be signed in the time before and during the New York and Chicago shows. Stalnaker will attend both shows personally and will renew many acquaintances made during his former connections in the industry. During the war Stalnaker was a major of artillery, joining the service when the United States entered the war. Since leaving the service he has been active in other enterprises.

Rickenbacker Returns Home

E. V. Rickenbacker, vice-president of the Rickenbacker Motor Co., returned this week from his European trip on the Olympic. The famous aviator spent two months abroad on his honeymoon, attending the foreign shows and picking up ideas on the progress in both automobile and airplane construction.

Indiana Truck Names Gargett

F. W. Gargett has been named assistant to the president of the Indiana Truck Corp. His duties will be looking after the branches and the subsidiaries of the company. Gargett served formerly with the Transport Truck Co., in the capacity of factory manager.

James R. Anderson Resigns

James R. Anderson, assistant general manager of the Kenosha, Wis., works of the American Brass Co., division of the Anaconda Copper Co., has tendered his resignation, to take effect Jan. 1. No reason is given publicly by Anderson, and he has not announced his plans for the future. He was associated with the Kenosha plant 19 years.

Henderson Tire Changes

F. P. Harrington has been made general sales manager of the Henderson Tire & Rubber Co., Inc., Columbus. Prior to the change Harrington was with the Dayton Rubber Manufacturing Co., Dayton, as assistant sales manager for two years, and had also been connected with the sales department of the Miller Rubber Co., for about 10 years.

Robert H. McKintry, for a number of years connected with the Miller Rubber Co., has been made special sales representative in western Ohio, Indiana and Michigan.

J. H. Redfern, formerly branch manager of the Dayton Rubber Manufacturing Co. at Denver, has been made special representative covering the States of North and South Dakota, Wyoming, Idaho, Montana, Colorado, Utah, Arizona and New Mexico.

Harry J. Crawford has been named special Pacific Coast representative covering the States of California, Washington, Oregon and Nevada.

Packard Makes Change

H. J. Crain has been appointed assistant mechanical superintendent of the Packard Motor Car Co., and A. F. Reese, special equipment engineer in the sales department. C. S. Richardson has resigned as district manager to become Omaha distributor.

Mock Is Bessemer Manager

Following the report of a week ago that the Bessemer Motor Truck Co. and the American Motors Corp. would merge under the name of the Bessemer-American Motor Corp., comes the announcement that Ralph D. Mock has become general manager of the Bessemer Motor Truck Co. He is known to the industry through his service as vice-president of the Hydraulic Steel Co. of Cleveland, with which he was associated for a decade and also through past activities with the Motor and Accessory Manufacturers Associations. Mock was associated with others in the organization of the American Motors Corp. of New Jersey, which has resulted in that company's financial rehabilitation.

Bourne Joins Agency

Stephen Bourne has resigned as assistant to the president of the Wills Sainte Claire Co. of Pennsylvania to join the advertising agency of Thomas F. Logan, Inc., New York, Chicago and Washington, as director of merchandising. During the war Bourne was secretary and trustee of the United States Shipping Board Emergency Fleet Corp. at Washington.

Bristol, Conn., Honors Hughes

Frederick G. Hughes, vice-president and general manager of the New Departure Manufacturing Co., has been elected president of the Bristol Chamber of Commerce, Bristol, Conn.

Studying "Indian" Development

C. B. Franklin, production engineer of the Hendee Manufacturing Co., is on a trip through the central West and Pacific Coast states getting suggestions for engineering development of the Indian motorcycle.

Road Builders Have Convention Program

Design, Construction, Maintenance and Traffic Will Be Discussed

CHICAGO, Nov. 25—The program has been announced for the Thirteenth American Good Roads Congress, to be held at the Congress Hotel, here, Jan. 16, 17, 18 and 19 under the auspices of the American Road Builders' Association. The opening session will be marked by an address on "The Future" by Thomas H. MacDonald, chief of the United States Bureau of Public Roads.

The afternoon of the first day will be devoted to the subject of road design, with MacDonald in the chair. Among the speakers will be Clifford Older, State highway engineer of Illinois; Lloyd Aldrich, consulting engineer, San Francisco, Cal.; A. T. Goldbeck, engineer of tests, U. S. Bureau of Public Roads; H. F. Clemmer, testing engineer, Division of Highways, Springfield, Ill.; Vernon M. Pierce, district engineer, U. S. Bureau of Public Roads, and C. M. Upham, State highway engineer, Raleigh, N. C.

Construction to Be Taken Up

Wednesday will be devoted to subjects having to do with construction, with J. H. Cranford, president of the Cranford Paving Co., Washington, D. C., in the chair.

The subject for Thursday morning will be "Maintenance," and the chairman will be A. R. Hirst, State highway engineer of Wisconsin. A number of speakers will discuss the maintenance problems of various types of roads.

The subject for Thursday afternoon will be "Traffic," with Thomas J. Wasser, State highway engineer of New Jersey, as chairman. One of the speakers at this session, on the subject of "Changes Needed in Motor Vehicles Legislation and License Fees," will be Harry Meixell, Jr., of the N. A. C. C.

Finance and miscellaneous subjects will be discussed at the closing session Friday morning.

VICTOR RUBBER WINS SUIT

BOSTON, Nov. 25—The Victor Rubber Co. of Springfield, Ohio, was awarded damages of $15,022 in the Federal District Court here to-day, following a trial lasting several days, in which the Grow Tire Co. of Boston was defendant. The suit was based upon a contract made to supply the Grow company with a large amount of Egyptian cotton. The Grow company, it was alleged, refused to abide by the contract.

Bus Interests Join in One Association

National Body Formed with Offices in New York and E. B. Burritt Manager

NEW YORK, Nov. 27—The National Motor Transport Association, with headquarters in the Fisk Building, 250 West 57th Street, New York City, has been launched, with E. B. Burritt, for eight years secretary of the American Electric Railway Association, as the prime mover in bringing together the bus interests. There is no connection with the trolley branch of transportation as might be thought from the fact that Burritt was identified with it so many years.

Patrick Healey Is President

Organization was completed at a meeting held in New York at which Patrick Healey, president of the Connecticut Motor Stage Association, Waterbury, Conn., was elected president; W. E. Travis, president of the Motor Carriers Association of California, San Francisco, vice-president; R. E. McCollum, president of the Ohio Motor Bus Owners Association, Columbus, vice-president; William P. Killeen, vice-president and general manager of the Washington Rapid Transit Co., Washington, D. C., vice-president; E. B. Burritt, secretary and general manager; and Alexander Spring, Waterbury, treasurer.

There will be three classes of membership. Class A is for operators, with dues one-tenth of one per cent of the annual gross earnings; class B, for manufacturers and parts concerns, with dues of $300 a year; and associate memberships at $10 a year.

Briefly, the object of the new association is "to develop the business of transporting passengers and merchandise by motor vehicles operating on public highways between fixed terminals and on regular schedules to the end that it may serve to the fullest extent the best interest of the public."

Taxicab Operators Barred

Operators of taxicabs and "jitneys" necessarily are barred from membership because the eligibility clause calls for buses running on a regular schedule and between fixed terminals. In other words, it is an organization for carriers by which is meant bus operators.

As yet Burritt has been unable to gather reliable data as to the bus field. Conservatively, it is estimated there are about 40,000 buses in operation in the country. It is thought there are about 10,000 operating companies, of which possibly 5000 may be regarded as going concerns, that is, companies operating in a business-like way and making money.

It is Burritt's idea to bring these companies into the fold, organizing along lines somewhat similar to the National Automobile Chamber of Commerce. Legislation is one of the things that will be watched carefully.

One of the first bits of attempted legislation that will be fought is the uniform law suggested at the October meeting of the American Electric Railway Association, which the bus men feel contains many drastic clauses which they would have modified. It is thought that pressure of bus competition may have led the trolley companies to suggest that motor vehicles having pneumatic tires shall pay one cent per ton mile of travel over public highways and motor vehicles with solid tires one and one-half cents.

RADIO WILL GUIDE TRUCKS, FENN SAYS

NEW YORK, Nov. 29—Radio as a means for controlling the operation of motor truck fleets in the near future was predicted last night by F. W. Fenn, secretary of the motor truck committee of the National Automobile Chamber of Commerce, whose discourse on the evolution of transportation was broadcasted from the WJZ station at Newark, N. J.

"Undoubtedly as time goes on," Fenn said, "motor truck fleets will be dispatched from one end of the country to the other by means of the radio, with resulting efficiency and economy to shippers and operators alike. The radio will make it possible for the home office to keep in touch with its operators on all routes, permitting it to take advantage of emergency orders and re-route its trucks in case of storms and highway blockades.

"In other words, the radio will be the eyes through which the traffic managers in our major cities will be permitted to watch closely the work of their operators for the benefit of business in general."

Barlow Starts Movement to Produce Steam Buses

CLEVELAND, Nov. 27 — Application for articles of incorporation for the Barlow Steam Engineering Co. has been filed with the Secretary of State at Columbus, marking the first step toward placing on the market a device for generating steam for motor power, invented by Lester E. Barlow.

Barlow has interested the Cleveland Chamber of Commerce in his proposition. It is said the organization will seek to secure the backing of local bankers and capitalists and will endeavor to secure a local plant for the enterprise.

It is Barlow's intention to organize a company to build steam-driven motor buses, after which he will incorporate another company to manufacture passenger cars. It is not his plan, however, to confine the use of his device to his own companies—he will grant patent rights to such other car makers as desire to use the invention.

Truck Association Re-elects Pulcher

Also Increases Its Board of Directors So That It Includes 15 Members

DETROIT, Nov. 27—Coincident with the shortening of its name from the National Association of Motor Truck Industries to the Motor Truck Industries, Inc., at a meeting of the organization here, the board of directors of the association was increased to 15 members, nine truck manufacturers and six parts makers, to permit of more effective handling of the association's business.

M. L. Pulcher, president of the Federal Motor Truck Co., will continue as president with H. T. Boulden, vice-president of the Selden Truck Corp. as first vice-president; Fred Glover, president and general manager Timken-Detroit Axle Co., as second vice-president; Don F. Whitaker, general manager of the association, as secretary and general manager, and A. S. More, president of the Denby Motor Truck Co., as treasurer.

Board of Directors Chosen

The board of directors, in addition to the officers, includes: G. A. Dana, president, Spicer Sheldon Axle Co.; B. A. Gramm, Gramm-Bernstein Truck Co.; M. A. Holmes, president, Transport Truck Co.; W. J. Kyser, president, Acme Truck Co.; T. R. Lippard, president, Stewart Motor Co.; A. E. Parson, treasurer, Brown Lipe Co.; J. W. Stephenson, president, Indiana Truck Co.; L. M. Viles, president, Buda Co.; F. E. Wilder, vice-president, Gemmer Manufacturing Co.; F. E. Williams, president, Garford Motor Truck Co., and G. W. Yeoman, vice-president, Continental Motors Corp.

A service committee headed by George Dow, service manager of Federal, will be named which will make an immediate study of the used truck situation. Much of the difficulty in moving used trucks is thought to be due to the inability of the dealer to rebuild them owing to lack of money. The committee will make recommendations to the directors on Dec. 20, who will decide whether aid in putting trucks in a salable condition is needed.

Opponents of Rear Light Law to Be Given Hearing

BOSTON, Nov. 27—As a result of a petition signed by a number of Boston motor car dealers and motorists, a hearing will take place before the Governor's Council at the State House here on Dec. 6 in opposition to the proposed new rear light law. Since the announcement of the regulations and the approval of some of the lamps, a number of dealers received word from their factories that they would not get cars with new lamps to meet the Massachusetts specifications. So far only six automobile companies have had lamps approved.

Reeves Sees Year's Output As 2,400,000

Of This He Says, Following Tour of Plants, 10 Per Cent Will Be Trucks

NEW YORK, Nov. 27—After spending two weeks on the road visiting from 25 to 30 plants in Ohio, Indiana, Illinois and Michigan, Alfred Reeves, general manager of the National Automobile Chamber of Commerce, is back at his desk again, convinced, as a result of his trip, that 1922 production will reach the record-breaking total of 2,400,000, of which approximately 10 per cent will be trucks.

"I found that business generally has had a chance to get its second wind, live down many of the mistakes of the past and get set for 1923," commented Reeves. "Next year promises to excel 1922, provided we can get enough closed bodies. That's the rub. The whole industry now has a new market in the demand for the closed car.

Closed Car Output Expanding

"This market will increase rapidly as the prices get closer to the open car prices and especially where the roads are improved. Closed car production in 1919 was 10 per cent of the total; in 1920, 17 per cent; in 1921, 22 per cent; while this year it will exceed 25 per cent, with the last quarter's production running 31 per cent of the total. In time it is expected that more than half the production will be the closed or year-round type."

Reeves said further:

After visiting so many of our factories I am convinced that our industry now has an excess capacity for all its needs. It can make 3,000,000 vehicles if hard pressed during any year. This means that there is very little chance for any new companies that may be launched. New dealers are hard to get and the old ones are standing by the standard lines.

Next year will find engineering and production on a very efficient basis but distribution will be the big problem for all manufacturers. While thousands of dealers have gone out of business, the ranks have been pretty well replaced by new ones so we now have more than 33,000 merchants retailing motor cars and trucks, all of whom must be aided by the manufacturer in connection with financing his stocks and passing the vehicles on to the public.

Readjustments Responsible

The big market we are enjoying now is the result of manufacturers taking their readjustments quickly, taking necessary losses and putting prices low enough to insure volume. To-day's values are the greatest in the history of the industry and with increasing costs for materials and labor some price increases are not unlikely. We had considerable buying by those who should have bought cars in 1921, plus those necessary to replace the worn out production of 1916 and 1917. The 1917 production was 1,868,947.

We will see still greater production next year, especially during the first six months, provided closed bodies enough are available. The industry normally makes 25 per cent of its year's production in the first quarter, 31 per cent in the second, 24 per cent in the third and 20 per cent in the last quarter. The last quarter this year will be better than the average.

Farmer buying will make for an increased production next year. His crops this year will bring a billion and a half dollars more than last and he must have cars and trucks.

The truck industry is more promising than it has been for some time but it needs more and better dealers and the elimination of some bad practices that have crept in during the depression, especially the selling of trucks on too small a first payment, with too long a time for full payment.

CLASSES BUS LINE AS RAIL "FEEDER"

WASHINGTON, Nov. 25—Bus lines were classified as "feeders" to electric traction lines in a decision of the Public Utilities Commission of the District of Columbia, denying the application of the Washington Rapid Transit Co., a bus operator, to extend its Rhode Island Avenue route.

In the opinion of the Commission there is a legitimate field for bus service in Washington, but "this does not lie in the multiplication of lines or of vehicles reaching the heart of the city. It lies, rather, in providing service in extension of the street car lines into territory so thinly settled as not to justify the large investment necessary for street railway service."

Fisher Reports Quarter's Surplus to Be $2,852,964

DETROIT, Nov. 29—Fisher Body Corp. and subsidiaries exclusive of the Ohio company, report for the three months ended Oct. 31, last, a surplus of $2,852,964, after charges and Federal taxes, equal after preferred dividends to $5.70 a share earned for the 500,000 shares of no par value common stock outstanding. In the previous three months surplus of $1,733,433, or $3.46 a share on the common, was reported, and in the corresponding period last year, surplus of $1,939,541, or at the rate of $3.75 a share on the common, was shown.

For the six months ended Oct. 31, surplus of $4,586,394 remained after preferred dividends, equivalent to $9.16 a share on the common, as compared with $3,151,777, or $6.06 a share, in the same period a year ago.

For the quarter ended Oct. 30 last, the Fisher Body Co. of Ohio reported net earnings of $329,293, after taxes, depreciation and interest. This is equivalent to $1.29 a share on the 100,000 shares of no par value common stock, after allowing for preferred dividends.

New York Suggests Pedestrian Control

Officers Would Clear Sidewalks as Means of Meeting Traffic Problem

NEW YORK, Nov. 27—Traffic cops on the sidewalks to control pedestrians and headlights for the officers are two reforms being considered by Police Commissioner Enright in his efforts to solve the congestion problem. With this end in view he is drafting a set of sidewalk traffic rules which will apply only to pedestrians and which will be rigidly enforced, he says.

These are only two of the relief measures that the Commissioner has in mind. With New York doubling the number of its automobiles every three years, he realizes that drastic steps must be taken to make it possible for residents of the city to use the streets and sidewalks.

Stores with Arcade Effects

So serious does he consider the situation that he says it may be necessary to eliminate the sidewalks on Fifth Avenue and Broadway and give the whole width of the streets to vehicular traffic. To care for pedestrians he would build the sidewalks along the first floors of the stores and office buildings, which at the same time would permit the stores to display goods in an arcade effect.

Enright also suggests taking down the Second and Sixth Avenue elevated lines and placing them underground with four tracks each. An elevated structure along West Street, the most congested thoroughfare in the city, is favored. This, Enright thinks, should be at least 80 feet wide and extend from the Battery to Seventy-second Street, with runways that would connect West End Avenue and Riverside Drive with Broadway. A few of the cross streets, particularly those leading to the four bridges across East River, should be widened.

Enright has given the pedestrian control idea considerable thought, and as this plan is outlined he would keep people moving and break up sidewalk groups. Persons persisting in standing and talking on the sidewalks may be handed a summons to appear in court.

Radiolite for Officers

Because of the number of traffic policemen who have been killed and injured by being struck by automobiles, Enright is considering equipping his traffic cop with a radiolite hat band or put an electric light on his cap. An electrically lighted baton is another idea. Having a high powered calcium light continually shine on the traffic cop at night, as is done in some of the smaller cities, is being considered. In the daytime, Enright thinks, accidents may be avoided by placing the bluecoat on an elevated platform.

California Reports Gain in Truck Sales

Cars Improve Also as More Are Being Shipped by Eastern Manufacturers

SAN FRANCISCO, Nov. 28—California automobile and motor truck dealers had another banner month of sales in October, according to figures just gathered by *Motor Registration News*, of Oakland. The total of automobile and truck registrations for October, 1922, was 14,158, of which 12,563 were automobiles and 1595 trucks, an increase of 19 per cent over the registrations of October, 1921.

When the shortage of cars felt by all the dealers is taken into consideration, these figures show a very healthy condition throughout the industry in California. November has shown improvement over October, due largely to the increased shipment of cars into the State by eastern manufacturers.

All Sections Show Gain

Northern California, with a total registration of 6204 automotive vehicles for October, 1922, shows 5450 passenger cars and 751 trucks, an increase of 17 per cent over the registrations of October, 1921. Southern California showed a net gain of 27 per cent for October, 1922, over October, 1921, with 7113 passenger cars and 841 trucks registered for the month just closed.

Trucks recorded a greater percentage of gain in registrations throughout the State than passenger cars, with a 59 per cent increase. The truck gain in northern California was 98 per cent and in southern California 35 per cent. Los Angeles led all the counties of the State, with total sales in passenger cars of 5165 for October, 1922, while the next thirteen counties combined showed sales of 5163 passenger cars, or two less than Los Angeles County alone.

From a percentage standpoint, however, Kern County, which stood tenth in the list as to number of sales, was first of the counties of the State, with an increase for October, 1922, over the same month of 1921, of 62 per cent.

Mobile Conditions Improve

MOBILE, ALA., Nov. 28—Conditions in the territory surrounding Mobile are much improved, and an excellent trade for the winter months is expected. With Alabama back in the position of the third cotton producing State in the South, and with a crop estimated to be in the neighborhood of 850,000 bales, which will be sold at an excellent price and which will be required almost as soon as bought, Mobile cotton dealing and shipping concerns are looking for an excellent business this winter and next spring, at least.

This added to general improvement in all lines is making for an excellent sale of automobiles and kindred lines in this territory, and there is no reason why this territory should not be one of the leading automobile buying sections for some months to come. The fact that from all appearances Mississippi will be the second largest cotton producing State in the South also helps the prospects of Mobile as a market.

Texas Sales Keep Up

DALLAS, TEXAS, Nov. 27—While the bulk of the crops have been marketed and the farmers of Texas are now preparing for another bumper production, the peak of the automobile buying does not appear to have been passed.

Retailers, despite the approach of winter and the inclement weather, have not noticed any lull in the buying of cars, tires and accessories. In fact November sales were about the same as those of October, and October was one of the banner months of the year.

In Dallas the number of retail sales has been around 100 per day, and the distributors have been placing cars with their dealers about as rapidly as they could obtain them.

The Fort Worth retailers report that the sales for November were about equal to those of October and that indications are the December sales will be as great.

Houston dealers reported increased sales for November, probably due to the fact that the automobile show, extending over a dozen days, was held during the month. Sales at Galveston were about what they were in October. At San Antonio the sales were holding up, the retailers reported.

Business in Boston Good

BOSTON, Nov. 27—Business continues at a reasonable pace, due in a large measure to mild weather. It has allowed a number of dealers to continue selling open cars. Now, however, they are beginning to concentrate on closed models. While the demand is ahead of the supply generally, some of the dealers are very nearly normal in filling their orders.

New York Salon Will Show 26 Makes of Automobiles

NEW YORK, Nov. 27—Twenty-six makes of cars will be on display in the eighteenth annual Automobile Salon, which will open in the Hotel Commodore Sunday evening. England, France, Belgium, Italy, Germany, Austria, Spain and the United States will be represented. In addition 12 custom body concerns will exhibit.

Those exhibiting cars are: Benz, Brewster, Cunningham, Daniels, Duesenberg, Fiat, Hispano-Suiza, Hotchkiss, Isotta-Fraschini, Lanchester, Mercedes, Minerva, Panhard, Rolls-Royce, Rubay, Steyr, Sunbeam, Voison, Winton.

Coachmakers will exhibit: Cadillac, LaFayette, Lincoln, Locomobile, Marmon, Packard, Peerless.

Coachwork exhibits will be made by: Brewster, Brooks-Ostruk, De Causee, Demarest, Fleetwood, Healey, Holbrook, Hume, Judkins, Le Baron, Locke, Rubay.

London Show Rouses Interest Near End

Attendance One Day Breaks Records—Biggest Demand Is for Small Cars

LONDON, Nov. 11 (*by mail*)—Quite a remarkable change occurred on the third day of the Show at Olympia and White City, which closes to-day. The attendance was poor on the first two days and the amount of business done was very disappointing, being much below anticipations. But on Monday (the third day) and thenceforward, marked improvement in both respects was obvious.

The attendance was greater than last year on each of the last six days, while on Wednesday all records were broken, over 80,000 people paying for admission; the crowd, however, was divided between the two sections, so that the pressure on space was not so great as in 1920 when Olympia alone was used.

Optimism Reigns at Close

It is impossible to give any definite intimation concerning the amount of business done, but so far as the best known makers were concerned, it was clearly evident that optimism had taken the place of something approaching pessimism on the opening days. Some firms were freely expressing the opinion that 1923 would be a record year for them, and among these were makers of high-grade as well as others specializing in low-priced and small cars.

But the majority of the business done was in small cars or those of moderate price, varying from 10 to 14 hp. and from £200 to£500. The new 14 hp. Wolseley and Crossley four-passenger cars at £525 and £475, respectively, were in obvious favor; the Morris fours, in two finishes, £255 and £350, were in demand and appeared to justify the planning of a 12,000 output, while the new 8 hp. Humber at £275 and the 11.4 hp. at £525 with the new overhead inlet engine were selling freely.

Other makers with established reputions and popular types of cars were equally well placed, but the demand for cars selling over £600 and for cheap full-sized models continued small until the end of the show. Economy in operating costs remained the outstanding feature of the public demand as of the show as a whole, though many buyers still hold off believing or hoping that prices have further to fall in the near future.

ASSOCIATION CHANGES NAME

CHICAGO, Nov. 25—A new name, Automotive Manufacturers' Association, was adopted at a meeting here this week by the organization heretofore known as the Association of Automotive Equipment Manufacturers. New constitution and by-laws also were adopted.

Government Starts Road Surface Tests

Will Seek to Learn Cause of Waving Found in Bituminous Mixtures

WASHINGTON, Nov. 28—A series of road tests have been begun by the Bureau of Public Roads at the Arlington Experiment Station here to determine the cause of waving in bituminous road surfaces. A circular track is being used, composed of 27 sections of asphaltic concrete of different mixtures.

Profile measurements of the circular road were secured before the tests were begun. Measurements will be taken at frequent intervals as the test progresses in order to determine the rate of formation of inequalities in the surface.

The tests are being made under solid rubber-tired wheels loaded with 600 pounds per inch of width of tire or approximately that of a 5-ton truck, traveling at a speed of 20 m.p.h. The device used will be guided by wheels traveling on rails and is electrically driven, the power being transmitted to one of the wheels, used to represent the traffic, which will make it act in exactly the same manner as the drive wheel of a truck.

The wear test of the circular track consists of 61 sections of concrete, and the ultimate result of the test will not only show what causes waves in bituminous road surfacing, but will also show the best mixtures of concrete and other road material. The test will require six months to complete, and it is planned to run the machine ten hours a day.

Marketing Associations Will Meet in Washington

WASHINGTON, Nov. 27—The first national convention of Co-operative Marketing Associations will be held here Dec. 14, 15 and 16, with headquarters at the New Willard Hotel. More than 200 member associations have already been invited to send representatives.

The purpose of the convention is twofold—the problem of transportation for the various associations, and rural credits legislation. A definite program is now being arranged.

Manufacturers Endorse Canadian Road Project

DETROIT, Nov. 24—A resolution endorsing the plan of the Canadian Good Roads Association to obtain from the Federal Government a further grant of $20,000,000 to assist provinces in road building and to provide an extension of time to provinces unable to take full advantage of the dominion appropriation within the time limit, was passed at a meeting of representative manufacturers in Windsor this week.

The meeting was addressed by W. R. Campbell, vice-president and treasurer of Ford Motor Co. of Canada, Ltd.; Hon. J. L. Perron, K. C., minister of highways for the province of Quebec, new president of the Canadian Good Roads Association; Hon. F. C. Biggs, minister of highways for Ontario; W. Sampson, president of the Canadian Automobile Association; and S. L. Suries, chairman of the executive committee of the Canadian Good Roads Association.

Congress Has Measure for Truck Mail Routes

WASHINGTON, Nov. 27—Representative M. Clyde Kelly of Pennsylvania has introduced a bill in the House providing for an appropriation of $100,000 to be used in the establishment of motor truck mail routes to facilitate the collection and delivery of food products. Kelly states that establishing these routes will result in the average saving of 20 per cent in the cost of food stuffs to consumers and will increase the farmer's profits by 15 per cent, both savings resulting from the decreased cost of transportation from farm to market.

According to Kelly, the Post Office Department has all the trucks it needs at the present and all that is necessary now is authority to put them on the road. Appropriation of $100,000 is intended to pay for the cost of establishing routes and operating the trucks.

Gain Made in Per Capita Earnings During October

WASHINGTON, Nov. 25—Comparison of employment for September and October in 118 automobile manufacturing plants shows an increase of nine-tenths of 1 per cent in the amount of the pay-roll, but a decrease of 5.9 per cent in the number on the pay-roll in a one-week period. Thirty-four of the 43 industries listed by the Bureau of Labor Statistics show increases in the total amount of their pay-roll in October.

The pay-roll of these 118 establishments for one week in September amounted to $5,483,856, as compared with $5,534,807 in October, when the number on the pay-roll was 171,892. The 48 establishments manufacturing automobile tires reported 45,017 on the pay-rolls in October, an increase of two-tenths of 1 per cent over the preceding month, although the amount of the pay-roll decreased 1.4 per cent.

The per capita earnings in the automobile industry increased 7.3 per cent in October as compared with September, while the earnings in the tire industry fell off 1.6 per cent.

PIEDMONT MOTOR PLANT SOLD

LYNCHBURG, VA., Nov. 28—The plant of the Piedmont Motor Car Co. has been sold at auction under a deed of trust and was bought in by the First National Bank of Lynchburg, beneficiary. A. Leslie Stephens of Lynchburg is in charge of the property for the bank and is endeavoring to find a private purchaser for the plant.

Road Making Gains Momentum in Peru

Highway Campaign Advances—Exchange Better and Crops Yield Good Prices

LIMA, PERU, Nov. 8 (*by mail*)—Exchange, which fell below $4 for the Peruvian pound in September, during the latter part of October rose to its old level of $4, and starts out November at $4.03. Par value is $4.84. During 1920 exchange ranged from $4.91 to $3.96; in 1921, from $4.12 to $3.15; in the years immediately preceding the Great War exchange ranged closed to par, and did not vary greatly in the course of the year; during the period following the disastrous war between Chile and Peru that ended 1883, exchange was far worse than it is today.

(*Editor's Note.*—Peruvian exchange was quoted at $4.20 at New York on Nov. 21, this being its highest quotation in two years.)

Newspaper Begins Campaign

Rising prices for cotton and sugar, two of Peru's chief exports, are adding to the encouraging feeling given by a rising exchange; they themselves contributed largely to the improvement in exchange. An encouraging feature in the automobile world is the increasing impetus that the movement in favor of good roads is taking. Since six months ago one of the papers of the capital began a campaign in favor of more and better roads. This campaign is now extending to the provinces. From Piura to Puno, and from Ica to Huancavelica, the press of the provinces is echoing and re-echoing the sentiment in favor of better roads that first found utterance in the capital.

Bus Traffic Extended

Bus or automobile passenger traffic is becoming more extended throughout the Republic. Service now exists between Piura and Morropon and Talara in the north of Peru, with the intention of extending the automobile route to reach Ecuador. If this is done, it will be one of the first international automobile services in South America. There is also an automobile line between Chocope and Puerto Chicama, near Trujillo, in the center of the coast region. In the South there is automotive transportation from Ica to the bathing resorts of the Huega and La Victoria, and to the therapeutic baths of Huacachina.

The new automobile year begins in Peru Dec. 1, one month ahead of the calendar year.

TRUCKS GO TO AUSTRALIA

SPRINGFIELD, OHIO, Nov. 27—Ten motor trucks were shipped Saturday from the Springfield works of the International Harvester Co. to Australia. The plant is still keeping up with its schedule of 25 trucks per day.

French Car Exports 10,112 in 9 Months

Of These 195 Were Shipped Here —France Took 2139 Units from America

PARIS, Nov. 15 (*by mail*)—France exported 10,112 automobiles having a value of 321,423,000 francs, during the first nine months of the present year. Compared with the corresponding period of last year, the values show a deficit of 82,487,000 francs.

Great Britain continued to be the best client of France, with Belgium second and the United States sixth on the list. The following is the number of French automobiles exported to the various countries:

England	3,672
Belgium	2,709
Algeria	1,119
Switzerland	576
Morocco	228
U. S. A.	195
Germany	136
Japan	130
Indo-China	155
Tunisia	90
Other countries	1,102
	10,112

The greatest volume of export business was done during the month of August, when 1534 automobiles were shipped abroad. The lowest number was in September, with a total of 950.

French automobile imports totaled 2773 units during the first nine months of 1922, of which number 2139 came from the United States, 423 from Italy, 115 from Belgium, 31 from England, and 65 from other countries. The value of these imports is 35,340,000 francs, being an increase of 9,460,000 francs compared with the corresponding period of a year ago. The excess value of French automobile exports over imports is 285,083,000 francs.

More Motorcycles Imported

During this period motorcycles to a value of 2,338,000 francs were imported into France, showing an increase compared with a year ago. The exports were 3,019,000 francs for motorcycles, a slight decrease from last year.

Airplanes to a value of 13,157,000 francs were exported from France during the initial nine months of the year. For the same period of 1921 the value was 28,615,000 francs. The value of flying boats exported during this period was 459,000 francs, compared with 775,000 francs in 1921.

STEEL COMPANY BUYS SITE

DETROIT, Nov. 25—The Michigan Steel Corp., newly formed for the manufacture of steel sheets for automobile parts, has bought a site near Detroit and will begin construction of a plant at once. The plant will cost about about $1,000,000 and have an initial capacity of about 3000 tons monthly.

George R. Fink, formerly with the West Fenn Steel Co., Pittsburgh, is is president and treasurer. Other officers are F. B. Lovejoy, New York, chairman of the board; F. H. Jones, New York, vice-president, and H. M. Steele, Detroit, formerly with Newton Steel Co., Newton Falls, Ohio, second vice-president.

French Trucks Compete in Long Endurance Test

PARIS, Nov. 18 (*by mail*)—After a technical examination, all the French trucks which took part in the 26-day military endurance test around Versailles have been found to be in such satisfactory condition that they can be recommended for Government subsidies. The makes represented are Renault, Saurer, Dewald, Scemia, and Berliet. The trucks are 7½-ton types which, while designed for commercial haulage, have been found suitable for the road transportation of military tanks.

Another military competition, for agricultural tractors capable of being used for hauling guns across country, was held on the old battle front just north of Soissons. The firms entered are Citroen, Mistral, Renault, Ara, and Scemia. Citroen has entered his rubber creeper band type of machine, but this having been objected to by the military commission, the machines competed non-officially. The military requirements are a four wheel drive or creeper band tractor capable of passing over broken country.

Farm Equipment Sales Heads Discuss Problems

CHICAGO, Nov. 28—The Sales Managers' Department of the National Association of Farm Equipment Manufacturers held their annual meeting at the Auditorium Hotel. "Advertising Its Relation to Sales" was the first subject commented upon and brought suggestions on connecting the advertising with the sales.

"How to Cut Sales Overhead" was another topic talked on while "Trade Ethics" brought the morning session to a close. "The Business Outlook for 1923" opened the afternoon meeting and was delivered in the form of an address by E. P. Farewell of Babson's Statistical Organization.

"1923 Prospects as I View Them" were expressions of what each member thought of the coming year. Optimism predominated in the talks.

TO TEST "BLUE SKY" LAW

CHICAGO, Nov. 25—Alleging that the Illinois securities law, commonly called the "blue sky" law, is unconstitutional, Charles H. Gill, inventor of a gearless transmission, has filed suit in the United States District Court, asking that the Secretary of State and Attorney General of Illinois be restrained from interfering with the sale of rights in his patents.

INDUSTRIAL NOTES

Latex Tire & Rubber Co. at Fond du Lac, Wis., will make its first quarterly dividend payment Feb. 1, 1923, following the establishment of a production record equalled by few if any of the younger tire companies which engaged in business before the period of depression made its effect felt. The announcement followed the receipt of word that agents of the company closed a raw material order that places the concern in an enviable position for the coming six months, during which time it is generally believed that the price of tires and other rubber products is due for an increase.

Harley-Davidson Motor Co., Milwaukee, will break ground Dec. 1 for a new heat-treating building, to be 80 x 145 ft., of brick and steel, one story and basement. One of the main shop buildings has just been enlarged by the addition of another story. Orders are reported to be increasing steadily and export business is especially active.

H. A. Waldron, General Motors Building, Detroit, has been appointed by the National Seal Co., Inc., of Brooklyn, N. Y., as its western sales manager for the sales of Sears-Cross locks for automobile bodies and its general line of automobile hardware. Waldron takes the place of T. P. C. Forbes, who formerly represented the company.

F. Rassmann Manufacturing Co., Beaver Dam, Wis., manufacturer of barn and stable equipment, has decided to enter two new lines, one being the manufacture of malleable disk wheels for Ford and other light cars, and the other the production of children's coaster wagons with malleable disk wheels.

Petroleum Motors Co., Rockford, Ill., reports an order for $112,000 worth of the engines from a Chicago truck company. One unit of the Rockford plant has been erected and machinery has been installed. Production of 20 engines a day is forecast when the plant is in operation.

Wisconsin Gray Iron Foundry Co., Milwaukee, is enlarging its foundry and core-room and installing considerable new equipment. New core-making machinery and cleaning room equipment will be installed as part of the general improvement plan.

Van Metal Wheel Co., San Francisco, has been organized to handle dealers' sales of the Van hollow spoke malleable and aluminum wheels in California. The new company is controlled by interests operating the Lambert tire agency in that city.

Wm. R. Johnston Manufacturing Co., manufacturer of windshield wings, mirrors, curtains and other automobile equipment, has occupied its new factory at 1300-1340 Fletcher Street, Chicago, where its production capacity is greatly enlarged.

Anderson Motor Co. announces the appointment of Melchoir, Armstrong & Dessau, Ltd., 116 North Broad Street, west, New York City, as export agent.

YELLOW CAB LENGTHENS DAY

CHICAGO, Nov. 27—The Yellow Cab Manufacturing Co has increased the capacity of its plant by lengthening the working hours from 9 to 10 hours with a full Saturday. Ground also has been broken for a new factory which will manufacture motor buses for the Chicago Motor Bus Co. and operators in other cities. This plant will be ready by February with an initial capacity of five buses a week.

Roster of Electric Service Body Grows

New Directory to Show Increase—No 1922 Dues for Members Joining Now

DETROIT, Nov. 24—The directory of the Automotive Electric Service Association for 1923 will show a large increase in members over the total for this year. In this connection Secretary D. W. Burke is sending out a letter to prospective members urging them to file their applications in time to be listed in the new booklet.

Because of the lateness of the season, the association will not assess dues for 1922 on members joining now, but suggests that they approximate their business for 1922 and, in making application, request that the dues apply for 1923. Dues are assessed according to volume of business, the five classes being as follows: Under $25,000, $10; $25,000 to $50,000, $20; $50,000 and less than $100,000, $30; $100,000 and less than $250,000, $50; $250,000 and over, $75. Initiation fees will be suspended until Jan. 1.

Plans for the annual convention of the association have determined the Congress Hotel, Chicago, Florentine Room, as the place and Jan. 29, 30 and 31 as the dates. The board of governors will meet on the opening day and the general sessions will be on the two latter days. A joint session with the Automotive Electrical Association, the manufacturer's body, will be held on the closing afternoon. All electrical equipment dealers are invited to attend the open sessions. Over 200 members will attend the closed sessions.

A questionnaire to car dealers is now being circulated by the association to determine the effectiveness of the service that the equipment dealers have been rendering and requesting information for improvement. It will also serve to show manufacturers how equipment dealer and car dealers are co-operating and afford opportunities to put the service on the best basis from the owner viewpoint.

Has Plan for Buying Parts with Trade Acceptances

NEW YORK, Nov. 27—Parts manufacturers are interested in a plan evolved by an automobile maker designed to keep the wheels turning in the parts plants during the dull season and at the same time enable the car builder to store up sufficient equipment to care for increased production in the spring.

Estimating that the average parts maker's plant operates at about 50 per cent capacity during December, January and February, and when the spring rush opens tries to crowd into a few months a production which could be distributed uniformly over each month under the new plan, this car maker agrees to accept sufficient material to build 1000 cars, each shipment to be paid for with trade acceptances for a period of 60, 90 and 120 days.

This step is proposed because this parts maker believes that next spring there will be an unprecedented demand for cars and if he has a surplus of equipment over and above his anticipated needs he will be able to increase his output and meet the needs of his dealers. He also figures that the parts people will benefit by being able to operate their plants to capacity during what heretofore has been the dull season.

Several of the parts concerns approached with this proposition are understood to have agreed with the logic of the idea. They figure that the trade acceptances can be used through almost any banking connection and that everyone in the transaction will benefit thereby.

FINANCIAL NOTES

General Battery & Supply Co. of Coal City, Ill., a $250,000 manufacturing concern, will occupy the Fuller factory building, East Moline, next month. Forty men will be employed when the plant is opened, and this force increased to 100 under capacity production. It will handle 15,000 primary and 1500 automobile storage batteries a month. The company was organized in 1919 and last year did a $225,000 business. Its officers are: Fred H. Jones, Chicago, president, and William A. Biesmann, Galena, vice-president and superintendent of production.

Cincinnati Milling Machine Co. has received authority from the secretary of state to increase its capital to $6,000,000. Frederick A. Geier, president of the company, says that the move was made in preparation for future expansion and has no immediate significance. The capital will be increased to $3,000,000 only, Geier says, of which half will be in common stock and half in preferred. The present capitalization of the company is $1,500,000.

More Cities Show Desire to Construct Speedways

SAN FRANCISCO, Nov. 27—Detroit, Altoona and Norfolk are negotiating with Jack Prince, builder of the speedways at Cotati, Fresno and near San Francisco, for the construction of wooden bowls for automobile racing. This is only one of several interesting statements made by Fred Wagner, dean of starters, who stopped in San Francisco recently on his way to the Thanksgiving Day Races at the Beverley Hills track, Los Angeles.

The four cities have filed applications with the American Automobile Association for sanctions to hold automobile races, according to Wagner, thus indicating that the plans for the bowls and the financing of their construction had proceeded to a definite point in each of the cities. Prince is now building a speedway at San Diego, which will be ready for try-outs shortly after Jan. 1.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Last week rates for call money ranged between 4 per cent and 5½ per cent, as compared with a range of 3½ per cent to 5 per cent in the preceding week. Funds were in free supply, and several large banks appeared in the market as lenders. There was no change noted in the rate for fixed-date money, 5 per cent being quoted for all periods from 60 days to six months, the same as in the preceding week, and very little business was transacted. The prime commercial rate remained unchanged at 4½ to 4¾ per cent.

Bradstreet's food index number, based on the wholesale price per pound of 31 articles used for food, stood at $3.46 last week, as compared with $3.42 in the preceding week and $2.95 in the week ending Nov. 23, 1921. Last week's index marked a gain of 1.1 per cent over the preceding week and 17.2 per cent over the corresponding week last year.

Based upon car loadings at the mines, the estimated total coal production for the week ending Nov. 18 was 13,200,000 tons, of which 11,100,000 was bituminous and 2,100,000 anthracite. This compares with 10,076,000 tons of bituminous and 1,863,000 tons of anthracite, actual production in the previous week.

Although freight car loadings for the week ending Nov. 11 were 40,918 less than for the week of Nov. 4, they were 198,132 cars more than in the corresponding week of 1921. There is still a shortage of freight cars, as is evidenced by the fact that on Nov. 8 there was need for 174,498 cars more than could be supplied. This was a decrease, however, of 4741 cars from the demand in excess of supply on Oct. 31.

The Federal Reserve statement as of Nov. 22, 1922, showed increases of $14,477,000 in gold reserves and $13,923,000 in total reserves. Bills on hand decreased $42,103,000, and total earning assets, $70,698,000. Total deposits showed a decline of $44,522,000 and Federal Reserve notes in circulation, $21,828,000. The reserve ratio advanced from 75.2 per cent to 76.7 per cent.

Chevrolet Assembly Plant in Texas Will Be Dropped

FORT WORTH, TEXAS, Nov. 28—The Fort Worth assembly plant of the Chevrolet Motor Co., one of the largest plants of this kind in the Southwest, is to be disposed of by the General Motors Corp., according to advices received by local officials.

The announcement of the intention to dispose of the plant here merely said "the manufacturing plans of the company have been changed and for good reasons the assembly plant will be disposed of." It is believed the machinery and materials will be moved elsewhere and the other property sold.

Calendar

SHOWS

Dec. 3-9—New York, Eighteenth Annual Automobile Salon, Commodore Hotel.

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8 - 13 — New York, Second National Automobile Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Nov. 25-Dec. 4—London (Olympia), Cycle and Motorcycle Show, British Cycle Motors, The Tower, Warwick Road, Coventry.

Dec. 15 - Jan. 2 — Paris, Aeronautical Salon, Grand Palace, Chambre Syndicale des Industries Aeronautiques, 9 Rue Anatole de la Forge.

Jan. 13-24 — Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

April - July, 1923 — Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

RACES

May 10 — Berlin - Grunewald, German Grand Prix.

CONVENTIONS

Dec. 6-8—St. Louis, Third Annual Meeting of the American Petroleum Institute, Hotel Statler.

Jan. 15-19—Chicago, Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show.

Jan. 29 - 31 — Chicago, Annual Meeting, Automobile Electric Service Association, Congress Hotel.

S. A. E. MEETINGS

Metropolitan Section

Dec. 14 — Speaker, Charles P. Grimes, Research Engineer, H. H. Franklin Manufacturing Co.; Subject, Air Cooling in Automotive Engines.

March 15—Speaker, William P. Kennedy, President, Kennedy Engineering Corp.; Subject, Trolley Buses and Flexible Vehicles for Street Railway Service.

April 19—Speaker, Edw. E. La Schum, General Superintendent, Motor Vehicle Equipment, American Railway Express Co.; Subject, Engineering Features of Fleet Operation.

May 17—Speaker, F. P. Gilligan, Secretary, Henry Souther Engineering Co., Subject, Metallic Materials for Automotive Work.

Other Meetings

Jan. 9 - 12 — New York, Annual Meeting.

Jan. 31 — Chicago Meeting and Dinner of the Society at the Congress Hotel.

Hudson Covers Field With Shortened Line

DETROIT, Nov. 27 — Hudson Motor Car Co. is now offering a line of automobiles which covers practically the entire medium-priced field with only seven models, Essex phaeton, cabriolet and coach and Hudson speedster, phaeton, coach and sedan. The prices range from $1,045 to $2,295, and in the Hudson plan each model is in a distinctive price class, the Essex closed models ceasing with the coach at $1,245 and the Hudson open models beginning with the speedster at $1,525.

The models and prices representing the complete line now are, the Essex phaeton, (five passenger), $1,045; Essex cabriolet, (single seat enclosed model), $1,145; Essex coach, (five passenger), $1,245; Hudson speedster, (four passenger), $1,525; Hudson phaeton, (five passenger), $1,575; Hudson coach, (five passenger enclosed), $1,625; Hudson sedan, (seven passenger), $2,295.

Less Benefit in Policy

In this arrangement is seen a merchandising policy which manufacturers and dealers of the country will watch with great interest, and which Hudson believes will prove of great benefit to the buying policy. By it the company will confine its manufacturing and selling efforts to a small number of cars, all of which are fast selling, and yet cover the entire field in the medium price. Each model is designed to fit a particular need, and the simplification of manufacturing problems results in prices most favorable to the buyer.

For the dealer it supplies a wide choice of cars without loading him with models with only limited buying appeal, the company declares. Factory officials declare that such a line will yield a dealer a larger net profit on a year's business than one containing more varieties of cars, some of which would be less easy to handle than others. Fitting in with the policy is the new dealer financing plan which has been selected after two years of study of such plans, and which is declared unusually economical and dependable in operation.

Warehousemen Invite Industry to Meeting

CLEVELAND, Nov. 27—Car, truck, parts and tire manufacturers who make use of the public commercial warehouse for distribution have received invitations to attend the third annual convention of the Shippers' Warehousing and Distributing Association, at the Hotel Hollenden on Dec. 4 and 5. The organization comprises traffic representatives of manufacturing companies which have warehousing problems in distribution.

Taxation, carload handling costs, methods of charging for storage, standardization of forms, pool car routing and the economics of distribution are some of the subjects on the program of the convention, which will be addressed on Dec. 5 by William A. Durgin of the Department of Commerce.

Details regarding the convention may be obtained from the association's secretary, Kent B. Stiles, editor of *Distribution & Warehousing*, 239 West 39th Street, New York City.

Issue Gasoline Coupons Pending Ruling on Tax

GREENVILLE, S. C., Nov. 27—Pending a ruling by the South Carolina Supreme Court on the constitutionality of the two cents per gallon tax enacted at the last session of the General Assembly, various independent oil companies of the state will issue two cent coupons to customers, which would be cashed in event the court decides against the tax.

Railroads Extending Store-Door Delivery

NEW YORK, Nov. 27—That the plan of store-door deliveries is making progress among the railroads is evidenced by the invitation extended by the Pennsylvania Railroad to officials of the National Automobile Chamber of Commerce to visit Kearney, N. J., Friday and inspect the experimental yard the company has established there.

Kearney is between Hackensack and Passaic and is the geographical center for the port district. The Pennsylvania has tried out store-door delivery for perishable stuff in a small way and believes it has great possibilities. By breaking bulk at this New Jersey point and trucking to New York, it is believed the public will be served much more quickly and at no more expense than the present way. In Kearney, it believes it has an ideal location for a yard such as would be necessary in putting the system into force.

Other Roads Interested

The Lehigh Valley road also is said to be contemplating trying such an arrangement with its yard at Bayonne, while the Erie has had the system operating more than nine months, breaking bulk at Jersey City and having the freight shipped by the United States Trucking Corp. to four terminals in New York City, where the consignee sends for it.

F. W. Fenn, secretary of the motor truck committee of the N. A. C. C., in speaking of the store-door delivery plan, says:

I regard the interest the Pennsylvania is showing in the store-door delivery system as most promising. I can look ahead to the time when all railroads will be using it, at which time an immense new market will be opened for the truck industry. I think the railroads will then buy liberally and maintain big fleets.

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Motor Vehicle Users Pay Bigger Tax Bill Than Railroads

Special levies against them in 1921 aggregated $341,000,000 while state and federal imposts on carriers amounted to only $276,500,000. Railroad plaint about onerous burden for highway building not well founded. Automotive freight bill heavy.

By James Dalton

MUCH ado has been made by the railroads of the country over their contention that they are being taxed heavily to provide for the construction of highways over which motor vehicles operate, free of charge, in competition with them.

This assertion has been made so often, and the propaganda campaign back of it has been conducted so skillfully that it is generally accepted as true, even by a good many motorists.

All such allegations are based on false premises. These are the facts:

The railroads of the country paid in 1921 approximately $276,000,000 in state and federal taxes. The major part of this impost was levied in the form of corporation income taxes.

The motor vehicle users of the country, in the same period, paid a total of approximately $341,000,000 in the form of special levies alone, such as registration fees, excise, gasoline, municipal and other levies. If an estimated $75,000,000 for personal property taxes is deducted, the automotive user still paid approximately $266,000,000 in special levies.

Corporation income taxes and all other general levies were paid by automotive manufacturers last year in addition to the other burdens. They logically should be included in the user's bill, because all these items finally are passed on to the consumer just as the carriers' taxes are reflected in the cost of rail transportation.

Disregarding, however, the corporation taxes paid by the automotive industry on an output with a wholesale value of $2,212,000,000, the total taxes of railroads amounted to only $10,500,000 more than the special levies alone on users of motor vehicles.

The total rural highway bill for 1921 approximated $700,000,000, although the final compilation has not been prepared by the Bureau of Public Roads. It thus appears that after deducting the item of $75,000,000 paid in personal property taxes by automotive users, their $266,000,000 in special tax levies paid at least one-third of the nation's highway bill last year.

IT should be understood, in addition that the $700,000,000 estimated for rural highway construction was not an annual charge against the taxpayer. A very large percentage of this total went into construction. This percentage is a capital charge which should properly be assessed over a period of years. The total of bond issues now outstanding against highway building is estimated at $367,687,000. This

sum is being directed into annual construction outlays and a very large proportion of the total cost of amortization and interest is being paid from motor vehicle fees.

It is apparent from these figures that any attempt to allocate to the automotive user only that part of the whole which he is paying in the form of state registration fees is entirely unfair.

IF the expenditures for municipal streets were to be included in the annual road budget of the nation, the total yearly expenditure probably would run well over $1,000,000,000. In any financial analysis, however, this amount can be largely set aside, as accepted municipal street development practice assesses the initial costs against abutting property and is a general charge common to all and profitable to all.

In many cases railroad construction in this country was stimulated through land grant subsidies. These subsidies are held to be justified by the enormous increases in land valuations which they made possible. An exact analogy to this situation is found in the case of highway development. Actual surveys made by the Bureau of Public Roads demonstrate beyond question that increases in valuation resultant from highway development range anywhere from 300 to 1000 per cent, depending upon the accessibility of the land.

While first and continued charges of railroad construction, maintenance and operation are lodged against the railroad, the railroad enjoys the sole right to the use of its property and exacts a compensation therefor. The motor vehicle enjoys no special privilege of this character as the highways are open to all alike.

In the last analysis, however, it is the taxpayer who pays the bill, whether it be for highway or railway construction and transportation. In the one case, it is true, he pays in the form of special levies or taxes, while in the other he pays a passenger or freight bill. But in either case, the taxpayer, who is the public, pays for the service and it is the public which must finally determine in what form and how he shall meet his transportation needs.

In any consideration of taxes there is one other point which should not be forgotten. That is that the automotive industry pays a very large part of the railroads' freight revenues and thus contributes liberally to the maintenance of the carriers. Here, again, figures are interesting.

Commodity statistics compiled by the Interstate Commerce Commission show that shipments of passenger cars, trucks and parts ranked fourth in 1921 in the number of carloads of manufactured articles carried by the railroads. The total was 359,472 carloads. Refined petroleum and its products came first with 983,264 carloads and it should not be forgotten that a very large fraction of these shipments consisted of gasoline used as fuel for motor vehicles.

It would seem, on the basis of these figures, that the automotive industry contributed vastly more to the railroads than the small fraction of the carriers' taxes which can be charged against highway construction.

Carrying the case still further, the freight paid on shipments of road building materials and machinery for the construction of the highways to which the carriers object so strenuously, would pay a considerable part of the total railroad tax bill.

One of the troubles with the railroads is that they have acquired the temperament of a pampered child. They were reared in the lap of luxury. They grew accustomed to having their own way in everything. They finally reached the point where they said, "The public be d——d."

Then came adversity. They had bitten the hand that fed them. They weren't accustomed to adversity and they still had the feeling that they should be pampered.

THE railroad tax bill in 1921 for the entire country was only $276,500,000 as compared with $341,000,000 in special levies alone on the users of motor vehicles, to say nothing of the corporation imposts paid by companies in the automotive industry.

These figures, obtained from official sources, show how little basis there is for the contention of the carriers that they bear an unfairly large part of the cost of building improved highways.

This article is an analysis of the comparative taxation burdens of the carriers and motor vehicle users. It shows that not only do motor vehicle users and makers pay a heavier tax bill, but that the automotive industry provides an important part of the railroad freight revenue.

That habit of thought never has been entirely overcome. It is possible to feel sorry for the railroads and more especially the owners of railroad securities because the carriers have not been prosperous in recent years, but it does not of necessity include sympathy with a dog in the manger attitude. For one reason and another the roads have not kept pace with the business and industrial development of the country. Additions to their mileage have been practically negligible. Equipment is inadequate to present needs.

It is true that there has been a remarkable development of highway transport in the last five years, but the carriers themselves were responsible in the beginning. They were unable to handle the freight offered them and shippers had to resort to the motor truck in self defense. It proved so economical and efficient that they continued to use it when the railroads had a lot of idle equipment on their hands during the lean months of depression.

CONDITIONS exactly parallel to those which gave highway transport its first impetus again prevail and the railroads are unable to carry the freight offered them. They haven't kept pace with the growth of the country and they can't handle the traffic produced by normal business conditions.

That was the genesis of highway transport of freight. The same situation holds in the passenger carrying field. The railroads have taken off many of their short-haul trains and were it not for motor cars and motor bus lines the people living in the towns called "way stations" would find their movements sadly circumscribed. These trains were taken off because they didn't pay. Another reason for the falling off in railroad passenger business has been the fact that at present rates of fare it is cheaper to travel in a bus and almost as cheap to drive one's own car.

Herein can be found the explanation, plus considerations of comfort, for the fact that 6,990,862,000 passen-

gers were carried 70,820,000,000 miles in motor cars last year, while the railroads were carrying 1,034,315,000 a total distance of 37,329,114,000 miles.

On the commercial side, motor trucks moved 1,430,000,000 tons of freight a distance of only 6,479,200,000 ton-miles, while the railroads were carrying 1,642,251,000 tons a distance of 306,755,332,000 ton-miles. It readily can be seen that the carriers get the profitable long haul business and that the short-haul freight, which is unprofitable for them, goes to the motor truck.

Battery Replaces Magneto Ignition in New Locomobile Model

SINCE the recent reorganization of the Locomobile Co. of America under the leadership of W. C. Durant a new series of Locomobile known as Series 8 has been announced. The general features of the car remain the same but important changes have been made in numerous details. It may here be recalled that some of the characteristic features of the Locomobile are the six-cylinder, low speed, side valve engine with a bronze crankcase and cylinders cast in pairs; a full-floating rear axle with radius rods and torque arm and double brake drums on the rear wheels.

A change of considerable importance is the adoption of battery instead of magneto ignition. The system adopted is the Delco dual system, consisting of two independent units, each with its own coil, breaker and distributor. With this system two sparks are produced in each cylinder at different points of the combustion chamber, thus insuring more rapid completion of the process of combustion and adding to the power and economy of the engine. The two sparks are purposely not synchronized, that over the exhaust valve being set to occur from 5 to 7 deg. earlier than that over the inlet valve, this having been found to prevent detonation. A wider speed range on high gear and more silent operation are claimed as other advantages resulting from the use of the new ignition system.

More silent operation has evidently been one of the chief aims of the Locomobile engineers in revising the design of the car, for most of the important changes have some bearing on this feature. Thus a new camshaft drive has been adopted, comprising camshaft gears of a new non-metallic material known as Textoil, manufactured by the General Electric Co. The cams have also been re-designed and the pitch of the inclines so altered that their operation is noiseless at all engine speeds, it is claimed. The spiral angle of the camshaft gears has been increased materially, to 28 deg.

Numerous minor changes have also been made in the engine. Thus, for instance, the pistons are now given greater relief, and the piston pins are secured in the piston bosses by a single pin screw extending all the way through the piston boss, instead of by two screws, as has been Locomobile practice in the past. The oil reservoir is now cast integral with the engine.

Slight modifications have also been made in the carbureter and its connection to the engine. The inlet manifold is now hot water-jacketed and is so connected to the engine cooling system as to induce a powerful circulation of hot water through the manifold jacket.

A novel principle has been incorporated in the clutch which is of the dry disk type. The driving set of disks is made of molded Raybestos and one set of metal disks is thus eliminated. In order to reduce the pressure on the driving teeth, both the internal and external diameters of the disks have been increased somewhat, and the driving disks are cut with 183 teeth on their outer circumference, with the result that the full-load driving pressure on these teeth is only about one-half pound each. There are seven disks to the clutch. Right within the clutch is a Thermoid fabric universal joint which tends to prevent chatter of the clutch due to the periodicity of the universal joints in the final drive. The pressure required to release the clutch has been reduced.

For the gearset the Locomobile company has adopted the Maag system of ground gears. These gears are used for the constant mesh, the reverse and the third speed set, the latter being the pair most used of the intermediate gears. A splined shaft has been substituted for the square shaft heretofore used. This splined shaft is ground on the sides and at the bottom of the splines, which, of course, tends to insure accurate mesh of the gears. The direct drive clutch has been changed from a four-tooth to a three-tooth design, the object being to make it possible to grind the engaging faces of the teeth by running a grinding wheel right through between teeth. With the direct drive clutch teeth ground after hardening there is absolutely no shake in this member. The teeth of the gearset are tested on the Maag tooth outline indicator and must be within 0.002 in. The pressure angle of the transmission gears is now 20 deg. instead of 14½ deg., as formerly.

Improved riding qualities are provided by a change in the spring design, whereby an increased number of leaves is provided in the springs. Each front spring has 16 leaves of varying gage, while the lower part of the rear springs has 11 leaves of the same character.

There has been no change in body styles. The chassis price is $6,800, while car prices range from $7,600 for the touring car to $11,000 for the sedan.

THE automotive division of the Department of Commerce has undertaken a world survey of various automotive products. This survey will give data on prices, preferences, prevailing types of bodies, and mechanical features and will furnish information on the sale of motor funeral cars and ambulances, motorcycles, motor boats and aviation equipment in addition to complete data on motor vehicles.

This survey will be available to exporters before the middle of the coming year. It will consist of three parts, as follows:

(a) World's Automotive Potentiality. A tabulated analysis with explanatory notes of the factors by which the automotive development possibilities of each foreign market can be gaged.

(b) World's Automotive Selling Seasons. A table illustrating the average monthly sales fluctuations in overseas markets with comments regarding the climatic and economic factors upon which these periodical changes are based.

(c) World's Automotive Sales Forecast. A bulletin issued quarterly stating the sales prospects in various markets and accompanied by a detailed analysis of the current factors based on data from the first two parts of the sales survey and on reports received from the field for this special purpose.

The Automotive World Sales Survey will enable the American automotive exporters to work foreign markets more scientifically and consequently create more effective take-ups for the sales fluctuations here and abroad.

Novel Body Design Features Shown at Automobile Salon

Two special collapsible cabriolets are exhibited. Disappearing steps on one body. Four-wheel brakes and overhead camshafts prominent on foreign cars. Closed models predominate. Phaetons have sport model characteristics. Twelve foreign makes present.

Facts About the Automobile Salon

Number of exhibitors	38	Models shown (continued)—		Chauffeur driven	41
Car manufacturers	19	Broughams	12	Owner driven	30
Cars by coachmakers	7	Phaetons	11		
Coachwork exhibits	12	Sedans	10	Open models	14
		Landaulet sedans	4	Closed models	57
Models shown	83	Roadsters	2		
Stripped chassis	12	Coupes	2	Foreign cars	12
Berlines	13	Landaulet berline	1	Domestic cars	14
Cabriolets	13	Phaeton with victoria top	1		

THIRTY-EIGHT exhibitors show 83 kinds of high-priced coach and chassis work at the Eighteenth Annual Automobile Salon, which opened at the Hotel Commodore, New York, on Dec. 4. Seventy-one different body models appear this year as against 60 last year, while the present exhibit exceeds previous ones both in beauty and size.

Features of the show include novel collapsible sashes on the new Rubay and on the Voisin, disappearing steps on a luxurious Isotta-Fraschini body, a distinct trend toward overhead camshafts in the European cars, a Lancia chassis of unusual design and a general increase in completeness and refinement of all body appointments.

There are 12 foreign and 14 domestic cars shown, while 12 coachmakers have special body exhibits. Cabriolets and berlines are again the dominating body types as they were last year, but there is a distinct increase in the number of broughams and sedans in this exhibit. Closed models outnumber open models by 57 to 14, this proportion being about the same as usual at Salon exhibits.

A surprisingly large number of owner driven cars are shown, considering the type of buyer to which the Salon cars appeal. Of the 71 body models, 41 are chauffeur driven, while 30 are owner driven. Some of the cars which are listed as owner driven, however, might readily be chauffeur driven if so desired.

Practically all of the phaetons have many of the characteristics of a sport model, including bright colors, many accessories and generally racy lines.

From a domestic viewpoint, the new Rubay line is perhaps the most interesting, since it comprises the only entirely new domestic cars in the Salon. Foreign countries represented include England, France, Germany, Belgium, Italy and Spain. American cars shown include Brewster, Cunningham, Rubay, Daniels, Duesenberg, Rolls-Royce, Winton, Cadillac, Packard, Lafayette, Lincoln, Marmon, Locomobile and Peerless. Foreign exhibitors are Benz, Fiat, Hispano-Suiza, Hotchkiss, Isotta-Fraschini, Lanchester, Mercedes, Minerva, Panhard, Sunbeam and Voisin.

Many of the high grade closed cars exhibited carry the spare tires or spare wheels at the side of the car, owing to the fact that they have a trunk rack at the rear. Access to the trunk would be difficult if there were a spare wheel behind it.

An outstanding feature in body construction is the use of raised panels permitting the effective use of two colors. There are several cars embodying this feature. In one instance the raised panel extends from the forward end of the hood, gradually widening until it extends the whole width of the cowl and then runs along the top of the side panels. In one case the effect is accentuated by beading marking the outline of the panel. Both the raised panel and the bead are formed integral with the parts on which they appear.

Collapsible Cabriolets

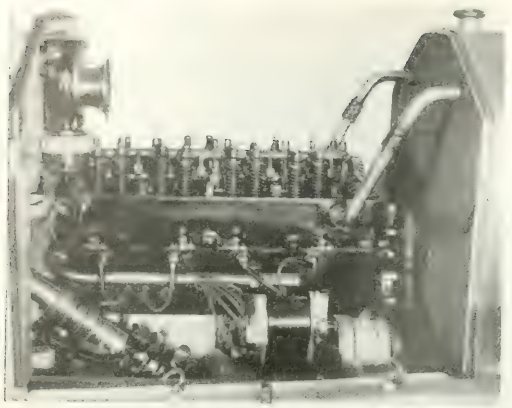
Two fully collapsible cabriolets are shown in which the front portion is entirely inclosed by glass in such a way that the vision is interfered with to a minimum. One of these is a French body by Million-Guiet and the other is by Leon Rubay. In the Million-Guiet body, which is mounted on a Voisin chassis, the front glasses are divided along the vertical center line and swing around hinge rods which take the place of the corner pillars. The glass in the door is also in two parts and is arranged to slide, so that the space over the doors can be half opened if desired.

When it is desired to drop all glasses, those in front are first swung through an angle of 270 deg. until they lie alongside of the side glasses and the hinge rods are loosened at the top and the assembly is dropped by a swinging motion into the front door, which is made with

Wide Variety of Bodies Shown at the Automobile Salon



1—*Locomobile.* 2—*Lanchester.* 3—*Rubay with collapsible side panels.* 4—*Duesenberg.* 5—*Peerless with new windshield construction. LeBaron body.* 6—*Isotta-Fraschini with disappearing door.* 7—*Voisin with collapsible side panels.* 8—*Lafayette with LeBaron body.* 10—*Peerless with Brandes-Ostruk body*



Lancia small V-8 engine with overhead camshaft

an outer panel hinged at the bottom and opens up for the purpose of receiving the glasses. The glasses are rigidly locked and cannot rattle when down. With this arrangement of the glasses the following five combinations are possible:

1.—All glasses closed.
2.—Glasses over doors slid into open position.
3.—Front glasses swung alongside of side glasses.
4.—All glasses dropped.
5.—The whole top down.

In the Rubay cabriolet, when open the glasses are concealed in the center body panel which is made with an outer hinged member for the purpose. In putting the glasses in place, the center panel is first opened and all of the glasses on one side are then swung up by a single motion into the vertical position, the middle glass being here locked by two main locks on the side beam of the roof structure. The front and rear side glasses are folded over the middle glass and they are now swung into position, the front glass being locked to the front door and the rear one to the rear door. There are anti-rattle features on both doors.

Naturally enough, the majority of the cars exhibited are of the closed type, and among these the inclosed-drive limousine (berline) seems to be gaining in prominence. Thus Holbrook exhibits enclosed-drive limousines on a Lincoln and a Cadillac chassis with some slight differences in design. The body on the Cadillac has two glasses between the driver's compartment, and the rear, each with its own regulator in the rear compartment, while that on the Lincoln has only a single glass. There is one other difference between these inclosed drive limousines, in that on the Lincoln the extra seats in the rear compartment are concealed or disappear in the back of the front seat when folded up, while in the Cadillac they do not.

Lancia Chassis

A chassis of somewhat unusual design and which has not been seen in this country previously, is the Lancia eight with the two sets of cylinders at an angle of only 14 deg. Both sets of cylinders are in a single casting and there is nothing in the outside appearance of the cylinder block to indicate that the engine is of the Vee type. Between the throws of the crankshaft there is an angle of 46 deg. and this is said to insure evenly-spaced explosions. The water pump is mounted in front instead of back of the front engine supporting arm, a change made to render the pump more accessible. An expanding type of transmission brake has been substituted for the contracting type. A very substantial torque arm of pressed steel channel section is used. Its rear end is of the same diameter as the rear axle center housing and is clamped between the two halves of this housing. The axle housing is built up of malleable and drawn steel parts, with substantial ribs on the center housing, and the various parts are welded together instead of being riveted. The flywheel is of the fan-spoked type and of unusually large diameter, especially for an eight-cylinder engine. It is cut with internal teeth for the starting motor.

The electric system on this car is of Robert Bosch make and is an eight-volt system. All switches are on top of the steering wheel, and therefore in a very handy position. At the center of the steering wheel is the usual knob or button for the horn. In this case, however, this knob has a rotating in addition to an axial motion. When pressed down it operates the horn, and when turned it shuts off the magneto in one position and switches on the dash lamp in the opposite one. Directly below this knob and concentric with it is a finger wheel which can be turned around its axis and has four operating positions. In the first position the generator is set for a double charging rate; in the second position the side lights or dim lights are turned on; in the third position the headlights and dim lights are both turned on, and in the fourth position all lights are turned off.

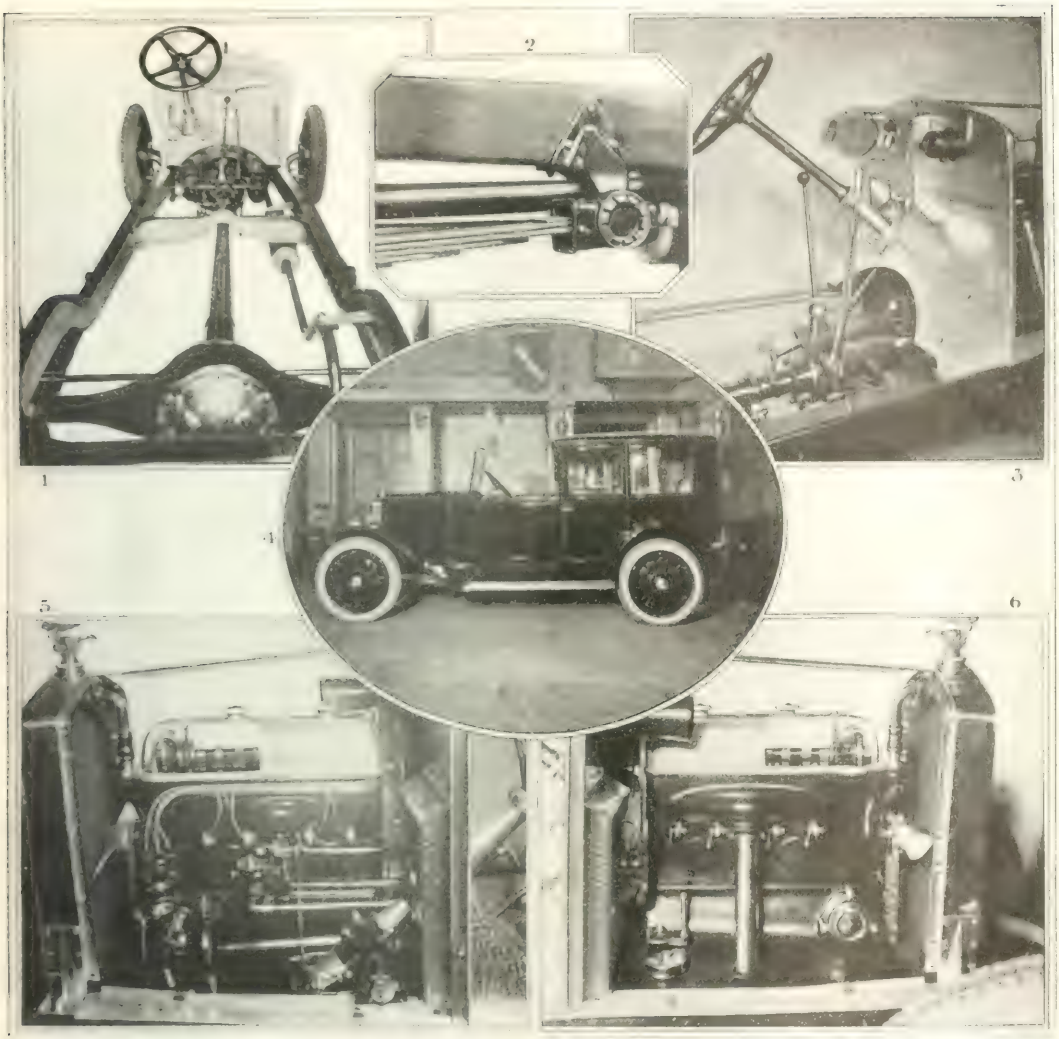
Overhead Camshafts Common

The exhibits at the Salon emphasize the prominence which the overhead camshaft engine has gained in the high-priced field, both here and abroad. Engines with overhead camshafts are seen on the Duesenberg, Hispano-Suiza, Hotchkiss, Lanchester, Mercedes and Rubay stands. The Mercedes is shown in a single six-cylinder chassis only, and though this design is not strictly new a few observations on technical features may prove of interest. The cylinders are made of forged steel, in pairs, and the overhead camshaft is driven through a vertical shaft at the front. Two carbureters are provided, one supplying the three forward and the other the three rear cylinders; there is, however, communication between the front and rear manifolds, which may be intended either for purposes of equalization or to make it possible to operate all six cylinders from either carbureter if the other should fail. The carbureters are of the concentric type and draw all of the air from an air stove around the horizontal portion of the exhaust manifold on the opposite side of the engine. A pipe extends vertically down from this stove and then bifurcates and passes underneath the crankcase to the opposite side, where each branch connects to one of the carbureters at the bottom thereof. Front wheel brakes are fitted in addition to the rear wheel and transmission brake.

Judkins & Merrimac exhibit two bodies of the sedan-limousine type on a Lincoln and a Cadillac. These are four-passenger bodies and the rear seat is divided. A feature of the design is an adjustable sunshade, the adjustment being made by a rod sliding inside a tube and being fixed in any position by means of a set screw. There is a trunk rack at the rear, and in this case—which is somewhat unusual—the spare tires are carried back of the trunk rack.

Cunningham exhibits a new model 115-A, a three-quarter collapsible five-passenger cabriolet. Only the portion of the top behind the doors collapses, and this part is made of Burbank material.

An entirely new chassis is exhibited by Leon Rubay. It is of distinctly foreign type and was designed abroad



1—View of Rubay chassis. 2—Detail of Rubay spring suspension. One end of each spring instead of being shackled, slides between hardened steel rollers. 3—Control members and instrument board on Rubay chassis. 4—Rubay towncar. 5—Left side of Rubay engine showing aluminum dashboard. 6—Right side of Rubay engine with overhead camshaft partly exposed

by a French engineer, but the design has been gone over here with a view to adapting it to American production methods, and the car will be manufactured in Cleveland. It is an example of the type of car now popular in Europe, with small-bore, high-speed four-cylinder engine, and should show very low fuel consumption.

The engine has cylinder dimensions of 2¾ by 5½ in. and is so geared as to insure the maximum fuel efficiency at around 25 m.p.h. The cylinders are cast in a block which is mounted on the aluminum crankcase, the latter being provided with a web extending to the frame side members, thus closing off the space beneath the crankcase. This helps to give the engine a very "clean" appearance. Water and oil connections are cast integral with the crankcase, and there is practically no outside piping. The crankcase oil drain is operated by a lever above the crankcase web, and the oil gage is located right alongside this drain lever. The overhead camshaft is driven by helical gears from the crankshaft at the forward end. Each valve rocker arm has a separate spring. Oil is supplied to the cams and rocker lever bearings by force feed. The camshaft drive gears at the top of the vertical shaft run in a bath of oil, which is maintained at such a level that the pinion is constantly submerged, the hollow vertical shaft serving as an overflow and return pipe. In order to obtain a straight-line drive, the engine is mounted at a slight angle in the fore and aft direction. The cylinders are offset ⅞ in. Lynite pistons and connecting rods are used. The engine has three main bearings.

The air pipe from the stove on the exhaust pipe passes through the engine. A machined cast-aluminum dash is provided and has the instrument board as well as the steering column secured to it. All wiring is concealed between the dash and the instrument board. The vacuum tank, at the forward side of the dash, is half concealed in a recess in same. There is a valve at the bottom of the vacuum tank which can be shut off and locked from inside the car. The entire electric system, including battery ignition, is of American Bosch make. The carburetor is a Rubay-Stromberg.

Special attention deserves to be called to the neat layout of the instrument board. On opposite sides there are round bases with two levers each, which look like switch handles, those on opposite sides being rigidly uniform. The levers on the right-hand side control the ignition and the lights, while those on the left-hand side control the starter and the choke. There is also a central instrument panel on the board and this carries an oil gage, ammeter, fuel gage, clock and speedometer.

Single-Plate Clutch

The clutch is a single-plate type running in oil. There is nothing unusual in the three-speed and reverse gearbox, which is combined with the engine into a unit power plant. Generator and starter are located back of the bell housing on opposite sides of the gearbox, quite symmetrically. The generator is driven from the crankshaft through a silent chain with eccentric bushing adjustment for tension and wear. A feature of the generator mounting is that the generator can be removed without disturbing the drive.

Owing to the fact that the engine is tilted for a straight-line drive, only a single universal joint is used at the forward end of the propeller shaft. It is inclosed in a spherical housing at the rear end of the gearbox and receives its lubricant from that box. The rear axle is of the full floating type, having a pressed steel housing with the usual two large openings at the center. The rear plate is the gear carrier, and when it is removed the entire differential and bevel-gear driving set comes with it, there being a splined joint in the propeller shaft some little distance ahead of the bevel pinion. One advantage of this construction is that the bevel gears of the final drive can be accurately adjusted away from the axle. Timken roller bearings are used throughout the rear axle.

Novel Spring Suspension

There is a novel point in the spring suspension which comprises half-elliptic springs at both front and rear. The rear end of the front and the front end of the rear springs instead of being shackled in the usual manner, are rolled out flat and pass between two hardened-steel rollers which are neatly encased in the spring brackets and provided with means for lubrication. The car is provided with four wheel brakes mechanically controlled. These brakes are of Rubay design and both sets are equalized. Steel ribbons are used for the brake connections, instead of round rods. The brake drums are made of aluminum castings which have a steel lining cast into them, while the brake shoes, also of aluminum, are provided with the regular asbestos fabric facing. By means of the brake pedal all four brakes are applied simultaneously, while the hand lever applies only the rear brakes. The front brake actuating shaft is concealed within the modified I section front axle. The Dot pressure lubricating system is used for chassis bearing parts, including the spring leaves. These receive lubricant through a hollow center bolt, the wall of which is drilled with holes to feed into the spaces between adjacent leaves. The car has a wheelbase of 118 in. and is equipped with 32 by 4-in. cord tires. It will be furnished with five standard bodies, all of the closed type.

The Winton company has this year brought out a five-passenger sedan to take the place of the four-passenger sedan of previous years. The chief object in bringing out this new design was to provide additional leg room in the rear compartment. It is built on a chassis of the same wheelbase as the seven-passenger Winton sedan but is close-coupled. This brings the rear seat farther forward and enhances its riding qualities, and at the same time gives space in the rear for a good-size trunk, for which a rack is provided. This is of somewhat unusual construction. The floor of the body is extended back of the rear compartment over the fuel tank and is provided with wooden slats on which the trunk can rest, while the rear of the body has the usual metal bar protectors.

J. Frank de Causse, who is body designer for the Locomobile Company of America, has an exhibit of Locomobiles with various types of body. A feature at this booth that attracts attention—though we believe it is not entirely new—is an open car with a spacious cowl for the rear seat, which is hinged to the top of the front seat back and swings out of the way when the passengers enter or alight. This cowl extends back as far as the rear edge of the rear door, and together with a sloping rear windshield extending from its rearward edge, and a Victoria top gives almost as much protection as a closed body.

New Rubay Voiture de Ville

One of the most extensive exhibits at this year's show is that of Leon Rubay. This is really in two sections, one featuring the chassis and the all-collapsible cabriolet and the other out in the hall, comprising other closed-body models. One feature of all of this year's Rubay models is wooden running boards in natural wood finish, with longitudinal grooves and drain holes. These running boards are provided with protection bars of nickel.

The Benz exhibit contains both four and six-cylinder models with Fleetwood bodies. One is an inclosed-drive limousine with gold trim, another a town brougham and a third a six-passenger de luxe cabriolet.

Hume of Boston exhibits a four-passenger sedan embodying several features of interest. The rear seat is divided, but the partition can be removed and the car then accommodates five passengers. This body is of the soft-roof type, which latterly seems to be coming into favor with numerous body builders and presumably also with the buying public. The construction is of what is known as the skeleton type, the ribs or bars supporting the soft material being exposed to view from the inside. There are two advantages to this construction. It obviously gives a materially lighter body than a solid roof would, and, besides, it does away with the rumbling noise which is so objectionable with some forms of solid-roofed bodies. Hume has been building this type of roof construction for some time, but in the model exhibited one important change has been made. Formerly the soft material extended to the edge of the roof and overlapped the metal sides, but now the metal is carried over the edge and extended across the roof for about 6 in., where it joins the soft material. The joint is covered by a bead set in cement. The roof ribs are made of ash, the same as the rest of the body, but are stained to match the interior trim of American walnut. In order to increase the angle of vision through the front corner glasses—the front glass being sloped—the front pillar of the door frame is beveled off or made triangular in section. Inside the front compartment forward of the door frames there are

Body Details of Cars Exhibited at the Automobile Salon



1—*Interior of Brewster body on Lanchester car. This is a two-door sedan, one door being located on the left front and the other on the right rear.* 2—*Interior of new Locomobile body.* 3—*Interior of Healey phaeton body on Cadillac.* 4—*Novel tire carrier on Isotta-Fraschini.* 5—*Distinctive radiator marking of the new Rubay.* 6—*Showing how side glasses are concealed in central body panel of Rubay cabriolet.* 7—*Isotta-Fraschini, showing disappearing step.* 8—*Arrangement of glass on Million-Guiet all-collapsible cabriolet.* 9—*Hume body on Marmon, showing divided rear seat*

cabinets on both sides for towels, licenses, maps, etc. The material chiefly used for these soft or ribbed roofs is what is known as Burbank.

Le Baron, a New York coach designer, has an exhibit of several bodies, besides being represented at stands of body builders. One of the cars at the Le Baron stand is a special five-passenger sedan built by the Bridgeport Body Co. It has a glass in front of the vizor which is intended to insure good ventilation of the front compartment without exposing the occupants to the weather. The upper half of the windshield can be swung at an angle of 45 deg. for instance, in which case the air will enter between the front glass and windshield top half, pass through the front compartment and leave through the opening between the halves of the windshield, it is claimed. The windshield may also be opened just enough to get the clear vision effect. Another advantage claimed for the front glass is that it serves to keep the snow off the windshield.

Another model shown is an all-collapsible cabriolet with skeleton construction and covering of Burbank material. There is thus just one thickness of material instead of leather on the outside and cloth on the inside, as has been the usual construction so far. All fittings of this body are leather-covered. There is also exhibited a town car or brougham for five passengers. A raised panel is worked into the metal of the hood and cowl and gives opportunity for an unusual color effect. This feature has been extensively made use of by Le Baron the past year.

Brewster Coupe

Brewster shows a four-passenger coupe with what he considers the best seating arrangement for a small job. There is an individual seat for each of the passengers. The rear seats swing up out of the way when not in use, while the front seats are of the bucket type of pressed-steel construction. There are only two doors, staggered, one in front at the left, the other at the rear on the right. The driver's seat is adjustable while the other front seat is fixed in position.

The windshield is of special construction and is of what is referred to as the retreating type, that is, it leans forward. It consists of three glasses, the top and bottom ones being permanently fixed in position, while the middle one is adjustable. The joint between the intermediate and lower glasses is curved upward. It is claimed that this glass gives a rain vision effect and good ventilation, and kills any glare from the sun. The body has a skeleton finish and soft roof, the trim being in natural ash. The construction is exceptionally light all through, and another desirable feature is the great visibility. There is a pressed metal ventilator in the roof and a rectangular glass in the rear. The body is finished with Brewster oil finish in two shades of brown and striped in burnt orange. The interior trim is in brown vici kid and the seats are covered with box cloth.

Fleetwood Bodies

Brewster also exhibits an enclosed-drive limousine, a town landaulet and a brougham.

Fleetwood, besides having its own exhibit of body models all mounted on chassis of well-known makes, is represented by bodies on the stands of many importers and domestic car manufacturers. The only thing strictly new on the Fleetwood stand is a combination stopping signal, rear light and parking or backing light. This consists of a cylindrical metal case having the word Stop stenciled out in the upper portion of the front, and red and clear-glass lenses in the lower part. The concern also shows a combined ventilator and dome light, the ventilator openings being around the base of the dome lamp.

Locke & Co. have recently been appointed agents for the French Hotchkiss car, which they show in both the four and six-cylinder models, of 12 and 30-hp. French rating respectively.

On the Rolls-Royce stand there are a number of different types of cars on display, a feature being made of the suburban limousine seating seven passengers, which is regarded as a family model and is made roomy and comfortable in both the front and rear compartments. The new open model brought out last spring at the time of the price revision is also shown.

Sport Model Features

Demarest & Co. show a sport model on a Peerless chassis, which has a feature in the form of a compartment behind the seat adapted to take two golf bags. There is a door on each side of this compartment and an automatic light inside is extinguished as the door is closed. The space back of the two-passenger rumble seat is used for a lunch kit and an ice box. This is a Le Baron design and contains the raised panel feature, the panel extending forward to the rear edge of the hood only. The edge of the rumble seat enters a channel in the rear deck, and any water that gets in is caught in this channel and led off through a copper tube.

Brooks-Ostruk show a completely collapsible cabriolet with a raised panel on the hood, cowl and sides. There is also an integral raised bead on the edge of the panel, heightening the effect sought by the panel. A special wheel carrying device of great rigidity is shown. It consists of two rods extending to the frame side rail. The bases of these rods hook over the top edge of the side rail and are secured in position by a single bolt each. There are tortoise-shell moldings on the doors and windows and the other fittings are made to match. Two disappearing seats slide under the driver's seat when not in use, and they need not be drawn all the way out if the person occupying one of them desires to sit sideways. Another model shown is a cabriolet with half length running board in front carrying a tool box and a separate step for the rear compartment. At the front of this step there is a small fender which together with the rear fender gives a coach effect. All interior fittings of this model are of 14-carat gold. The fenders are only very slightly crowned to give the effect of leather fenders.

Bus Service in Shanghai

A MOTOR bus service has been inaugurated in the international settlement of Shanghai, carrying passengers from the lower part of the town to Jessfield, a distance of five miles, for a fare of $.30 silver, according to a report to the automotive division of the Department of Commerce.

A motor bus service between Changsha and Siangtan has been started by a French company with head offices in Hankow. The company has 24 cars available and the service will be extended from Siangtan westward over the road built by the famine refugees.

Six German Benz buses have been bought for a Foocho motor bus service and will arrive in Shanghai shortly.

An auto bus line has recently been established between Mexico City and Cuernabaca in connection with the hotel resort at the latter place. This service is operated by Americans.

Special British Design Features Shown in Three New Models

Two detachable heads on engine of six-cylinder Star facilitate handling. Daimler adopts single plate clutch and trussed steel body frame. Talbot engine accessories arranged in novel manner. Battery ignition gains in use.

By M. W. Bourdon

SPECIAL design features appear on three new British cars which are of particular interest to American engineers. On the new Star six-cylinder car, with 2.72 x 5.12-in. cylinders, cast in a block separate from the crankcase, two detachable heads are used, each covering three cylinders. It is admitted that this arrangement adds slightly to production costs, but it is held that the greater ease of handling the smaller units and of remaking the smaller joints warrants this extra cost.

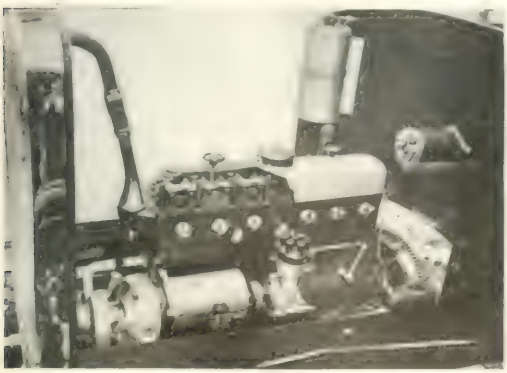
The unit power plant system is utilized, the upper part of the two-part crankcase having four arms with web extensions to the frame. On the left-hand web are mounted the water pump and magneto in tandem, while on the right the steering casing is carried on an upright integral bracket. A feature of the gearset casing is the provision of a "tunnel" serving as a support for the starting motor. The motor casing is a sliding fit in this tunnel and is held firmly by two drawbolts grooved to accord with the periphery of the casing, where they would otherwise "stand proud" within the latter.

Fabric disk joints are used for the open propeller shaft, but a point of note is that one of each pair of spiders has a projecting central boss made slightly spherical to enter a sleeve extension of the other spider and form a pilot bearing. It has been found with high-speed engines that a great deal of vibration may be caused owing to the disk failing to keep the propeller shaft in axial alignment with the driving shaft. Obviously, a propeller shaft rotating at 2000 to 3000 r.p.m. an eighth of an inch out is a serious matter. The provision of pilot bearings for the pairs of spiders is a comparatively simply way of overcoming the defect.

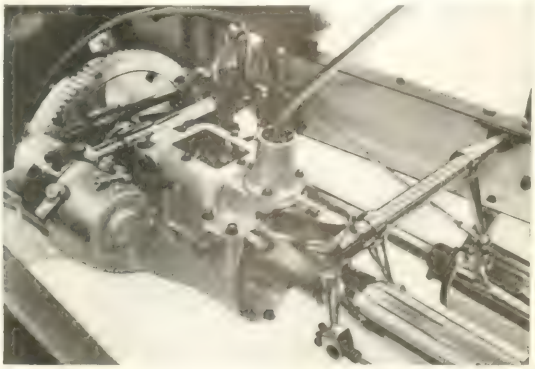
Daimler and B. S. A.

Several of the new Daimler and B. S. A. models use battery ignition, and the ignition system on these cars comprises an automatic switch controlled by the vacuum in the inlet manifold which cuts off the ignition current when the engine is "killed." In the case of the 12-hp. Daimler Six, which has 2.32 by 3.7-in. cylinders, the extraordinary low rear axle ratio of 6.17 to 1 has been adopted, which gives a road speed of only 30 m.p.h. at 2100 r.p.m. of the engine. The same ratio is used with the 16-hp. model, which has a somewhat larger wheel diameter.

Among the features common to all new Daimlers is a valve in the water inlet pipe to the cylinders to control the engine temperature, and in the largest model this is supplemented by a thermometer on the instrument board. The circulation control valve is coupled to the mixture control valve and is in operation only when a rich mixture is given for and after starting from cold.

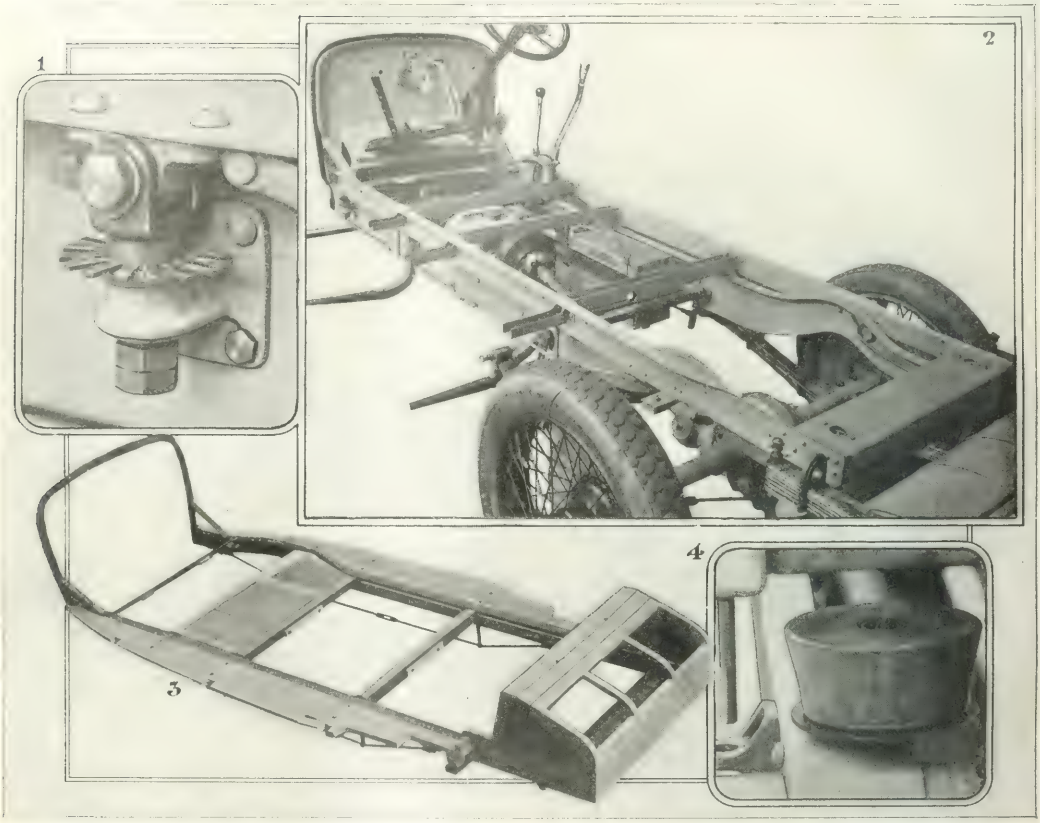


Engine of six-cylinder British Talbot

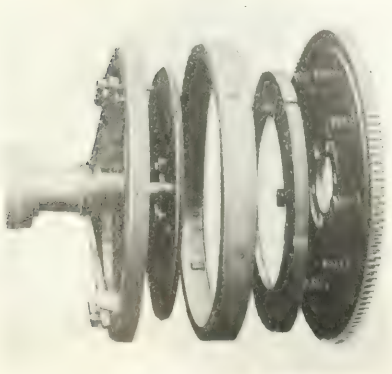


Gearset of new Talbot Six. Note enclosure of universal joint in rear end of casing

Daimler "Insulation" of Bodywork



Figs. 2 and 3 show pressed steel frame forming bodywork foundation attached to Daimler. Figs. 1 and 4 show front end hinge fitting and rear end bumper support which serve as a means of anchoring the special frame to the chassis frame. This is the Daimler practice to "insulate" the body from the chassis and to protect the body from frame distortion



New Daimler single plate clutch in parts

The cone clutch, which has been used hitherto on Daimler cars, has been replaced by a single plate type. The actual flywheel is merely a steel disk with external teeth for the starting motor, the clutch casing, a separate cast-iron ring supplementing the function of the disk flywheel. Nine springs are used, these being non-adjustable and inclosed, with abutments consisting of pressed steel cups sunk through the flywheel disk. The friction surfaces are of fabric, one ring being secured to the driven plate and the other to the back cover.

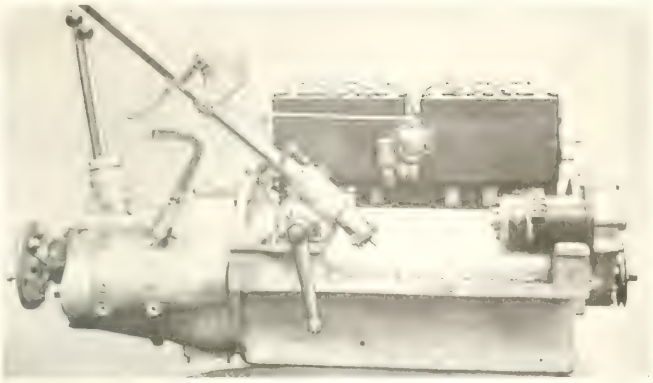
Body "Insulated" from Chassis

For many years past it has been Daimler practice to "insulate" the bodywork from the chassis by supporting it at four points—two front and two rear, with intervening rubber buffers. In order to carry out more completely this plan of mounting the body on the frame so that it is practically unaffected by frame distortion, all types of bodies are now being erected on a special channel steel frame of their own, this frame forming the

foundation of the body and remaining permanently an integral part of it; the system of anchorage to the chassis frame will in future comprise rubber buffers at one end and a hinge at the other end.

As usual, in new overhead valve designs, the pushrods on the six-cylinder 2.24 by 3.74-in. Talbot engine pass down through channels formed in the cylinder block, the latter in this case being integral with the upper half of the crankcase. The lower half of the crankcase in aluminum is continued rearwardly to form the clutch pit and bottom half of the three-speed transmission casing, this part housing the layshaft bearings, while the separate top half supports the central gearshift lever.

Projecting rearward from the gearcase is an overhanging bracket supporting one end of concentric brake shafts, the other ends being supported by the frame side members. The inner shaft carries the hand lever at its outer end. Two brake coupling rods run back closely adjacent under the torque tube to equalizers under the bevel pinion extension of the axle.



Right side of Star Six. Note tunnel for starter at right of gearset case

Reverting to the engine, aluminum pistons are used, as are battery ignition and pump water circulation. The generator and distributor are separately mounted on the left side, being driven in tandem. Water pump is in line with these units but in front of camshaft gear housing.

New Type of Cylinder Boring Machine

THE machine herewith illustrated was originally developed for boring the individual cylinders and finishing off the head end of air-cooled engines. However, according to the designers, it can also be used for boring block-cast cylinders, and in case these have a separate head the machining time is materially reduced.

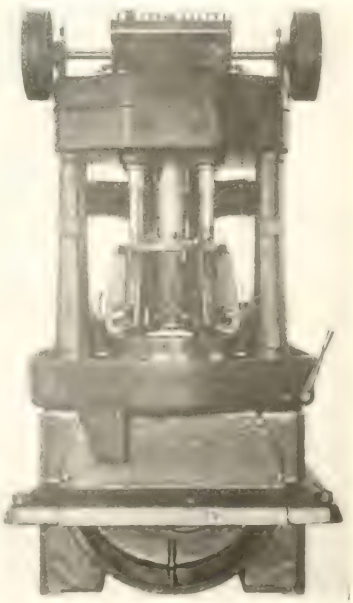
Three separate cuts are taken in boring a cylinder, and two in finishing the head. There are five spindles which rotate about their respective axes but are stationary in space, and all five cuts are taken at the same time in separate cylinders. The work is mounted in a rotary fixture having six positions, five working and one loading position. Loading and unloading are accomplished while cuts are being taken, so that only the time required to index the fixture counts as lost time. The work holder and work are fed upward onto the cutting tools by a cam, which makes it possible to obtain a quick return, a quick approach, uniform boring, a reduction in feed for finishing the head of the cylinder and a dwell for the final finish of the head. The time required for boring a 3¼ in. cylinder 9 5 32 in. long and finishing the head is given as 1½ min.

Among the advantages claimed for the machine is that the cutters and fixture are held rigidly in an accurate relation. This is due to the use of a large diameter pilot which is integral with the head of the machine and pilots in the ram which is actuated by the cam and on which is mounted the rotating fixture. The use of cam feed makes it possible to obtain a very quick approach, a variable feed and a quick return.

In order to keep the cylinders at a substantially constant temperature throughout the boring operation, a coolant is pumped through the spindles and discharged adjacent to the cutting tools onto the surfaces to be machined. The fact that the coolant passes through the spindles ends to maintain these at a constant temperature and to maintain a constant clearance between the spindles and their bearings. Chips are washed away by the coolant almost as soon as they are formed.

The machine is semi-automatic, the only duty of the operator being the loading and unloading of the work while the machine is in operation, the indexing of the fixture when the machine comes to rest automatically at the end of the quick return, and throwing in of the clutch after the fixture has been indexed.

The machine described is of considerable size, measuring 8 ft. 2 in. in height to the top of the pulley and occupying approximately 5 ft. square of floor space. It was designed by O. C. Kavle and L. W. Moulton and is now in production.



Kavle & Moulton cylinder boring machine

Just Among Ourselves

Motor Vehicle Sales Follow New Roads

MOTOR vehicle sales follow road improvements just as commerce followed the railroads in the old days when railroads were making extensions. Every mile of improved highway means a new potential market. Factory sales departments might find it profitable to study road building maps, especially in States where large sums are being expended. If distributors and rural dealers are not profiting from these improvements they are overlooking a lot of bets. Whenever a good road goes by a farm house, the occupants of that house will want a car or truck, or perhaps both, and they will buy them just as soon as they can get the money. The chances are about 50-50 that they have enough money right now.

British Manufacturers Cut Prices to Get Sales

BRITISH motor vehicle manufacturers have made up their minds that if they ever are to get their factories into anything like normal production they must follow the example of American producers and reduce prices. There have been many cuts of late. These apply both to new and used vehicles. The reductions range from $200 to $5,750. Manufacturers say they have been made possible by improved methods of production, lower prices for materials and lower wages for mechanics. Lack of demand probably has been the impelling motive, however. American-made cars also are cheaper and they are getting the lion's share of business. Wealthy Britons, paying to the Government in taxes a large part of their incomes, do not find it possible to indulge their fancy for deluxe cars. Going to the other extreme, motorcycles are as popular as ever. British makers have been disturbed by an unconfirmed report that Henry Ford will place a motorcycle on the market at $100.

Automotive Industry Jumps Far Into the Lead

THE automotive industry now is so far ahead of all rivals in the dollar value of its manufactured products that it no longer presents a comparison but rather a contrast. The following figures on the dollar values of 1922 production for the ten leading industries have been compiled by the Bureau of Foreign and Domestic Commerce, Bureau of the Census and the Bureau of Mines.

Automotive industry	$2,865,000,000
Petroleum	2,050,000,000
Meat packing	1,935,000,000
Foundry	1,900,000,000
Lumber and timber	1,675,000,000
Iron and steel	1,650,000,000
Clothing	1,530,000,000
Flour mills	1,275,000,000
Cotton goods	1,250,000,000
Boots and shoes	1,100,000,000

The total for the automotive industry is sub-divided as follows: Cars and trucks, $1,490,000,000; replacement parts, $550,000,000; tires, $675,000,000; accessories, $150,000,000.

Warns Dealers Not to Strain Their Credit

G. BREWER GRIFFIN, manager of the automotive department of the Westinghouse Electric & Mfg. Co., is an optimist on the farm market.

"We are watchfully optimistic regarding the automotive vehicle business for 1923," he says, "as the general business of the entire country promises to be better than during 1922. Most cars sold this year have been sold in cities and large towns. It is thought the small towns and farmers will begin to buy shortly after the first of the new year.

"But dealers must be careful not to overextend their credit capacities by sales on too low initial payments and too long-time payments if the support of local banks is needed or expected. There is a danger to dealers in selling cars to 'good moral risks' who have no fixed income, unattached real estate or nothing beyond a small salary or wages."

Doctor Can't See Why Schwab Loves Life

CHARLES M. SCHWAB has a sense of humor as well as a genius for business. He gave an inspirational talk the other day in Indianapolis to Stutz dealers and distributors in whom he has become much interested since he took financial control of the company. In telling of his plans for holding similar meetings frequently, he said he recently told his doctor that if he could be assured of living twenty-five years there were a lot of things he'd like to do.

"Do you smoke?" asked the doctor.

"No," replied Schwab.

"Do you drink?"

"Rarely."

"Have you any other vices?"

"No."

"Then," snapped the doctor, "why in blazes do you want to live twenty-five years?"

What Good Is Salesroom Without Salesmen?

AN illustration used by Schwab points a moral for a good many motor-car dealers.

"One day Mrs. Schwab and I were out walking in New York," he said, "and chanced to pass the ——— salesroom (naming a very expensive car). There in the window stood one of their magnificent automobiles selling around $15,000. We looked over the car, my wife and I, but there was no sign of a salesman

More or Less Pertinent Comment on Topics of Current Interest to Men in the Industry

near it. No one seemed to care whether we received any attention or not, and we walked out of the store.

"I turned to my wife and said, 'Those people may build one of the finest automobiles in the world, but they run their business in a rotten way, and I wouldn't have one of their ——— machines for love or money.'"

Have you ever been in a sales room where the atmosphere was somewhat the same?

Doherty Has a Scheme To Aid Trolley Lines

HENRY L. DOHERTY, who operates public service corporations all over the United States, believes in monopolies. He admitted it in a speech in Detroit not long ago. For one thing, he thinks there is an oversupply of taxicabs in the congested districts of most American cities and that service in other sections is a vacuum. He believes exclusive franchises might improve conditions. Another of his suggestions is that street railways could be used to do a large part of the delivery of goods in congested cities, especially at night. This would apply particularly to what "now requires heavy trucking." Doherty operates a good many street-car systems and the idea isn't a bad one—from his point of view.

Doesn't Want Drivers With "Telescopic Vision"

HEALTH COMMISSIONER COPELAND of New York, United States Senator-elect, strongly advocates rigid vision and hearing tests for all applicants for licenses to drive motor vehicles, particularly taxicabs and motor trucks. He is an eye and ear specialist and headed one of the draft boards during the war. In this work he discovered that many men whose vision was good enough to see one particular thing could not take in other objects at the same glance. This is what is called "telescopic vision." He contends that a man with "telescopic vision" should not be permitted to drive such a vehicle as a taxicab. Perhaps he's right.

Railroads Optimistic But Is It Justified?

RAILROAD managers assert they have turned the corner and that freight congestion will be less serious from now on unless there is an exceptionally early and severe winter. They do not contend that their troubles and those of shippers are over but merely that they are getting untangled. Some of the congestion in yards has been relieved and more traffic is moving. It remains to be seen, however, whether their optimistic feeling is justified. It is significant that the peak of car loadings for the year seems to be past and that there has been a considerable shrinkage in the last few weeks in offerings of miscellaneous freight and merchandise. A decrease also is shown in the freight-car shortage but it may be accounted for by the decline in offerings of freight. Unless there is an unexpectedly heavy falling off in the volume of freight traffic, the car shortage probably will last for several months.

Farmers Will Buy But Only at Fair Price

THE automotive manufacturer who overlooks the fact that the buying power of the farmers of the country next year will be between $1,250,000,000 and $2,000,000,000 more than it was after the harvest of 1921, will be making a grave mistake. The current report of the Department of Agriculture shows the value of the twelve leading crops to be approximately $6,000,000,000 as compared with $4,700,000,000 at this time last year. Values of crops still in the hands of farmers are going steadily higher. This applies especially to wheat and cotton. There are even predictions of 50-cent cotton, although it is to be hoped it will not go as high as that. The farm market will be a mighty good one in the next year but it must not be forgotten that it will be a buyers' market and the people who get the business will be the ones who give the farmer what he wants at what he thinks is a fair price.

Ford Will Give Time to Power Projects

ONE of the interesting angles in connection with reports that Henry Ford has practically completed negotiations for the purchase of nearly 200,000 acres of coal lands in eastern Kentucky and western West Virginia is the assertion that he proposes to construct a double-tracked electric railroad from some point in Kentucky to the Atlantic seaboard. Ford has said that he doesn't propose to buy any more railroads but he may build them if it suits his purpose. The electrification proposal is the significant feature. The lands he is expected to buy are mostly on the Big Sandy River, a navigable stream with direct connections to the Ohio River and with easy access to the Kentucky. If he builds a railroad and electrifies it, it is safe to say the current will be generated by water power. He also proposes to electrify the D., T. & I. More and more, as time goes on, will Ford devote his time, energy and money to the development of hydro-electric power.

J. D.

Problems Met in Design of Third Brush Generators

Service, production and operation must all be considered. Few other small units offer so wide a field for research. Selection of insulating materials and bearing types is important. Methods of commercial testing made more efficient.

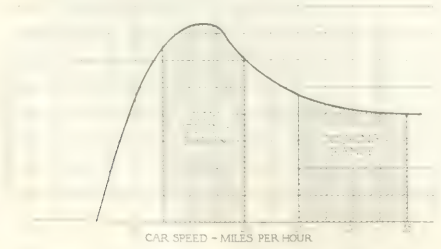
By Warren P. Louden
Automotive Engineering Dept., Westinghouse Electric & Manufacturing Co.

THE third brush generator, at first thought, appears to present a simple problem for the designer, but it is safe to state that there are few other units of similar weight and size which offer as wide and fertile a field for research. These problems are divided not only into the electrical and mechanical branches, but the manufacturing phase must be fully considered as well. Naturally, the foremost and most essential factor is the performance of the unit on the motor vehicle. All other ideas are contributory and are to be considered mainly as means to efficiently accomplish this end—for unless the generator gives satisfactory service to the car operator, the other advantages are lost, and any effort expended to gain them will have been wasted.

Since the first introduction of the third brush principle in 1888 by Tesla, to its original form for automobile use in 1914, and its present scheme of connections as finally adopted in 1916, this one unit has been the source of constant endeavor on the part of designers to improve its characteristics, decrease its size and weight and lower the operating losses. In order to visualize more clearly the broad scope of this problem, it might be well at this time to separate it into its several factors:

(1) Operation.
(2) Electrical characteristics.
(3) Mechanical features.
(4) Manufacturing.
(5) Service.

These will be found to cover the ground quite fully. It should be kept in mind that none of the individual requirements can be considered wholly by themselves, but rather must be so correlated to the others that the final design will form a compact and efficient unit. The following points will serve both as a detail of the foregoing list, and as a suggestion of the many individual problems which are open for further study.



Curve of charging current, indicating two extranges of operating conditions

Storage Battery Relief

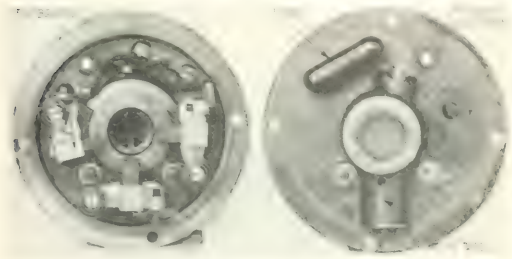
It is naturally desirable to relieve the storage battery at the earliest possible moment, and on this account a low cut-in speed (i.e.—the speed at which the generated armature voltage equals that of the battery) is essential. A steep front curve is likewise desirable to follow up the first point and permit the generator to carry the load. There are, however, two extreme conditions of battery charging to be provided for—the first encountered in city driving, where low rates of speed prevail, and frequent recourse to the starting motor is necessary, while lights will also be used quite often when the car is standing. Opposed to this service will be that of touring; where the car is driven at moderately high speeds for long periods of time, stopping and starting is infrequent; and if the lights are used it will generally be when the car is in motion and the generator capable of carrying the load. Hence, we must, with one generator setting (except possibly isolated cases of extremes) provide for either condition, since it is manifestly impossible to expect the operator to constantly manipulate the third brush to meet daily requirements.

The characteristics of the third brush generator are fortunately such that the proper charging rates are obtained at any speed. Our problem is therefore confined under this heading to obtaining the earliest possible cut-in speed and balance point, and after the peak output is reached, to have a sharp current decline with speed. The generator, to accomplish this, must be of the reaction type; that is, the ratio between the armature ampere-turns and the field ampere-turns must be comparatively large. Inasmuch as the generation of electricity depends upon the three factors of speed, density of magnetic circuit and the number of armature conductors, the proper results are obtained by using as many armature conductors as possible and by having a weak magnetic field. The large number of armature conductors permits of a low cut-in speed and the quick building up of the current curve.

At the point where the magnetic field created by the armature conductors balances that of the field coil turns,

distortion of the field magnetism occurs, throwing the flux over to the portion of the armature which does not furnish field current. This further cuts down the field current and causes a rapid decline in output.

One other point open to research would be to eliminate the inherent fault of the output rising as the battery charges—in other words, that these generators give a lesser output to a discharged battery than to a nearly charged one. This is the reverse of desirable battery charging, and at present the resources of the designer



Inside and outside view of commutator end header

are limited to making this increase as slight as possible. By choosing a suitable point on the magnetic saturation curve (preferably near the knee), a very slight increase of field flux will be had for any increase in line voltage. It is necessary to compromise in this case, however; otherwise, going too far toward minimizing this latter condition will upset the action of the armature distortion at the proper point and prevent the current decline, giving a characteristic more of the order of a bucking-series generator.

Naturally, the designer is constantly seeking to improve the efficiency of his units as well as to decrease their weight and size. However, in striving for this end he must also produce what is known as "sparkless" commutation; otherwise, excessive brush wear will be encountered and his design fail on this account.

The attainment of satisfactory commutation conditions depends upon a number of varying factors, and is in itself a subject for considerable study; of far too much length to be treated to any extent in this article. It would perhaps be sufficient to give some of the governing features:

The neutral zone, that is, the space between pole faces, where the magnetic fluxes are not present to any extent, should be kept as wide as possible. The skew or spiral of the armature slots should not be greater than is necessary to give a smooth reversal of commutating current; otherwise, a portion of the conductor will be under one zone of flux, and the other under the opposite flux. The number of armature turns between commutator segments must be kept low, to prevent a high reactance voltage, with destructive sparking.

Heating Results from Losses

Heating is a natural result of losses, and is dependent upon the ratio between these losses and the amount of external generator surface from which they are dissipated. A balance must be maintained between these factors so as to obtain the best proportions.

The machine must also be capable of maintaining moderate overloads for short periods of time without injury to the windings, and here the designer must allow a certain factor of safety. As a matter of fact, the demands of the automobile manufacturer have become so great that it is only with difficulty that a unit can be designed with any margin of safety, as it is now customary to exact every possible watt output from the generator, regardless of the demands of the service. In this respect not only the generator, but the battery as well, suffers. The ability to sustain a small overload, say 25 per cent, is therefore one of insulation ability rather than one of capacity of the conductors. By properly treating the fibrous materials of which the insulations are made, they can withstand temperatures of over 100 deg. C. (212 deg. F) continuously, and in some cases even 150 deg. C. (302 deg. F.), although in the end their life is considerably shortened. In fact, in continuous service, such as is encountered on trucks and buses, the generators must be set for lower outputs than when used intermittently, as on passenger cars.

Stability

In addition to the above, the stability of the generator should be considered; that is, it is necessary that it possess leeway electrically such that its output will remain constant under identical conditions, over long periods of service. Under this heading, also, we will do well to include the means of adjustment for output—that is, the movement of the third brush relative to the main brushes. Too many designs are extremely sensitive to this factor, and it is difficult to adjust the output with any degree of assurance that it will remain as set. Usually, the third brush is canted on one edge when moved angularly, and as its surface wears in, the output will vary. To insure a stable design, the pole tip wings must be properly beveled off to present a magnetic field of gradually increasing intensity to the armature conductors. The neutral zone, that is, the non-magnetic space between the pole tips, should span at least one-third of the total pole pitch; i.e., the pole bore divided by the number of poles. Also, the spiralling of the armature teeth, which is done in some designs to reduce magnetic noise, should be less than the width of the neutral zone. Careful consideration of the limitations of these three points will give the foundation of a correctly principled design.

This phase of generator design is quite often considered of minor importance, as compared with the desired



Automobile type generator with third brush regulation

electrical features, and it is very likely to be neglected in favor of the latter. While it is true to a certain extent that the electrical characteristics are more likely to be under the direct observation and criticism of the car operator, yet it is just as essential that the machine operate correctly mechanically; otherwise the electrical performance will also be impaired.

The bearings present probably one of the greatest problems, for these really determine the ability of the armature to run freely, and it is essential that they be

not only quiet and of long life, but the matter of their proper lubrication is an important factor. Care must also be taken, however, not to provide over-lubrication; otherwise the oil will get into the generator proper and damage the windings.

Bearings are divided into two distinct types: namely—(1) the plain or sleeve type, and (2) ball bearings.

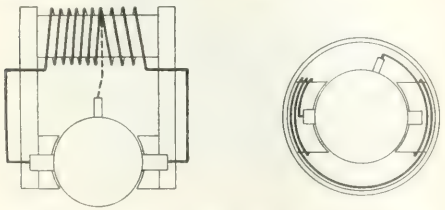
Plain bearings are inherently quiet, and the designer's problem is confined to the selection of proper materials, the correct dimensional proportions between the diameter and the lateral length, and finally—the lubrication.

Selection of Material

The selection of materials has, to a certain extent, been reduced to common practice as the result of experience. On the other hand, available space almost completely dominates the length of the bearing, since the amount of room allocated to the generator by the car manufacturer is often times very limited.

Lubrication depends entirely on the type of mounting, i.e., flange or foot. In the flange type the driving bearing receives its supply from the engine gear case. This supply varies widely, not only with the speed, temperature and oil level of an individual engine, but also between engines of various makes. For best results the bearing should therefore be designed to take as much oil as the engine gives, at the same time clearing itself to prevent the oil from working back into the generator proper. A suitable baffle scheme must be provided, to prevent oil vapor being forced into the generator by the breathing action which occurs in the crank case. The self-lubricated bearings are usually taken care of by wick cup oilers, with provision for additional oil being supplied whenever necessary.

Ball bearing problems are more of a mechanical nature and consist of proper fits on the armature shaft and in the bracket housing, so as to prevent either cramping of the balls or excessive creeping. A baffle system is also required to prevent oil and vapor from being drawn through the bearings into the generator, as in the case of the plain bearing. Great care must be exercised in mounting ball bearings, that they be free from foreign matter in the nature of grit or chips; otherwise, a grinding action sets in which soon wears the bearing out. Thus, the problem of proper bearing design plays a very important part in the whole schedule.

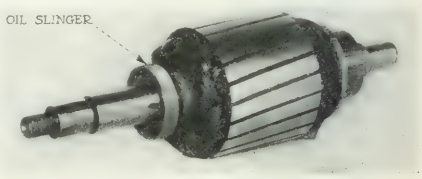


(Left) Diagram of Tesla third brush regulation. (Right) Modern third brush regulation, automobile type

Another point of no less importance is the brush holder, for unless this is of rugged construction, trouble is sure to develop. It must be heavy enough to carry away the heat of the brush, rigid enough to withstand vibration and maintain the output settings, and of such design that the brushes are accessible and interchangeable. It would also be a desired feature, if possible, to provide for spring adjustments, so that the pressure of the brush on the commutator be varied as required.

The third brush holder adjustment is worthy of the most serious consideration. It has been debated for some time whether it is desirable to make this adjustment easy or difficult. Much has been advanced for both sides, but the trend of opinion seems to be toward making the provision for doing this an easy operation, and to have the means in an accessible position. It should not, however, be possible for one to adjust past the same output point of the machine; otherwise there is every likelihood of damage ensuing. The adjustment should be positive, and means for rigid clamping should be provided.

The commutator offers a fertile field for investigation, since it is necessary that this part of the unit be both electrically and mechanically strong, and at the same time capable of being produced at a minimum of cost.



Armature of generator

The shop end of the generator problem presents one of the most involved sides, for unless the machine can be manufactured readily and cheaply, the finest technique of either the electrical or mechanical engineer becomes of little value other than an interesting laboratory experiment. Hence it is impossible to consider the technical side without the manufacture also receiving its proper share of attention. While it is, of course, necessary for the producing departments to adhere to fairly rigid mechanical dimensions, nevertheless the design must be such that liberal allowances can be made. There is little to be said in favor of a machine which on test will prove extremely sensitive, and in which the slightest variation of an element will cause it to be rejected. It must be possible for the shop to assemble material at random and not be confined to the art of selecting and fitting individual parts, in order to meet the specifications. It must not be understood that we wish to appear as condoning inferior workmanship, but rather trying to guard against the unnecessary expenditure of labor and materials.

Reduction in Number of Units

In order to reduce manufacturing costs to the lowest possible basis, it is desirable to confine the number of units, varying only by a slight difference, to a minimum. If it were possible, for instance, to have all armatures (and especially their shaft extensions) the same, it would then be permissible to stock these ahead during dull periods, thus holding the trained organizations intact. At the same time the speed with which the car manufacturer could be served in his rush periods would be greatly increased. Furthermore, a reduction in costs would follow, since the overhead expense would be maintained at an even percentage, and wastage and spoilage held to a minimum by reason of the efficiency of the operators.

This same line of reasoning can be applied to the frame, poles and coil assembly, such that the same unit may be used for either direction of rotation or any desired type of mounting (flange, foot, band, etc.). The variety of units must also be held to a minimum, for equipment and production reasons. This will also greatly affect the amount of raw material required to be carried in advance, which also has a marked influence on

overhead charges and delivery dates. At the present time special attention is being given toward the attainment of this ideal by committees of both the Society of Automotive Engineers and the Automotive Electric Association, working jointly. The greatest drawback to the ready adoption of this recognized advantage is the matter of service of equipment on engines already manufactured. Many engine builders prefer to continue with their present designs, instead of bringing out a changed model solely for the benefit of the electrical equipment manufacturer. Probably the simplest method and one which will finally be adopted, will be to bear with the situation as regards present designs, but to obtain the co-operation of both the engine builders and automobile manufacturers, such that new designs of engines will utilize standardized electrical equipment.

The design of parts to permit adjustment at the factory will also tend to reduce the cost of production, since by this means greater freedom as regards settings is obtained.

Insulation

The matter of insulation and the proper value of applied voltage to ground for proving its strength is a subject for considerable discussion. It is a problem to decide where to draw the line. Naturally, it is best to provide as much insulation as possible; yet considering that we are working with exceedingly low voltages, very slight electrical insulation is required and the subject becomes one of the mechanical strength required by service and manufacturing. Too much insulation is a waste of both space and material, while lack of a sufficient quantity will cause the car owner future expense and trouble. The problem then becomes one of making the best and most judicious use of the materials. Current practice dictates the use of fish paper cells in the armature slots and single cotton covered enamel wire for the conductors, with cotton sleeving around the commutator connectors. Some manufacturers also place insulation strips between individual coils where the end turns overlap. The field coils are wound with either enameled wire or wire having a single cotton insulation covering. The whole coil is then covered with cotton tape, which serves to mechanically hold the coil together and as a protection against electrical grounds. Both armature and field coils are further subjected to a varnish treatment, which serves to securely bind the conductors together and to exclude moisture. Another purpose of the varnish treatment is to provide a heat conductor, since the varnish fills in all interstices between the wires and will conduct away the heat at a faster rate than air. Also, it acts as a preservative for the fibrous materials, preventing a too rapid deterioration due to the great heating to which they are subjected.

Commercial Testing

Commercial testing consists of deciding to what extent the units must be proven at the factory before shipment. Just how this can be performed quickly and sufficiently rigidly to determine their probable ability to successfully perform on the automobile is one of the engineer's functions. It is necessary to reduce the time of this operation to a minimum, in order to not hold completed units when they are required, or to necessitate abnormal expenditures for factory equipment. This is accomplished to some extent by introducing a rigid system of checks on the individual component parts as they are being brought through various stages of manufacture. In fact, these parts are checked usually after each operation, so that by the time they reach the assembly section all defective parts have been eliminated. The assembled generator is then given a run under operating load until all parts have thoroughly heated up, so that any defect not readily found in the tests of the component parts will be brought out.

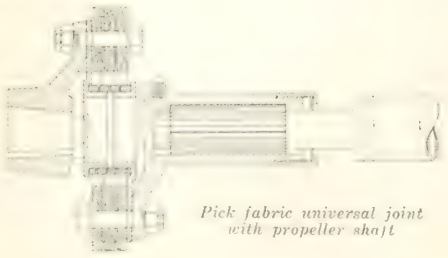
Problem of Service

The last, but by no means the least of the points to be considered, is that of service; i.e., the matter of repair and replacement. This, of course, is closely co-ordinated with the manufacture. It is essential to reduce the number of parts which must be carried in stock by service stations, and by so doing the greatest amount of general service can be rendered. Parts must be accessible for quick and easy repair, and in this way the expense of necessary replacements kept down. Perhaps, in summing up, it might be stated that the greatest problem in building a generator is to construct one which will need no service other than that necessitated by legitimate wear.

COMMERCIAL melting practice for aluminum and its light alloys has been studied in a preliminary way by the Bureau of Mines. The purpose of this investigation is to ascertain the metal and fuel losses in melting aluminum and its light alloys in the United States, and to determine the preferable methods of melting. A preliminary report, to be issued as a bulletin, has been prepared, and a complete report will be issued later.

Fabric Universal Joint with New Features

TWO uncommon features are embodied in the fabric type of universal joint manufactured by the Carl Pick Co. One of these is a slip shaft connection which gives protection against end thrust, telescoping of disks and undue loads on bearings, and at the same time simplifies the assembling operation. The other feature is a centering device, which is recommended particularly for speed truck jobs and permits of holding the propeller shaft in alignment at all times. In this design the fabric disks take only the torque, all other strains being provided for elsewhere. These fabric universal joints are made in four sizes, covering the commercial field from the light delivery wagon to the 3½-ton truck.



Pick fabric universal joint with propeller shaft

New Cylinder Grinder Features Vertical Spindle

Radical departure from horizontal type. Mounting of mechanism above grinding wheel claimed to remove dangers from abrasive dust. All necessary power furnished by a 2 hp. electric motor.

CYLINDER grinders heretofore have been generally of the horizontal-spindle type, and the development of a vertical-spindle grinder, known as the Williams, by the Hy-Way Service Co., therefore marks a new departure in this particular branch of machine-tool engineering.

Several advantages are claimed for the vertical construction, the most important probably being that, since all of the mechanism is located above the grinding wheel, there is no danger of any of the abrasive dust finding its way into the bearings and other running parts of the machine. The ways on the vertical column on which the grinding-wheel head slides are protected by a canvas curtain.

The longitudinal table slide has sufficient movement in either direction from the center to provide for positioning the spindle for grinding three cylinders to each side of the center, without uncovering the ways of the slide, hence these ways also are protected against damage by abrasive dust. In setting up for grinding any particular size of cylinder, the bed on which the work table is mounted is set in approximately the correct position to locate the work under the grinding wheel properly. A final adjustment is then made by means of a cross slide controlled by the screw and crank seen near the base of the machine at the front.

All of the mechanism of the Williams cylinder grinder is carried by the wheel head. The drive is by individual electric motor, a 2-hp. G. E. motor being mounted at the back of the head. There are three functions which must be performed by the power from this motor, as follows:

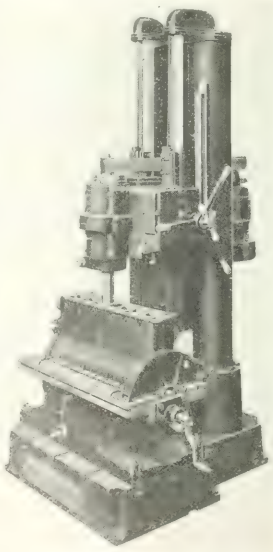
1—Driving the grinding spindle at the high speed necessary for the abrasive wheel to cut efficiently.

2—Transmitting the planetary motion to the spindle unit.

3—Feeding the head down in order to advance the grinding wheel into the cylinder and then returning it to the starting point.

From the side view of the machine it may be seen that the electric motor is provided with a double-end drive. At the top there is a pulley which carries a fabric belt by means of which power is transmitted direct to the grinding spindle. In this way the high speed of rotation of the motor is utilized to give the required cutting speed for the abrasive wheel, the correct speeds for various sizes of wheels being obtained by the use of suitable pulley ratios. It is claimed that owing to the use of a direct drive, ample power is secured from a 2-hp. motor.

The spindle of the abrasive wheel is mounted in a sleeve which, in turn, is eccentrically located within a second-sleeve member, on which there is a ring bevel gear to which power is transmitted for rotating the wheel unit independently of the rotation of the grinding spindle.



Williams cylinder grinder with cylinder block in position on work table

The two cylindrical members which constitute the grinding spindle mounting are arranged in such a way that by making suitable adjustments the eccentricity of the grinding spindle in relation to the entire spindle unit may be varied from zero up to 1⅛-in. A graduated dial is provided to indicate the eccentricity for any given setting. This is ample to provide for all commercial sizes of automotive cylinders where grinding wheels of suitable size are employed for the various jobs, without the necessity of changing pulley sizes.

Power for the planetary movement to the grinding head is taken from a helical pinion at the lower end of the electric motor and carried through a suitable train of helical, bevel and spur gears to a pinion that meshes with the ring bevel gear on the grinding spindle unit. For different jobs it is desirable to have a selection of speeds of rotation for the spindle unit, and this is accomplished by the use of the two spur gears, both of which are mounted on the shaft carrying the pinion that meshes with the ring bevel gear. Between these two gears there is a clutch member operated by means of the hand lever (left side), and by the manipulation of this lever a speed of either 40 or 60 r.p.m. may be imparted to the planetary movement.

Feed and the Reverse Movements

The Williams cylinder grinder is furnished with a range of feed changes, so that provision may be made for advancing the grinding wheel into the cylinder at twelve different rates of feed, according to the job which is being handled. After the grinding wheel has been advanced to the desired point, the feed is reversed, in order to carry the grinding wheel and its head back to the starting position.

On the shaft which transmits power through the planetary movement of the spindle unit, there is another bevel gear which transmits power through the feed box, by means of which three changes of speed are obtained. This box consists of two cones of three gears, all of which are in mesh, and by means of a plunger a diving key is manipulated to provide for driving through the desired pair of gears.

At the end of the shaft carrying the second of these two cones of gears there is a bevel pinion meshing with the familiar arrangement of two bevel gears loosely mounted on a vertical shaft, with a clutch member between the gears, so that either one may be secured to the shaft for feeding the grinding head down or raising it. This reversal of movement of the head is automatically accomplished by means of stops on the column, which trip the clutch just referred to. There is a small plunger under the gear box, which may be manipulated by hand to reverse the direction of feed.

At the lower end of the vertical shaft carrying the two bevel gears and the clutch, there is a second bevel gear which drives a horizontal jack shaft. Two spur gears on this shaft transmit power to a parallel shaft, and by means of a clutch member operated by a plunger, either of these two gears may be engaged to provide for transmitting power at either of two specified rates. This multiplies by two the three changes obtained through the cones of gears; and a second multiplication is obtained by the two changes accomplished by gears manipulated by a lever (left side), making a total of twelve available rates of feed, ranging from 0.007 in. to 0.375 in. per revolution of the grinding spindle.

Feeding the head up and down on the column of the machine is accomplished by means of pinions meshing with the racks. Power is taken from the horizontal shaft through a worm to a worm wheel carried by the cross shaft, on which are mounted the pinions that mesh with the racks on the column. At the right hand end of this cross shaft there is a capstan wheel that permits of raising or lowering the grinding head by hand.

Function of the Capstan Wheel

This wheel is furnished with a clutch that engages the worm wheel on the cross shaft, and when this clutch locks the worm wheel to the shaft, the capstan wheel is inoperative, because it would involve turning the mechanism of the entire machine by hand; but when the clutch is released so that the worm wheel is loose on its shaft, it is merely necessary for the man to turn the capstan wheel to rotate the pinions in mesh with the racks on the column of the machine and moving the grinding head up or down as required. All of the mechanism of this feed box runs in a bath of oil.

Arrangements for the manufacture of this grinder have been made with the Foster Machine Co. who, we are informed, will go into immediate production on it. The distribution of the machine will be looked after by the Hy-Way Service Co.

Grinding Attachment for Lathe

A GRINDING attachment for a lathe that is particularly useful in the tool room has been brought out by the Precision and Thread Grinder Mfg. Co. It is known as a multi-graduated precision grinder and clamps upon the top of the lathe tool rest. It is made in two models, one for lathes equipped with back tool rest and the other for ordinary lathes. The grinder is adapted for grinding thread gages, taps, dies, chasers, thread rolling dies, hardened worms, thread milling hobs and thread molding dies and also for internal grinding up to a depth of 12 in.

The same concern also manufactures a precision thread lead variator which is claimed to make it possible to obtain a precision lead from the ordinary lathe lead screw, and to elongate the lead on parts which are subsequently to be hardened, to compensate for shrinkage. This eliminates correction grinding in non-precision work and reduces it in precision work. In the illustration the grinder and thread lead variator are shown applied to a lathe and in operation.



Lathe fitted with thread grinder and precision lead variator

Single Track Car Uses Little Fuel

IN connection with the European tendency to develop cars that are more economical in operation, a certain amount of interest attaches to a so-called single track car just brought out in Germany. It was designed by Reinhold Boehm, who held the duration flight record from 1913 to 1920, and is to be manufactured by the Mauser A. G. in Oberndorf, an old gun factory. Generally speaking, the machine is of the motorcycle type, but provides a completely enclosed seat for the operator. To hold it in the upright position when at rest, two supporting wheels are provided at the sides which can be let down as the machine comes to rest and raised up when starting off. The engine is a two-cylinder opposed, rated at 6 hp. at 3000 r.p.m., and is built by the Bayerische Motoren Werke. The regular wheels carry 26 by 3 in. tires, the supporting wheels 15 by 2½ in. The wheelbase is 75 in., the weight 330 lb. The fuel capacity is 17 quarts, the fuel consumption 1 gal. per 67 miles and the maximum speed 40 m.p.h. In dense traffic the machine can be used as a three-track vehicle by letting the supporting wheels down. An auxiliary seat is provided for a passenger.

Helping Tractor Sales and Service by Conducting Dealer Schools

Dealers welcome power farming instruction given by tractor manufacturers' schools. Proves valuable in bringing dealers, customers and company together and decreases calls for service help. Laboratory work imparts thorough knowledge of product.

DEVELOPING and maintaining an efficient dealer organization is one of the most important problems confronting the tractor manufacturer. While it has been, and still is, the policy of some companies to sell direct to certain industrial fields and territories where for one reason or another they have no dealer representation, the dealer is recognized as the logical sales outlet.

Manufacturers are endeavoring to strengthen their retail connections but the methods used to attain this end vary widely in their fundamental conception and details. There is a universal attempt to select the best dealers possible but after the contract is signed some manufacturers leave the dealer to his own initiative in developing sales, depending on "pep" literature and meetings to supply the necessary force in maintaining morale.

Many manufacturers, in addition, go to considerable effort and expense to instruct dealers in the details of mechanical construction, methods of locating prospects, closing sales and rendering service. It is a question just how far a manufacturer can go to develop the dealer organization and it is one in which the trade is vitally interested.

During the winter season for the past four years, the Advance-Rumely Thresher Co., Inc. has been conducting dealer schools with marked success. For three years these schools were held at the home office, but this form of educational work proved so valuable that last winter schools of one week in length were held at ten branches in addition to the home office school.

Knowledge of Product, the Best Selling Asset

The fundamental idea behind these schools is to so instruct the dealer that he knows thoroughly the products which he is selling. Richard Spillane, writing recently in the *Philadelphia Public Ledger*, expressed the idea aptly by telling the following story:

"Hugh Chalmers, who was a big figure in the National Cash Register Company before he entered the automobile field, says the greatest speech on salesmanship he ever heard was in Berlin. Incidental to a trip abroad, he visited the general agencies of the cash register company and addressed a gathering of their salesmen of the German Empire. One salesman, who had been extraordinarily successful, also was to address the audience explaining how he did it.

"When the salesman was introduced Mr. Chalmers was astonished to see in him a man more of the workman than the salesman type. The successful salesman opened his mouth once or twice and said nothing, shifted his position two or three times and became more and more troubled. Then suddenly extending his arms as if in appeal to his hearers to judge him kindly, he blurted out: 'I do not know how to make a speech, but I know the cash register better than the man who invented it.' Then he left the platform.

"Mr. Chalmers says it was the most impressive address on selling he ever heard."

The Rumely company has built its dealer schools on exactly this idea. It believes that the first and most important step in selling is for its dealers to know the products in detail. Relatively little straight "sales talk" is included on the program. Two-thirds of the time is spent in the laboratory where those in attendance work under the direction of competent instructors. The lectures deal mainly with construction and operation and are closely correlated to the laboratory work. At each school a professor from the Agricultural Engineering Department of the State university gives a lecture dealing with the place of the tractor in agriculture. Entertainment features are not neglected. Following is a typical program, although at the branches the trip through the factory must be omitted:

Monday

Forenoon—Registration and trip through the factory.
1:30-2:30 *p. m.*—Introductory remarks. Lecture—Principles of the Gas Engine. Valves and Valve Timing. G. W. Iverson.
2:30-4:30 *p. m.*—Laboratory.
7:00-9:00 *p. m.*—Smoker and Get-together. Chairman, Finley P. Mount, President Advance-Rumely Co.
Address of Welcome. Warren T. McCray, Governor of Indiana.
The Place of the Tractor in the Corn Belt. Prof. G. W. McCuen, Ohio State University.

Tuesday

9:00-10:00 *a. m.*—Fuels and Carburetion. J. A. Secor, Chief Consulting Engineer, Advance-Rumely Co.
10:00-12:00 *a. m.*—Laboratory.
1:30-2:30 *p. m.*—Lecture—Triple Heat Control. G. W. Iverson.
2:30-4:30 *p. m.*—Laboratory.
7:30-9:00 *p. m.*—Entertainment, K. of C. Club Rooms.

Wednesday

9:00-11:30 *a. m.*—Rumely Truck. F. P. Shortle.
1:30-2:30 *p. m.*—Importance of Lubrication. Representative Vacuum Oil Co.
Tests on Lubricating Oils. S. F. Lentz, Texas Co.
Oil Pull Lubrication. G. W. Iverson.

2:30-4:30 *p. m.*—Laboratory.
Lubrication. R. W. Carrington, Standard Oil Co.
7:00-8:30 *p.m.*—Advance-Rumely Movie.
Value of Advertising. W. B. Henri, Henri, Hurst & McDonald.

Thursday

9:00-10:00 *a. m.*—Gear Lubrication. Representative Ironsides Co.
Care and Operation of the Tractor. G. W. Iverson.
10:00-12:00 *a. m.*—Laboratory.
1:30-2:30 *p. m.*—Tractor Ignition. J. L. Snyder, American Bosch Magneto Corp.
2:30-4:30 *p. m.*—Laboratory.

Friday

9:00-10:00 *a. m.*—The Ideal Separator A. J. Knapp.
10:00-12:00 *a. m.*—Laboratory.
1:30-3:30 *p.m.*—Laboratory.
3:30-4:30 *p. m.*—Product and Policy. J. Abrams, Sales Manager.
6:30 *p. m.*—Banquet. Finley P. Mount, Toastmaster.

THIS story tells how one company conducts its tractor school for dealers and customers. It outlines a typical schedule by which instruction is concentrated into a week's course and relates some of the benefits which have accrued to dealers, customers and the company alike.

*

The fundamental idea back of this tractor school is to give the dealer a thorough working knowledge of the product and thus secure greater sales and better service. How well the idea works out may be gathered from the story.

It requires two railroad cars to transport the material consisting of engines, transmissions, models, ignition equipment, tools, charts, etc., used at each school. There are two sets of this equipment. While one set is in use the other is being transported to and set up at a new location. Everything is planned out in advance with the idea of keeping the students busy from the time they arrive until the end of the banquet.

One laboratory instructor is provided for ten students. A laboratory manual and general instruction book are issued to each student when he registers. These printed instructions give the directions for each laboratory exercise together with a set of questions designed to stimulate the student's interest and to cause him to dig for important points.

Most of the instructors are service men at the different branches although frequently students who are attending for the second or third time are used in this role. Aside from the lecturers the crew which makes all the schools consists of a general manager, director of the laboratory work, magneto man and truck man. Frequently some of the laboratory instructors are taken from one branch to the next to avoid having an entirely new crew, but these men are never taken far from their original headquarters. In addition to this staff there is an advance man who is engaged in setting up the equipment for the next school.

There has been a total attendance of 2400 students at these schools in the four years of their existence. Last winter the attendance was 1161, consisting of 654 dealers, 417 customers and 90 salesmen. One branch manager expressed his opinion of the schools in the following manner:

"There are several things that appeal to us as of more importance than any other thing in connection with the school. One is that the personal acquaintance obtained by our organization with the customers and dealers is a thing of lasting value to both the company and the trade. This personal acquaintance creates a loyalty that will never be destroyed. Another observation we have made, and one that impressed us very much, was to have new dealers and customers say to us that hereafter they would always believe anything that might be contained in our catalogs and literature. After having an opportunity to work upon our product they knew that the representations made in our literature were based on facts. This was expressed by a large number of new customers and dealers who had not had an opportunity to attend any of our previous schools."

The admittance of customers other than dealers, besides making better operators and stronger friends for the company, had an effect which was not anticipated. Many of these customers who had ordered for spring or early summer delivery decided, after attending the school, that there was no advantage in further waiting and ordered immediate delivery so as to become better acquainted with the tractor and work it in gradually before the heavy work started. These customers left the school well started on the road to becoming successful power farmers because they had taken the first step in the right direction; they knew the tractor and how to care for it.

The schools have already exerted a marked influence in solving the service problem. It has been found that the customers who attended seldom call upon the dealer for help and what is of equal importance, dealers who have attended are able to take care of an increasing amount of their service work without calling on the branches for help. The calls from school dealers for service help on the part of the branch have decreased so rapidly that some branches have already reduced their service forces. While the full effects of the work of these schools on the service problems of the company have not yet been realized the results are pronounced enough to indicate that the reduced cost of furnishing service will be no small item in covering the expense of the undertaking.

This form of sales and service promotion work is appreciated by the dealers. Eighty per cent of those in territories where schools have been held have taken the course. Thirty per cent of these dealers have attended a second time while in many cases other members of the sales and service force attend the second, third and fourth years. The dealers have arrived at a point where they look forward to this annual event.

It is difficult to estimate the full value of this form of educational work for it touches the trade at many points. The students undoubtedly take away a large amount of specific information which is fundamental to the rapid spread of power farming. The dealers become acquainted with the men and policies of the company. The officials of the company secure first-hand information regarding the problems of the dealers. The personal acquaintances made between members of different groups in the trade has a lasting value. The Advance-Rumely Co. believes that these schools were an important factor in keeping its factory running every day during the recent readjustment and is planning to enter the coming winter with a larger school program than ever before.

New Device Permits Studying Motion of High Speed Machine Parts

Gives reproduction of movement at speed reduction of 100 to 1, or stationary image of part in any point in cycle of operation. Periodicity and amplitude of vibration may be determined and causes traced. Applicable to many automotive engineering problems.

IN the development of high speed engines irregularities in operation are often observed which are difficult to explain and analyze, for want of a suitable means of investigation. Various stroboscopic apparatuses have been devised for this purpose, most of which use a flexible shaft for operating rotating shutters. A device known as the Elverson Oscilloscope has been developed in England and is based on the principle of the persistence of the image of an object produced by a momentary flash of light.

The Oscilloscope can be used in two ways, namely, so as to give an accurate reproduction of the motion of any high speed machine part at a speed reduction of 100 to 1, or to give a stationary image of the relative position of any parts at any speed and for any particular point in the cycle of their operation. The principle of the device is exceedingly simple. Use is made of a flash lamp consisting of a bulb filled with neon gas which is lit up by means of an electric discharge between conductors within it, brought about by an interrupter actuated directly from the mechanism to be investigated. The neon lamp is said to have an exceedingly small-time lag; that is, practically no time elapses between the moment the electric contact is made and the moment the lamp attains its full brilliancy. When operated in the stationary position contact is made once per cycle of the mechanism to be investigated, always at exactly the same point in the cycle.

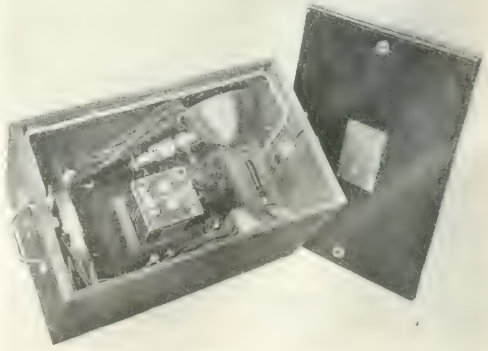
OWING to the persistence of the image, the observer apparently sees the mechanism at a standstill in the correct position or relationship for the point of the cycle in question. What he sees is not how the parts are related and what shapes they assume when the mechanism is at rest, but the relationships and forms of the parts at the speed of operation for the particular point of the cycle investigated.

The interrupter, of course, must be mechanically connected to the mechanism to be investigated and the lamp brought into a position where it illuminates those particular parts whose motion or change in shape under the forces of operation is to be studied. As will be seen from the illustration herewith, the lamp is provided with a reflector, so as to increase the intensity of illumination, but in cramped spaces, as, for instance, in engine crankcases, it can be used without the reflector. Tests must be made in subdued light, but complete darkness is not essential. After the relationships at one point of the cycle have been investigated the interrupter may be shifted to investigate another point and the angular or linear displacement of the two points can be accurately determined. If necessary good photographs of the parts may be taken.

IN the other position of the apparatus, known as the creeping position, supposing the part to be investigated to have a rotary motion, the interruption of the electric circuit is made to occur at a point 3.6 deg. further on in the cycle during each succeeding cycle. This effect is obtained by the use of two gears with 99 and 100 teeth respectively. The result is that the actual cycle of operations is displayed before the eyes of the observer at one-hundredth the actual speed.

It is obvious that one of the problems in automotive engineering to the study of which the apparatus lends itself is that of the motion of valve mechanism. It is stated that observations with the instrument have shown that with some forms of valve gear the valve after climbing the cam incline will bounce three or four times before coming to rest, while single or double bounces are very common.

The outfit comprises two slides, which enable the operator to produce one, two or four flashes per revolution. It is evident that the higher the speed the better will be the image. In cases where it is more convenient to drive from a shaft running at a fraction of mainshaft speed, at very low speeds, with a single flash per revolution the image has a tendency to be discontinuous, and this can be remedied by producing either two or four flashes per revolution. There is, however, another object in provid-



Elverson Oscilloscope in portable case

ing means for producing more than one flash per revolution. Suppose that a case of vibration is to be analyzed and the periodicity and amplitude of the vibration are to be determined. If the vibration is synchronous with the shaft speed the vibrating part will appear to be slowly swaying to and fro. After the vibrating part has been observed with a single flash per revolution, two flashes per revolution are produced, and if a double image is then seen it proves that the vibration is synchronous with the shaft. On the other hand, if the double image appears only with four flashes per revolution, then the vibration occurs twice for every revolution of the shaft. If such a vibrating object is observed with the apparatus in the stationary position, two images will be seen, and as the apparatus is angularly advanced by hand, these images will recede and approach each other. Their maximum distance apart is a measure of the amplitude of the vibration.

A PECULIAR action in valve gear that has been observed with the instrument is surging of the valve springs. That is, the spring will leave its supporting surface, and in extreme cases it may even be seen floating in the air for an instant. Valves have also been seen coming down on their seat at a slant and then adjust themselves. Where a rocker arm works directly on the valve stem and is so designed as to produce considerable side pressure, the stem may be observed flexing and then snapping back again at every opening of the valve. By cutting away a portion of the crankcase and exposing the cams, it is possible to study the motion of the cam followers and find out at which end any irregularity in the valve action starts. It is thus possible to draw a curve of actual valve lift against angular motion of camshaft or piston position and compare it with the theoretical or desired curve.

THE action of magneto contact breakers at high speed can also be investigated with the aid of this instrument. In connection with magnetos it has been found that certain types of flexible couplings produce a decided lag, and this lag can be measured. On aircraft engines the cylinder heads are said to have been observed "breathing" under the explosion impulses. Chain drives for camshafts, etc., can be investigated as to their regularity of transmission and vibrations can be traced to their sources. In lubrication problems it is possible to trace the exact distribution of lubricant on fast-moving parts.

A most interesting study is that of the influence of engine vibration on aircraft fuselages, and we are informed that under this influence the fibers of the ash members can actually be seen opening up and shutting.

The apparatus described is manufactured in England by Herbert Kennedy & Co., Ltd., and is at present being demonstrated in this country by Peter Davey. Among others, a demonstration was given at the plant of the Wright Aeronautical Corp. in Paterson, N. J., on the standard Wright eight-cylinder aircraft engine, bearing on valve action, vibration, magneto drive, etc., at speeds up to 1800 r.p.m.

New Automobile Ammeter of Simplified Construction

AN automobile ammeter without electric coils or connections has been developed by the Westinghouse Electric & Mfg. Co.

The design of this ammeter, known as type BT, involves a radical departure from the principles used in all previous ammeters, in that no wire connections or coils are used. The case of the instrument has a magnetic yoke or loop projecting to the rear, through which is passed the current carrying cable or wire, which functions as a coil. The yoke has pole pieces extending into the inside of the ammeter. These poles vary in magnetic polarity and strength, corresponding to the direction and strength of the current passing through the wire and, being made of a special alloy steel, act without any residual magnetism error which would change the zero of the instrument. There is also a fixed permanent magnet inside the instrument, with poles located at right angles to the poles formed by the yoke. Pivoted on a shaft in the center of this group of poles is a soft iron vane which takes up a position corresponding to the relative strengths of the permanent and electro-magnetic poles. The shaft carries the usual pointer which indicates the value of the current on a dial. The movement is so balanced that car shocks or swaying will not cause the pointer to swing, it is claimed.



Westinghouse type BT ammeter

This peculiar construction, which was made possible by the development in the Westinghouse laboratories of the new non-residual steel alloy, reduces by more than 50 per cent the number of necessary parts and facilitates installation on the car by means of two pieces of wire or cable with connections and clips, the only operation necessary is to pass the dashboard cable through the opening in the back of the instrument. Other advantages claimed are that all possibility of ground is eliminated, there can be no short circuits or burn-outs and overload will not injure the meter.



Rear view of ammeter on dashboard, showing battery cable passing through yoke

AMERICAN exporters of automotive products should exert the utmost care in the terms used in their catalogues printed in foreign languages. Instances have come to the attention of the Automotive Division of the Bureau of Foreign and Domestic Commerce where prominent automotive exporters have done a great deal of harm to the reputation of their first class product in foreign territories by distributing catalogues containing descriptive adjectives and nouns which could not but convey a very unfavorable impression, owing to the fact that in the different countries these words would apply only to products of an inferior standing and quality or are not used at all.

Scandinavian Nations Now Good Market for American Cars

Buying public favors our product. Recently lowered freight rates permit competition with European manufacturers. Extension of credit facilities and modification of sales policy needed. Large war stocks on hand keep market for heavy trucks dormant.

By Birger Jacobsson

NORWAY, Sweden, Denmark and Finland, together termed the Scandinavian countries, are at the present time very good customers of American cars and trucks, and it is expected that the number of American cars imported to these countries will more than double when the Finnish and Norwegian monetary exchange rates become more favorable.

Before the outbreak of the war imported American cars came via German ports. During the war dealers found it troublesome to import cars as the English embargo made it difficult in many ways beside the fact that tires had to be stripped off the cars.

The years 1919 and 1920 promised tremendous business, but the manufacturer's inability to fill orders proved a handicap. During 1921 the depression hit Scandinavia and importations of cars dropped to a minimum. Last winter the dealers began to see their opportunity and to-day we may regard one of the Scandinavian countries, namely Sweden, as a first rank customer of the United States. It is close to Mexico and Australia in the number of cars imported, though its population is little above the 5,000,000 mark and importations from Germany, Austria, Italy, France and England are by no means small.

AMERICAN automotive products can be sold in increasing numbers in Scandinavia. General business conditions have improved. Freight rates have been materially reduced and good roads are being built.

* * *

This article, by Birger Jacobsson, tells about trade practice in Scandinavia, shows how the market should be cultivated and outlines the modifications needed in selling policy to improve merchandising methods.

KEEN competition with practically all European automobile producing countries makes an analysis of the Scandinavian market of special interest to American automotive manufacturers. The car buying public in these countries favors a light car with large engine. At the same time it is very particular as to the quality of the body. Its ideal would be the average American "light six" chassis equipped with the average European body.

During the past year a great many Austrian and German cars have been imported, but it is believed that this heavy importation has been influenced by the inexpensiveness of these cars on account of the ever depreciating rate of exchange of those countries, rather than by a desire to market them in the future.

American cars and trucks can now compete with any similar European product having a stabilized price, since heavy freight charges have been cut to a minimum. Two years ago the average freight cost to any of the Scandinavian ports of entry was as high as $1.75 a cu. ft., which resulted in an abnormal freight charge of $700 for the average light car as compared with a charge of $120 to-day.

Custom duties in all Scandinavian countries are now being based on the cost of the car landed at the port of destination and this averages 12 to 15 per cent in Sweden, Norway and Denmark. Finland has a duty of 40 per cent for passenger cars and 10 per cent for trucks.

The dealer who is able to get all his car shipments from the factory between March and July is in the most advantageous position. There are, of course, cars sold during every month of the year, but at least 75 per cent of sales take place during the period mentioned. This selling period is dependent upon the season to a very great extent.

Passenger cars which list at $500 to $1500 are the best sellers. The amount of business done in closed cars is very small compared with what it should be and it is, in most instances, heavy freight charges that have held business back. No doubt importation of sedans and coupes will increase now that freight charges have been lowered. Closed cars may be sold from July to Christmas, but the volume will only reach about 10 per cent of open car sales.

A leading automobile dealer in any one of the Scandinavian countries must possess considerable capital to be able to pull through the dull season. It is a very difficult matter to obtain the capital to pay for cars about four months prior to arrival and sell them, as the majority of the dealers do, on easy payment terms.

THE American manufacturer who can facilitate credit matters for his dealer is therefore sure to increase the volume of business considerably. The banks do not



This map shows where manufacturers ought to have representation for the proper distribution of automotive products in Scandinavia. The shaded areas surrounding each of the main distributing centers indicate the logical extent of territory for each center

seem to understand the importance of automobile financing and dealers find little or no assistance from their banking connections.

American manufacturers should deal with each country directly. They should have a general agent or distributor and his subagents or branches as follows:

Norway—General agent at Christiania.
Branches or subagents at Bergen, Trondhjem, Christiansand and Stavanger.
(If the general agent is located at Bergen he must have a branch at Christiania.)

Sweden—General agent at Stockholm.
Branches or subagents at Gothenburg, Malmo, Karlstad, Kalmar and Sundsvall.
(If the general agent is located at Gothenburg he must have a branch at Stockholm.)

Denmark—General agent at Copenhagen.
Branches or subagents at Aarhus, Odense and Aalborg.

Finland—General agent at Helsingfors.
Branches or subagents at Abo, Tammerfors, Vasa and Viborg.

The general territorial divisions are indicated on the map.

It is absolutely wrong to have the general agents located in the smaller towns or cities. Such an arrangement does not get the bulk of business that it should because the dealers cannot get adequate representation in the capital or in the larger cities.

The general agent should not handle competitive lines. Scandinavian dealers generally represent a number of manufacturers, American as well as European, and in most instances the lines are competitive. If the dealer concentrates on one or two makes he can secure a much greater turnover and can attend to service matters more efficiently.

For example, a leading dealer in one of the Scandinavian capitals is general agent for the following cars: Rolls Royce, Delage, Benz, Buick, Hupmobile, Anderson and Panhard, and in addition is the general agent for Panhard, Benz, Clydesdale and Denby trucks. This dealer has no doubt invested a considerable sum of money in spare parts to be able to given service to all these makes. He feels that he does not want to give up any of the agencies, having expended a lot of money and effort to introduce them into the market. He is sure that if he drops one of the lines another dealer will step in and capitalize on his work. This may sound very queer to the American manufacturer, but it is the way most of the dealers in Scandinavia feel.

Good Service Essential

The car-buying public is now awakening to the fact that it wants a car which it knows the dealer is able to service. The American manufacturer would do well to supply the dealer with only those parts for stock that he knows are subjected to wear and not let the dealer order parts from the catalog just as he chooses.

If the manufacturer is well represented in all the North European countries he would do well to establish some kind of service parts depot in England or Holland, or he may choose any one of the free ports at Copenhagen, Gothenburg or Stockholm. In this way the dealer in American cars may be able to compete with European cars. At present many an owner of an American car has to wait for months for necessary spare parts.

The market for trucks of one to three tons capacity is at the moment good. It must be remembered that new road regulations are or will be in effect shortly whereby an extensive use of pneumatic tires is prescribed. Buses seating 20 passengers will also have a good market for years to come.

There is no longer a market of any importance for trucks of more than three-ton capacity for the Scandinavian countries have absorbed more heavy trucks than they need and there are hundreds of war trucks stored in ports and offered at prices as low as $200 or so.

American trucks are favored and the majority of buyers now are asking for quality rather than a low price. Those who do want to buy inexpensively find a Ford dealer in every little city in the country.

The parliaments of the Scandinavian countries have been discussing roads. Sweden has started to rebuild most of its roads this year. Millions of kronas are spent on the Government road program and most of the workmen shut out of the factories are employed in that field. The rebuilding of roads will have its influence on the automobile market and in the majority of cases sales will be augmented.

Rapid Changes in Agents Unsound

Many an American manufacturer has lost prestige by making too many changes in general agents. A manufacturer who makes a new appointment too frequently on account of the fact that the volume of business secured the preceding year has not been satisfactory, will gain little confidence with dealers and the buying public. In many instances the dealer cannot be blamed for a small volume of business. He may have had trouble in getting shipments from the factory through on time or have suffered difficulties in other ways. It would in such instances pay the manufacturer to send his direct representative over to investigate before making a decision. It is a journey of less than two weeks and the representative is only a day's travel from any of the other agents in the Scandinavian countries.

Recently it has been decided to arrange an international automobile exhibition at Gothenburg during 1923. This will be the first large automobile show in any of the Scandinavian countries for the past eight years. The exhibition floor space will cover more than 10,000 sq. ft. It is expected that exhibitors will have free customs clearance, very much reduced freight charges to the exhibition and free return freight. The show will cover all types of cars, trucks and motorcycles.

Freight Rates to Hawaii Reduced

AN important change in the freight rates on automobiles, trucks, etc., shipped from the United States to Hawaiian Islands will soon be made, the transportation division of the U. S. Department of Commerce has been advised by the Trans-Continental Freight Bureau.

The present carload minimum weight of 10,000 pounds and rate of $3.65 per 100 pounds will be changed to a minimum weight of 16,000 pounds on passenger cars and parts thereof, and a rate of $3.15 per 100 pounds will apply.

A separate rate is provided for automobiles, freight, k.d., boxed; automobiles, chassis, freight or passenger cars, k.d., boxed, and tractors, k.d., boxed. On these commodities the minimum weight will be 20,000 pounds per carload and the rate $3.05 per 100 pounds.

The changes will not be effective until the new tariffs are published, which, it is expected, will be within the next 60 days.

Automobile Air Resistance Measured in Wind Tunnel

Tests made at Zeppelin Works show that the air resistance of modern types of motor cars is materially less than would be concluded from coefficients found in engineering text books. Advantages to be derived from complete streamlining of cars.

AN investigation of the air resistance of automobiles with different types of body has been made in the large wind tunnel of the Zeppelin Works at Friedrichshafen, and the results are discussed in a recent article by P. Jaray in *Der Motorwagen*. Jaray found that the air resistance coefficient is smaller than has been generally assumed heretofore, even in the case of conventional type vehicles. Making use of the well-known formula for air resistance.

$$F = c A V^2,$$

where F is the resistance in pounds, c, a constant, A the forwardly projected area in square feet and V the speed of the car in miles per hour, the value of c has been given heretofore by different authors as ranging all the way from 0.00275 to 0.00420. Dr. Riedler in his book on the Scientific Determination of the Merits of Automobiles gives it as varying between 0.00318 and 0.00338. According to the Automobile Technical Handbook, 10th edition, and Hütte, 22d edition, its value is 0.00276, while according to tests made with large cars by E. H. Lockwood at Sheffield Scientific School, its value is 0.00291.

Jaray's experiments showed that for a conventional modern car with no unnecessary projecting parts (no top, no baggage on the outside, no boxes and cans on running boards, etc.), with disk wheels, the air resistance coefficient varies from 0.0023 to 0.00265. For a closed car (limousine) under the same conditions the value of the coefficient varies from 0.0017 to 0.0018. For a car with a boat type of body without fenders or with horizontal plane fenders, with disk wheels and small windshield (racing car) the value of the coefficient was determined to be from 0.00138 to 0.00143, while finally for an all streamline body the coefficient was only 0.00064.



Jaray's streamline body evolved from wind tunnel experiments

Jaray explains that the reason the coefficients given by others are somewhat higher than those found by him is undoubtedly that their experiments were conducted with less favorable types of body. Those tested in the wind tunnel were all of comparatively recent design. It is fairly obvious that a top of poor design from an aerodynamic point of view increases the air resistance materially. Of the cars subjected to tests in the wind tunnel some had no top, while in the case of those that had a top it generally was of such construction that when taken down it gave a form favorable to easy air flow. With the top raised, air resistance coefficients of 0.00318 to 0.00345 and even 0.0037 would have to be figured with, and, besides, the increase in the projected area due to the top would have to be taken into account.

Coefficient of Air Resistance

Jaray thinks that the fact that closed cars (limousines) have a lower coefficient of air resistance than open cars will come as a surprise to most automobile engineers, though it will be quite obvious to the specialist in aerodynamics. In consequence of the unequal projected areas of open and closed cars, the total air resistance is, moreover, substantially the same for conventional constructions, and it cannot be changed materially. Neither V-type radiators nor wedge-shaped windshields have any appreciable influence. Even a pointed or downward sloping form of the forward end of the body is of relatively small importance, as long as the fenders prevent smooth flow of the air around the body as a whole. Only the elimination of the fenders or their arrangement in the direction of the air stream results in a material reduction of the air resistance, but of by far the greatest importance is the elimination of wheel resistance.

What is probably most required is to get the upper part of the wheels out of the air currents, because, on account of its more rapid forward motion, it is subjected to substantially four times the air resistance which corresponds to the actual speed of the car, while, on the other hand, the lower part of the wheels is almost at a standstill relative to the air. Accurate experiments on this point, in which smooth disk wheels presumably would give better results than spoke wheels, are not yet at hand. In connection with stock cars this question is of little moment.

Jaray then makes numerous calculations of the saving in energy-expenditure in horsepower hours which can be effected by the use of streamline forms, under different conditions. The advantage of the streamline form is, of course, most important when driving against a strong head wind.



Dealers Object to Exclusive Factory Advertising Control

Standardized copy fails to take advantage of local situation. Dealer pays for part of campaign and should have something to say about material used. Much printed matter useless to dealer.

Editor, AUTOMOTIVE INDUSTRIES:

Changed advertising policies on the part of some factories may be a point of friction in the contact between the dealer and the factory. Several Western distributors in taking new contracts have found that the advertising policy has been practically taken out of their hands and that in the future they will be expected to run copy and material furnished by the factories rather than that which in their own judgment would bring them the greatest business.

The principal objection to much of the advertising furnished in the past is that it has been designed mainly to sell the car, and not the dealer and his organization, which many Pacific Coast dealers have used as the basis for most of their merchandising. One dealer expressed it as follows:

"Inasmuch as we are expected to contribute toward a factory designed advertising campaign, this campaign represents in part our money. It is not unreasonable for us to expect that we should have some voice in the scope of this campaign and particularly in its application.

"The past has proven that stereotyped advertising campaigns, as designed by routine copy experts, do not cover the ground. A test of this is simple. Take any standard magazine, clip from it all the automobile advertisements and without mentioning the name, read them to any person fairly well posted in the automobile trade. If this individual to whom the advertisements are read can tell which automobile is being sold by any of the copy, he is a wonder. Most of the copy harps on the subject of luxury, beauty, comfort and reliability to a point where the song of one is the song of all.

"Automobile history in the West is such that it is continually making news. This news is the kind of stuff that sells automobiles, and will do it far better and more impressively than the same old story of luxury, beauty, comfort and reliability. Such facts as the following are news and form the basis of 'honest-to-God' merchandising.

"The Portland Chevrolet dealer in the first week after the appearance of the new model took more than two hundred orders for the new car.

"A local company buys $150,000 worth of machines of one model for highway service."

Automobile dealers in the West feature different sales points than they do in the East. Oregon to-day has in the neighborhood of 2000 miles of paved roads and 40,000 miles of macadam and mountain trails. The paved roads have grades not to exceed 5 per cent, but the mountain roads try cars to the quick.

Not so many years ago a dealer having a splendid car in every respect, lacking one thing, lost many sales because the car failed to stand the test on the outside roads. This was a car that came out with an unusually small brake. Things like that do not go unobserved in this country of motor fans. It was the source of 75 per cent of his sales resistance.

Finally, the factory made a change and did a mighty good job of it. It was an advertisable feature that meant something at a particular time, and without overemphasizing it or unduly calling attention to it, it was nevertheless possible to use the point to good advantage. None of the factory copy helped in this respect.

Not so very long ago, factory advertising chiefs held a conference at which they accused the average automobile dealer, when given any leeway in an advertising campaign, of frittering away the fund on things such as lodge programs and carnival programs and similarly admittedly ineffective ways of spending advertising money.

However, as a counter to that, the dealer can point out such instances as the following: In one city civic clubs and women's organizations in the community said in no

THIS letter was written by a man who is thoroughly familiar with selling automobiles in a practical way. He is in a position to know what dealers throughout the West are thinking.

He objects strongly to the demand which many factories are making that the dealer use only such advertising copy as is prepared by the factory. He believes that such a demand is unfair to the dealer and ineffective in producing maximum sales.

Factory sales managers may not agree with all of the opinions expressed. AUTOMOTIVE INDUSTRIES *will be glad to print any further views on this important question.*

uncertain terms what they thought of signs placed along a certain park drive where a community owned the right of way, but where adjoining property could be purchased for signing purposes. The factory had at that time started an extensive advertising campaign along this highway. They were requested to discontinue it by the community, and the dealer transmitted the request to the factory, but the factory insisted that the very opinion of the objectors would make the campaign more exclusive, and therefore the sign should go up. Needless to say, this campaign has been productive of nothing but ill-will and a continuous source of annoyance to the dealer who has been placed in an apologetic position ever since.

Then there is the flood of printed sales helps which clutter up every salesroom; pertinent facts, good illustrations and diagrams that tell a story that is valuable. The intelligent salesman can make no end of use of this material, but only a dealer who has to shovel this stuff into the furnace every so often knows how much of this material serves no useful purpose.

The factory's viewpoint in some respects is probably built on the theory that advertising in any community should build up their name, the name of their product to the end that their position in any community may be continuous and secure. The dealer, on the other hand, points out that precedents and past experience have shown conclusively that the most important asset which a factory can have in any community is a solid dealer organization, and that without that the best name falls by the wayside. To that end, the Western signers of the new contracts are of the opinion that it is a mistake to take the policy of local advertising out of the hands of the dealer and distributor.

Steering System Faults Explained

Editor, AUTOMOTIVE INDUSTRIES:

Your recent articles pertaining to the question of easy steering of automotive vehicles are exceptionally timely. We must necessarily admit, with regret, however, that the question of steering and the fundamental laws that govern it have suffered much with neglect the past six or eight years. Very little if any information has been given publicity that would help to overcome the many faults of hard steering and front wheel wobble.

In the many cases that I have observed, front wheel wobble was overcome only at the expense of a very noticeably shortened life of the steering gear and this without actually removing the cause. In these instances bearings, bushings, tie rod knuckle pins and drag link springs were tightened which overcame the evil but only for a short time until these parts worked loose again. During the time that they were tight these parts were subjected to very rapid wear and consequent shortened life.

It can safely be said, without any hopes of having to retract the statement, that very few, if any, passenger cars or motor trucks have their drag links located in the proper position, to facilitate easy handling. It has been almost universally accepted that the position of the drag link should be such that its center-line intersects the center of the front spring eye. I have found by experience that this rule is incorrect and quite often results in front wheel wobble, depending entirely, of course, upon the characteristics of the front spring design.

It can be said that the center line of the drag link should be tangent to a radius of from two to four inches above the front spring eye under full load conditions. The true radii can be determined only by calculation. This radius or center which indicates the insersection of the drag link center line is also the true center about which the axle, in its shackled condition, tends to rotate. With the drag link located thus the steering gear is relieved of every possible shock that would otherwise be delivered to it because of the fore and aft motion of the axle resulting from the various positions of the spring due to the irregularities of the road.

To relieve the steering gear of shock by the correct alignment of all parts that connect with it, is to relieve all of these working parts of shock and consequently increase the life of the entire mechanism.

A good practical rule to follow concerning the castor of the front axle and one that invariably eliminates even the slightest tendency to "shimmy," is to make the castor angle identical with the wheel spindle angle. In other words if the angle of the spindle is $1\frac{3}{4}$ deg. from the horizontal then the castor angle should also be $1\frac{3}{4}$ deg. I have personally conducted tests in which we exaggerated the castor angle to as much as 10 deg. and found the effect of hard steering becomes exceptionally apparent beyond 5 deg., the effect, however, increasing as the tire size was increased. It was also found that at any angle greater than 4 deg. front wheel wobble became almost uncontrollable. At 10 deg. it was impossible to exceed a speed faster than a walk due to "shimmy" caused by the exaggerated castor angle. A. W. WERNER,
Chief Engineer, Parker Motor Truck Co.

Electrical Unit Standardization

Editor, AUTOMOTIVE INDUSTRIES:

We are very much in sympathy with some kind of a standardization program covering electrical units, and believe that a combination of the schedules proposed by J. G. Vincent in the Sept. 28 issue, and the schedule proposed by L. B. Ehrlich would be well worth considering.

While it might appear to be somewhat detrimental to progress, to standardize on the number of teeth in the starting motor pinion, yet this is one of the most annoying features of starting motor equipment and one which an effort should be made to standardize, and we believe that, by using perhaps a couple more sizes of starting motors, instead of the five sizes proposed by Vincent, it would be possible to standardize on the number of pinion teeth for a given size of starting motor. Then, the difference in their other characteristics would surely be such as to put them in the proper classification.

With reference to generator standards, we believe a similar numbering system should be used, and a set or two or three sets of specifications for each number of generator should be arrived at, somewhat as indicated by Ehrlich. For instance, we might take a No. A S. A. E. standard generator and we would have, say, three different sets of specifications covering this sized generator. I would give each of these two or three, or even four sets of specifications, a separate number or letter. It should then be possible to order, say, a No. 2-A generator and know just what you were getting, or the standard number could be No. 21 or No. 22, the first digit being for the No. 2 S. A. E. standard, the second for the particular specification required.

We firmly believe that the main mechanical and mounting dimensions should all be standardized for a given number of generator and starting motor and, further, that the characteristics of each generator in a given number should be standardized even though this might require two or three different sets of specifications. This, particularly, for generators. WALTER M. PETTY,
Service Motor Truck Co.

Problem of Production Becoming One of Management

Competitive advantage from operating equipment or methods tends to diminish. Further increase in output and decrease in costs will result from better leadership. Big questions all ones of human understanding, capacity and inspiration in management.

By Harry Tipper

THE problem of production is becoming more and more a problem of management. Advantages in machinery and processes are difficult to secure and still more difficult to maintain in the face of the widespread standardization and the competitive necessities.

Writing in 1900, Hobson, the economist, noted the tendency for all mechanical equipment, systems and methods of operation to become equally the property of all competitors within the field. As he noted, the ease of communication, the general advance in scientific knowledge, the necessity of the seller to reach the whole possible market, tended to reduce the opportunity for competitive advantage because of operating equipment or method.

Great variations still obtain in the matter of production costs. The advantages in this respect are not to be found exclusively in the largest establishments. In fact, many cases have developed when the largest companies have been placed at a disadvantage in competition with smaller concerns in the same line of endeavor.

Buying advantage, volume of production, and extent of distribution, are not in themselves sufficient to give a preferential position to any concern in the marketing of commodities. There are phases of the matter which account more largely for the variation in production costs in the same field with similar manufacturing requirements. These phases classify themselves as

(a) Reduction of avoidable wastes.
(b) Increase in production rate and reduction of labor cost and turnover.
(c) The accuracy of the judgment in estimating the future conditions in buying and selling.

These are problems of management and relate directly to the understanding of those responsible for the factory operations. They belong to the human side of industrial affairs more largely than the mechanical or systematic. The history of industry shows that wastes are reduced bit by bit. They are affected by the intelligent consideration of the man who is close to the operations. They are almost insignificant in the individual effect, but they assume large proportions as these small advances continue.

In one plant in the automotive field, a large cut in the operations was secured by the ability of the various supervisors to make a small cut in one or more of the items under their care.

Gas consumption for melting the cyanide had been reduced about 60 per cent by more careful insulation and better alloy in the pots. Tool consumption had been more accurately determined and savings effected by a more detailed and careful study of the actual service of a given tool.

All through the plant the same story obtained. To secure such results a number of supervisors had to work enthusiastically and intelligently with matters which were routine. It is a difficult matter to retain alert curiosity about familiar routine, to question the advisability of each piece of work and each method. It is still more difficult to study out these small improvements in the face of the operating necessities always facing the supervisor. The work must be gotten out. Everything has a tendency to give way before this pressure for operation. To keep the minds of the supervisors active and alert, for those small improvements, which constitute the substantial progress in waste reduction, is a job of human understanding in management demanded of the real leader. This job argues the capacity to inspire, to instil confidence and to encourage by example and precept all through the establishment.

The increase in production rate is again a matter for management in human affairs. There is a tendency in all

WITH the ease of communication and increase in general scientific knowledge it is becoming increasingly difficult to obtain and maintain industrial supremacy through equipment and methods.

* * *

Harry Tipper points out that the reduction of waste, increase in production rate and reduction of labor costs and turnover and accuracy in forcasting buying and selling conditions are all problems of management.

* * *

He shows that good management requires getting the best from the individual through an understanding of human affairs and that supervisors of manufacturing labor should have a freer hand to bring about improvements in relationship which their close contact permits.

men to slack off to a minimum pace that which has become routine. Most men are interested in earnings only as a matter of necessity or the special urge of an unusual requirement. Many men are content to make a fair sum of money, although all men will take advantage of scarcity of labor to get more pay for the same work, and most men will strike for greater privileges; pay alone will not increase the production pace on the average. It takes a lot of careful study to work out a wage system and time study arrangements which will appear fair and reasonable. It requires intelligence in management of an unusual kind to keep men contented, working harder than the average of their occupation and staying with the same concern.

THE important part of the matter is its practicability. It is evident that such items as a large production per man and a smaller labor turnover are possible from the fact that factories in a number of cities have done just this. In fact, there is no phase of management which shows a greater variation than the position of production costs from the standpoint of direct labor. Side by side in the same town factories employing the same kind of skilled help vary as much as 40 per cent in the effective costs. In all the metal trades industries there are factories showing smaller turnover, no strikes and few general disputes. These are practical effects secured from men of capacity, but not men of genius. For some reason, the men in these shops who are charged with the responsibility of management have had a free hand in governing the conditions.

I am firmly convinced, from much conversation with factory men, that there are many men in the supervision of manufacturing labor who could and would better the conditions in this respect if the general executives or directors would give them a reasonably free hand. Most of the more alert men in responsible charge are interested in the progress made in other shops. Many of them have studied the methods and results. Many of them have a good deal of understanding about the way to handle human beings, but not many of them have any power to change working conditions, labor rates or other general labor factors without the approval of other men further away from the subject and less capable of judging the wisdom of the action.

Decrease in production costs and reduction of labor turnover are matters of human relations, and belong to the realm of management. Little can be done with equipment and system; what is done must be done through understanding and judgment.

The circle of industry has materially enlarged even since the war. The automotive industry is more intimately affected by other conditions on the outside. Consequently the operations are more and more concerned with the efficiency of judgment displayed by the management in the speculative decision on the buying market for materials and the selling market for product.

HERE there is a great deal to be learned. Few manufacturers but misjudged the recent depression. Many misjudged the recovery. More are still misjudging the market conditions for automobiles, parts and accessories, so that all their other calculations are set by the ears on account of that error.

We have not had much practice in this speculative judgment on markets because it has not been necessary to consider the matter seriously until lately; consequently, we are not intelligent in estimating the outside conditions which affect these calculations.

Economic curves can help much. Charts of production and distribution are of value. But the position of the individual concern in this respect is not intimately related to these charts and curves, except as they are interpreted in the light of the individual history and the particular problem involved. This relation between the general economic circumstances and the particular factory is the speculative part of the problem of the buying and selling market. Experience is required in order to weigh outside circumstances, past records, present indications, and suggestions in the true light in connection with the responsibility of management. More and more the actions of business are concerned with the future, immediate and more distant. Every policy must be weighed for its future significance. Each new development must be considered in the same way. Plans must be determined to-day for operations affecting the market of next fall or five years from that time.

All these are speculative in the sense that they rest upon the interpretation of past events, and present conditions in their future suggestion. Each problem varies in this respect. Even when we knew that business would be poor in 1921 some factories went ahead with production at full pace. In a number of cases this was justified—in some it was not. What made the difference?

THE individual circumstances, finances, costs, sales work, trade reputation, operating ability, etc., all entered in. In some cases they were measured more correctly than in others.

The speculative judgment on the immediate future and more distant requirement of the buying and selling markets is a part of the job of management and one of the items demanded by the competitive conditions in a more efficient industrial establishment.

So the big problems are all problems of human understanding, capacity and inspiration in management rather than matters of systems and equipment.

Educating Independent Garage Men

THE independent garage is an important factor in the maintenance of the electrical equipment on the automobile. There are large numbers of owners who are not conveniently located with respect to authorized electric service stations. When these owners have electrical trouble, they naturally turn to the man that they regularly patronize for maintenance work.

The education of the independent garage man on the subject of maintenance of electrical equipment is consequently of major importance if owners are to get satisfaction from the electrical equipment on their cars. The garageman must know how to diagnose the trouble, how to fix it and where to get such replacement parts as are necessary. In an effort to supply the garageman with this sort of information, the Westinghouse Electric & Mfg. Co. has compiled the Westinghouse Automotive Electric Service Encyclopedia and Parts Data in two volumes.

Volume I deals first with electrical fundamentals and with the various units that go to make up the electrical equipment on the motor car. Following this, there is a section devoted to the internal wiring diagrams of various types of equipment. The next section gives the wiring diagrams for Westinghouse equipped cars. Another section tells how to locate trouble. The following section gives detailed instructions for the construction of test equipment, after which comes a section on test specifications. The last part of the book describes the Westinghouse equipment on various makes of cars more completely. This section is arranged alphabetically. Volume II gives the style number and price of every Westinghouse unit and each of its parts. It also tells how and where to order parts.

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Watch Your Coal Bins

FORTUNATELY for the automotive industry the fuel problem was solved temporarily before it became so acute that operations were completely curtailed, but the strike lasted long enough to show what might have happened had it continued much longer. For one thing it meant a big increase in the coal bills.

One fact which should be kept constantly in mind by large consumers of fuel is that the agreement between the miners and operators was merely a temporary one and that it will expire April 1. Little progress has been made in arriving at an arrangement which will mean permanent peace in the coal fields.

When the strike began last year it was viewed with comparative indifference because there were large reserve stocks above ground. No such condition will prevail next spring and if there is another suspension of operations it will become serious much more quickly.

Automotive manufacturers were fortunate last year because they had been given ample warning that a strike was impending and were able to accumulate reserves. The situation should be watched closely for the next few months to the end that the industry may be as happily situated if there is to be another walk-out.

Owners Dictate Future Design

EVERY car owner is a potential inventor. Despite the credit due to engineers for improving automotive vehicles, the 13,000,000 people in the world who drive cars and trucks are primarily responsible for improvements in design. The car user knows very definitely what doesn't please him in the operation of his vehicle. Regardless of engineering effort, he will always find "something to kick about." These "kicks" are the acorns from which the oaks of design improvement later grow.

Manufacturers who are to go forward most rapidly will begin to pay more attention to what the owner thinks about their product. They will devise methods of getting owner-reaction from every part of the country, and will definitely attempt to incorporate that reaction into future construction policies.

When an owner is displeased with something about a car he rarely knows the real reason for the trouble or the difficulties of remedying it. He simply knows that he is not satisfied. To explain to him the reasons for the trouble may convince him intellectually that he has all that can be expected, but it does not satisfy his desire for the something better that he wants.

Engineers may say that the popular desires are frequently visionary and unpractical. Frequently they are, so far as present practice is concerned. They deserve careful consideration, nevertheless, because current expert practice is always somewhat behind current needs and desires.

Don't Forget Your Foreign Trade

AMERICAN manufacturers cannot afford to let domestic prosperity obscure the enormous trade possibilities abroad. Although this business may not be thrown on our doorsteps it is vital to the continued prosperity of American business. Foreign outlets must be found for surplus American products if our mills are to be kept operating at capacity.

Now is the time to lay the foundation for an export trade which will keep the wolf from the door in periods of depression at home. Such a business cannot be retained permanently if foreign fields are forgotten as soon as domestic demand insures a market for all the goods which can be made.

Success in foreign trade demands patience, courage and foresight. It cannot be built up overnight as a stop gap to overcome the effects of depression at home.

Keeping everlastingly at it is the only way to get and retain sales in other lands.

Trade is beginning to revive in Great Britain and trade there always means foreign trade. Notwithstanding the collapse of currency in Germany that country has been able to build what are said to be the largest freight steamships ever constructed in Europe.

These are indications that our chief rivals in international trade are emerging from after the war chaos. They are preparing to go after foreign trade with the energy and patience for which they have been noted and if America is not to lose what it has gained it must keep constantly on the job.

Difficulties of Noise Measurement

ENERGY in all its different forms is undoubtedly capable of measurement, but in some forms such measurement seems to involve much more difficulty than in others. This applies particularly to sound or that form of sound with which we have most often to deal in mechanics—noise. There is obviously a good deal of similarity between noise and light in this respect, as both, if they emanated from point sources, should follow the same law as regards variation in their intensity with distance. This "inverse squares" law is made use of in all measurements of luminous intensity. It could undoubtedly also be applied to the case of noise measurement if the noise emanated from a restricted area and if it were found possible to absorb sound by any walls as effectively as it is possible to absorb light radiation by a black surface.

A sound wave carries a certain amount of energy which can be made to deflect a lightly mounted vane upon which it strikes, and the resistance to the deflecting force on the vane may be taken as a measure of the intensity of the sound at that point. The difficulty here is that of the sound energy acting on the vane, generally only a small portion travels directly from the source to the vane, most of it reaching the vane by being reflected by the floors, walls and ceiling of the room in which the test is being made, as well as by other objects within the room, or if the test were made in the open, the sound would be reflected by the ground and by any nearby objects. It seems impractical to have both the source of noise and the indicator of sound energy mounted far away from any surfaces capable of acting as sound reflectors, but it is not impossible that a method may be discovered of so constructing or lining walls that they will absorb practically all of the sound energy that falls upon them. This is really the chief problem involved in the development of a method for measuring or comparing noises.

There are, however, also other difficulties connected with the problem. In comparing gear noises and other objectionable noises of machinery, what we desire to know is which is the most objectionable to the ear. It does not require much argument to make it plain that all sounds are not objectionable in direct proportion to their wave energy, but that much depends upon the character of the sound. Of course, as long as we confine our measurements to any particular kind of noise, such as gear noise, this difficulty practically vanishes.

This problem of the measurement of noises has received a good deal of attention recently in connection with gear noises, but if it is solved effectively there will be many other uses for the method evolved. In automotive engineering we could use it to advantage also in determining engine noises, which might possibly be divided into valve noises, exhaust noises, etc.

Perhaps some day we will have a noise measuring technique as highly developed as photometric science is to-day. In this latter field we now have an instrument which when placed at any point of an artificially illuminated room will tell immediately the intensity of illumination at that point in foot candles. For the unit of sound energy the name caruso has been proposed; the unit, however, seems to still lack a precise definition, but that could probably be readily supplied if once an accurate method of comparison of sounds had been found.

Keep the Name of the Industry Clean

EVERY man connected with an automobile manufacturing plant affects future sales favorably or unfavorably by his personal conduct. Small deeds, relatively unimportant in themselves, are frequently responsible for strong and widespread criticism of the industry as a whole. The following letter, recently received by AUTOMOTIVE INDUSTRIES from a prominent industrial executive, illustrates this point admirably. The letter tells its own story and points its own moral:

"A friend of ours just came in from Philadelphia this morning on a train that was three hours late and he had to put up with a lot of drunken nonsense from representatives of your industry who were coming out here from Philadelphia to drive cars back.

"This man has been on a lot of trains out of Philadelphia and New York in the last year or so and says it's been his misfortune many, many times to hit trains with these gangs that were being brought out to drive cars home. I am just wondering if that is a good advertisement for the automobile industry.

"Granted, there are only a comparatively few of these men out of the hundred million people in this country. Nevertheless, it rather seems to me if I were on a train, saw a drunken gang like that and discovered what car they were going to drive back, that certainly would be the last car that I would want to use because there would be no telling what shape it would be in by the time it got to Philadelphia.

"In their liquid loquacity, this bunch admitted that a number of them were pinched the last time they came East driving through Beaver Falls. Driving away is a good proposition for a car if it is well handled, but I have seen some drive-aways that I wouldn't take as a gift."

November Output May Be 220,000

Year Moves Forward to 2,500,000 Mark

That Total Probable Despite Regular Inventory Taking at Holiday Season

NEW YORK, Dec. 4—With a total production of cars and trucks estimated at 220,000, November not only establishes a new record for that month but becomes the ninth consecutive month to pass the 200,000 mark. This figure was reached in the face of a short working month, inclusive of a holiday, which was the only factor keeping the total output from equaling that of October.

As it is, the high mark in the production history of the industry for a year's output has been passed by a substantial margin and the end of December will probably see the total production for the twelve months around 2,500,000. There will be some curtailment of operations this month due chiefly to the closing of many of the plants for the regular inventory taking. But even with this done the output will have to be only slightly in excess of 150,000 to bring the year's total to that figure.

Operations at High Level

Manufacturing is being maintained at a remarkably high level, despite the season of the year when there is a seasonal lull both at plants and in the sales field, and few producers are reporting any tapering off of schedules. They are being governed in their operations solely by the demand and as yet there is no wide evidence of a sales decline.

While closed cars continue foremost in the manufacturing programs, there is evidence of an expansion in open car production, which will grow steadily to meet the anticipated demand in the spring. Body plants are working full blast to catch up with back deliveries as well as to meet current demand. So great is the press for closed bodies that factories producing them will work at maximum capacity throughout the winter. Greater relief will come with the opening of additional plants after the first of the year.

Some improvement is noted in the transportation situation. Shipments are being received by Pacific Coast dealers with more regularity and added rail equipment is moving carloads that have been awaiting movement for some weeks. It is confidently believed that the worst of the difficulties in getting cars to dealers have passed and from now on there will be noticeable improvement. Driveaways are reported to be decreasing and

(*Continued on page* 1153)

Business in Brief

NEW YORK, Dec. 7—Industry is generally active. The jobbing trade has kept a good pace aided by holiday buying and retail trade has been stimulated by colder weather. Primary lines in general are quieter. Collections are slightly easier.

Complaint of car shortage continues to be widespread, although the situation appears to be somewhat improved. Supply of cars seems to be poorest in West Virginia and central Pennsylvania.

Car loadings for the week ending Nov. 18 exceeded those of the week of Nov. 11 by 15,185 cars. Coal was responsible for this upward turn. Total loadings aggregated 969,094 for the week.

Crops are moving to markets more freely. England is buying Manitoba wheat, and some 20,000,000 bushels may be expected to move eastward in the next two weeks. Winter wheat crop conditions have improved and a larger acreage has been planted than was at first expected.

Building has proceeded at a fast rate due to the open season. This has maintained activity in building materials. Delayed coal shipments have affected production of brick, cement and lime.

Steel prices have eased slightly. Railway material is taking large amounts of steel and cars continue to be ordered. Furnace coke is at the lowest point since the end of the strike.

Stocks recovered before the holidays after being depressed by bear raids. Bonds moved irregularly. Sterling reached 4.52¼ for demand. This is the highest point since July, 1919. Money rates continue steady. Bank clearings totaled $5,499,985,000, a loss of 23.6 per cent from the previous week.

Taking of Inventory Starts in Milwaukee

Some Plants in Districts Close Although Closed Car Shipments Continue

MILWAUKEE, Dec. 4—As might be expected, there has been a slowing up of automotive production schedules since the Thanksgiving Day recess, but this is far less in effect than it has been in any other year at this period. A good many shops closed down Wednesday night until Monday morning, over the holiday, inasmuch as need of parts by manufacturers is less urgent, and while delivery specifications are well sustained, considerable of the current output is going into stock for meeting shipping directions when these become more active after Jan. 1.

The let-down in passenger production in this district is not uniform, at least one factory still being virtually on a capacity basis while others are as a rule down partly or wholly and engaged in inventories. Shipments, however, are going forward every day, these embracing principally closed models, considerable of which are still on back order.

Dealers are taking a few open cars, not so much for stock as for display purposes and the endeavor to obviate a barren aspect of show windows and sales floors, and they are also taking all the closed types available, using the surplus over current sales for stock and display.

Parts Makers Work Steadily

Makers of engines, transmissions, frames and other units are working steadily, although their shipments temporarily are lower. These industries look for a satisfactory December, but no resumption of brisk activity until after the national shows and the resumption of factory production on quantity scale in preparation of spring deliveries to distributors and dealers.

It is significant that parts makers have encountered no such slump in orders as usually has been experienced in former years after Oct. 15 or Nov. 5. The present let-down has been gradual and began much later, while its extent is not severe.

Tractor and power farm operating equipment manufacturers look to see the big exposition of the industry at the Wisconsin implement association convention in Milwaukee this week develop considerable business and give them a basis upon which to determine production schedules for the coming three or four months.

December Opens with Big Programs

Curtailment Is Due with Holiday Season

Price Changes and New Models Keep Business Continuing in Good Volume

DETROIT, Dec. 1—Manufacturing in December will show a gradual decline owing to the lateness of the season and the holiday inventory period. While there is continued extensive buying of closed models, most of the open cars are going to dealers for stocking over the turn of the year. This is especially true in the middle priced field, there still being a large volume of purchasing of open models in the low-priced and better-priced lines. Price changes and new models in a number of lines have kept business coming through in greater volume than usual at this time of year.

Manufacturers generally are rushing through a large number of cars before winter weather complicates the railroad situation. Shipping during the early months of the year may be curtailed greatly because of the shortage of transportation facilities and it is desired to provide ample stocks against this. There is, however, much ready business and schedules are conservatively based.

Schedules of Companies

Ford sales during November will exceed 100,000, practically all of which are in the domestic field, and due largely to the recent price cut. Sales following the reduction have exceeded expectations and will necessitate the manufacture of 100,000 vehicles in December, despite inventory period. Closed car business is about 25 per cent of the total. Tractor manufacturing is approximating 200 daily.

Chevrolet is building 1200 cars daily and will increase this output during the month. Business is running strong on closed cars, and orders are several months ahead in practically every model. There is a large ready market for its open models, and the company is intensifying its sales efforts in all territories.

Companies manufacturing closed cars of the utility type report these behind orders in almost every instance. From ten to thirty days are required for deliveries. In this group are Dodge Brothers, Maxwell, Hupp, Dort and Studebaker. Schedules in these plants on all models show Dodge Brothers to be manufacturing about 500 daily; Maxwell, 200; Hupp, 100; Dort, 100, and Studebaker, 400, in all plants.

Buick is continuing its heavy production. Schedules in all plants, including Canada, approximate 600 daily, a large part of which is in its touring sedans. Hudson and Essex are building about 250 daily, with its coach models leading in popularity. Closed car Hudson and Essex business is now close to 60 per cent.

Better priced lines are running close to capacity. Cadillac with new low prices in effect is building about 100 daily. Packard is increasing its production in December to 2250 a month, a 25 per cent increase over its earlier year schedules. Lincoln production at the rate

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Dealer Should Be Given Greater Education on Part Plant Advertising Plays in His Selling Campaign

By W. K. Towers,

Advertising Manager of the Paige-Detroit Motor Car Co. and Jewett Motors

Detroit, Dec. 4.

INCREASED competition in the automobile business in 1923 means increased competition in advertising and it will be necessary to study mediums very carefully and devise new mediums. If this department is to be efficient in carrying out its part of the work of building sales more money will be spent in advertising than ever before. At this time, practically the entire available billboard space of the country is sold out for the year. Dealer co-operative work on advertising will probably reach a higher point in 1923 than it ever has done. In this latter field lies the most important work that the advertising department must undertake.

Dealers must be educated to the point where they can tie in their sales efforts with the advertising matter that is carried. Whether in national or local mediums having a dealer study the advertising matter and the persons to whose attention it is being brought means increased sales. Much advertising value is lost due to the failure of dealers to adopt the ideas carried out in the advertising.

Dealers should be educated to knowing that a sale is only part of a sequence of activities, the first of which is the national advertising. This is followed by the local advertising, then the personal letter or pamphlet in the mail and then the call of the salesman. Unless this follow-up campaign is adhered to faithfully, the advertising has not been successful. With dealers convinced of the efficacy of this chain of action, much improvement will be found in business.

Some sort of united action should be taken by the industry to formulate policies in relation to dealer co-operation on advertising. We are still in the formative stage and should be careful in the precedents we set. Dealers may become so accustomed to policies now in effect that it will be difficult to change them later. Should there be no definite ground on which to work we will be faced with the question of following suit each time a company alters its policy.

Factory help to dealers on used car advertising cannot go beyond the institutional stage of building up dealer reputation by helping to place the dealer as a reliable merchant. We build reputations which reacts favorably to ourselves in the sale of new cars. It cannot be expected that one factory will help to advertise another because its dealer has used cars of the other make to dispose of.

Poster advertising has been found effective and the industry should not participate in any movement to destroy this for purely esthetic motives. As long as others continue to use this form of advertising the industry should also share it to the full. Highway signs which are dangerous to travel should be removed but others than these should not be disturbed unless there is general demand for their discontinuance.

Willys Claims Agreement to Be Heard December 11

TOLEDO, Dec. 3—Date for the hearing on an agreement concerning disputed claims between the Willys-Overland Co. and the Willys Corp. has been set for Dec. 11 in the local Federal court.

Curtis T. Johnson, special master, has heard a number of the special and smaller claims not included in the mutual agreement reached some months ago. In the general agreement, claims of the Willys-Overland Co. against the Willys Corp. were limited to $167,797 and those of the Willys Corp. against the Willys-Overland Co. to $189,554. Neither of these amounts will now be pressed.

Goodyear Abrogates Kennedy Agreement

New Contract Entered Into Which Eliminates Bonus Provision Contained in Old

AKRON, Dec. 4—The contract between the Goodyear Tire & Rubber Co. of Akron and Leonard Kennedy & Co. of New York which provided for the payment by Goodyear of $250,000 a year plus five per cent of Goodyear profits between $10,000,000 and $20,000,000 annually for management of the Goodyear company, and which was made the basis of the suits filed in the Akron courts Aug. 8 by Mrs. Laura L. T. Weiss of Cleveland attacking the legality of the entire $85,000,000 refinancing and reorganization program of Goodyear was completely abrogated and discarded on Nov 24 by Goodyear directors at a meeting held in New York, it has just become known here.

$250,000 Provision Retained

The abrogation of the contract entered into under date of May 1, 1921, by Goodyear—the date when the company's reorganization program was consummated, was followed by the writing and entering into by the Goodyear directorate of a new contract with Leonard Kennedy & Co. which still provides for the payment of $250,000 a year, but which eliminates the provision calling for payment each year of a five per cent bonus.

In view of the fact that the contract formed the basis for Mrs. Weiss's four actions as a Goodyear stockholder, the action of Goodyear directors in abrogating the contract and entering into a new agreement, is considered significant from the viewpoint of old common and preferred stockholders of the Goodyear company.

Francis Seiberling and Russell Robinson of Akron, two members of the Goodyear directorate board who have filed answers in which they join with Mrs. Weiss in her allegations as to the believed illegality of the Kennedy contract, were not present at the meeting of directors when the contract was discarded. Both were unable to attend due to personal business.

Action Disclosed in Court

The action was not publicly revealed until the motion filed by the Kennedy company, seeking to have service of summons upon it in the Weiss suits quashed came up for hearing before Common Pleas Judge W. J. Ahern of Akron. Attorneys for Mrs. Weiss then asked that the hearing be postponed until they could secure a copy of the new contract.

E. G. Wilmer, president of Goodyear under the refinancing program, declined to commit himself as to the Goodyear directorate action, but did not deny that such action had been taken. Goodyear directors who were not at the meeting Nov. 24, however, have confirmed the negotiation of the new contract.

Motions seeking to quash service of summons on Owen Young of the General Electric Co. of New York and Clarence Dillon of Dillon, Reade & Co., two of the three trustees of the 10,000 shares of management stock issued under the refinancing program, have been argued before Judge Ahern, who has allowed two weeks for the filing of briefs.

Dillon, Young and John Sherwin of the Union Trust Co. of Cleveland are named defendants in one of the four Weiss actions. In this case Mrs. Weiss claims illegal issuance of the 10,000 shares of management stock to the three, and also charges dissipation of Goodyear assets through payment to each of them of $10.000 a year as salary, in addition to provision of a $10,000 traveling fund, available for all. She also claims this management stock as a voting power under the refinancing program which virtually controls the Goodyear company to the exclusion of the voting power of stockholders.

Dillon and Young seek to have the service of summons quashed on the ground that they are residents of New York and are outside the jurisdiction of the Akron court. Sherwin has accepted service of summons in the case and has filed his answer, entering a general denial to the allegations of Mrs. Weiss's petition.

MAKERS INQUIRING OF STEEL FOR 1923

PITTSBURGH, Dec. 4—Officials of steel plants here are expecting that activity in the automobile plants will provide them with sufficient orders to round out their first quarter's production next year, so that it will prove equal to their fall business.

With this in view, there is not expected to be any change by the big steel producing plants in the price of automobile sheets for the first quarter and the ruling rate of 5 cents is likely to prevail.

The contemplated expansion in the spring building program of the automobile industry is one of the few optimistic factors in the business life of the steel industry. Comparatively few of the big automobile plants have as yet placed their orders for sheets and bars, but many inquiries have been made and commitments are expected to be made in a short time.

FORD TO MOVE GLASS PLANT

DETROIT, Dec. 4—The glass manufacturing plant of the Ford Motor Co. will be located at River Rouge. The present plant at Highland Park, where experiments with glass production were made, will be abandoned when operations at the Rouge begin.

Hoover Bumper Claim Sustained by Court

Accounting of Profits from Lyon's Sales Ordered Made to American Chain Co.

SAN FRANCISCO, Dec. 4—By a decision of Judge H. M. Wright of Los Angeles, Special Master in Chancery, the American Chain Co. wins its suit against the Chester N. Weaver Co. of San Francisco, involving the validity and priority of the Hoover spring bumper as against that of the Lyon bumper, which is declared an infringement on the Hoover patent. An accounting of profits accruing from the sale of Lyon bumpers from 1916 to 1922 is ordered.

The suit was brought by the American Chain Co. in the southern division of the United States district court for the northern district of California, Judge Van Fleet presiding, and the finding of the Master in Chancery is subject to review and revision by the court. Both sides to the suit, however, agreed to abide by the decision of Judge Wright, and there is little probability that the court will interfere.

Manufacturer Not in Suit

The Lyon bumper is manufactured by the Metal Stamping Co. of Long Island City, and an attempt was made to include this firm in the defendants along with the Weaver company, which is western distributor for the Lyon bumper, but this inclusion was not allowed owing to a technicality in the filing of the amended suit by the attorneys for the plaintiff, the American Chain Co. It is generally understood here, however, that the Metal Stamping Co. will be made defendant in another suit.

It was shown during the 14 days' hearing of the suit that more than half a million Lyon bumpers have been distributed, and an accounting of the profit on these to the American Chain Co., to which Thomas A. Hoover of Fresno, Cal., assigned his patent, has been ordered. The Weaver company, in its defense, attacked the Hoover patent on the ground of want of invention novelty, lack of utility and priority of the Lyon invention as well as prior publication.

Question of Priority Important

The Special Master in Chancery considers the question of priority as the one of greatest importance and, after disposing of negatives of the other claims of the defense, declares other alleged prior inventions, such as those patented by Muir, Harroun, Welton, Newcomb and Harris, to have been of the rigid bar type, whereas the Hoover bumper is of the spring bar type. Concerning the claims of Lyon to priority of invention, the master's report says:

I accordingly find that the Hoover letters patent are valid. It is not necessary to say whether the Hoover invention is of a pioneer

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Reo's Report Shows $3,140,529 Profits

Assets Increased and Liabilities Decreased During Year Ending August 31

LANSING, MICH., Dec. 5—Total assets of the Reo Motor Car Co. are $16,238,864, and current liabilities, $2,783,025, according to the financial statement as of Aug. 31. The assets have grown $4,000,000 over 1921 and liabilities have decreased. Net profits for the fiscal year were $3,140,529. President R. E. Olds said.

In his statement to stockholders, Olds said:

Amounts due the company on notes and open accounts show a substantial reduction over the previous year. This is gratifying in view of our increasing volume of business and tends to show the gradual recovery which is taking place in the business world.

Inventories of raw materials and finished products at the plant and in stock at branches are priced on a conservative basis. These show a slight increase over the last annual report. Extensions to buildings and plant equipment have been made as required without the issue of bonds or preferred stock.

New types of open and closed cars have been added and these have had an unprecedented reception which argues well for the future plans of the company. The Reo selling organization is continuously increasing its list of distributors and dealers and expanding its territorial lines. In entering upon our nineteenth year there is every indication of a successful and increased business.

Current Assets and Liabilities

The current assets of the company show $5,886,880 cash, bills receivable, $2,335,560, and inventories of $7,174,603 as principal items. In the current liabilities, the principal items are accounts payable of $1,734,708, and reserve for taxes of $915,590. During the year in addition to cash dividends, $6,937,250 was transferred from surplus account to permanent investment in the form of a 100 per cent stock dividend. The present surplus is $5,719,913 as compared to $9,785,666 last year. The present book value of the common stock is $14.12.

In connection with the annual report it is noted that the directorate of Reo, comprised exclusively of its officers, has not changed in its 18 years of organization. These are R. E. Olds, president; R. H. Scott, vice-president and general manager; H. T. Thomas, vice-president and chief engineer; D. E. Bates, secretary and treasurer; R. C. Rueschaw, sales manager; George E. Smith, purchasing manager, and Harry C. Teel, factory superintendent.

ADDITIONS TO DANIELS BOARD

NEW YORK, Dec. 4—E. Roland Harriman, Henry Coleman Drayton and F. Frazier Jelke of Jelke, Hood & Co., and Philip Kip Rhinelander of the banking firm of Gillespie, Meeds & Co., have been added to the board of directors of the Daniels Motor Co., whose plant is located at Reading, Pa.

The four new board members are reported to have acquired a substantial stock interest in the company, and it is expected that the infusion of new blood will be followed by important industrial expansions. The company now is building its own engines at the Reading plant.

Berkshire Magneto Sold to J. & B. of Pittsfield

PITTSFIELD, MASS., Dec. 4—The J. & B. Co. has purchased the Berkshire Magneto Co. and is forming the Berkshire Products Corp., which will produce on a larger scale the principal products identified with the two companies. The change will be effective Dec. 15. The Berkshire Magneto plant is to be closed and the equipment moved to the J. & B. plant. It is understood that the ignition coils and timers for cars, trucks and tractors, leading J. & B. lines, and magnetos and windshield wipers, leaders for the Berkshire Magneto, will continue to be manufactured extensively, together with other apparatus of an automotive nature.

By the merger, Frederick G. Crane and his son, Frederick G. Crane, Jr., who have been the principal owners of the Berkshire Magneto, acquire a substantial interest in the consolidated property, whose capitalization is to be increased. Edward T. Shaw of the Berkshire Magneto will be retained as research engineer.

The officers will be: President, treasurer and general manager, George H. Southard; vice-president and director of sales, Harrie R. Williams; secretary and assistant general manager, Raymond D. Tufts; directors, Clement F. Coogan, Kelton B. Miller, David J. Gimlich, Frederick G. Crane, Jr., Harrie R. Williams, Raymond D. Tufts, George H. Southard, Jr., and Walter C. Kellogg. The merger reunites two concerns that sprang from the old Pittsfield Spark Coil Co.

DUPLEX MAY INCREASE BOARD

DETROIT, Dec. 5—Stockholders of the Duplex Truck Co. will vote at the annual meeting, Dec. 12 on a proposal to enlarge the board of directors and also to increase the capitalization from 100,000 to 125,000 shares with a par value of $10 if the changes are agreed to. The company intimates that it will extend its sales and manufacturing fields and that changes in managements will be made.

RUSSIA REVOKES LICENSES

WASHINGTON, Dec. 4—According to advices received by the Automotive Division of the Department of Commerce, the Russian Soviet Government has revoked the licenses to import motor vehicles and has requested a large American manufacturer to supply passenger cars direct to the government at wholesale prices.

Paige Plans 65,000 Production in 1923

Of This Output, 50,000 Will Be Jewetts—Closed Cars Will Reach 40 Per Cent

DETROIT, Dec. 4—Paige-Detroit Motor Car Co. and Jewett Motors has scheduled 50,000 Jewetts and 15,000 Paiges as its production in 1923, about 40 per cent of which are expected to be closed cars. This new total will be about 100 per cent greater than 1922 production.

Production this year, the company declares, will double the best previous year the company has had.

To provide for increased manufacturing, the company has taken over the former plant of the Hinkley Motor Co. and will devote it exclusively to Paige assembly. Formerly both Paige and Jewett models were assembled in plant No. 1. This building in the future will be devoted exclusively to Jewett. Under the new plan, the company will specialize two entirely separate groups of employees on the two models.

With the addition of the Hinkley Building, the company will have seven plants in the southern section of Detroit. The two main plants, in addition to those above, are for the manufacture of Jewett engines and include the painting and trim buildings.

Company Making Ranger Placed in Receivership

HOUSTON, TEX., Dec. 4—A voluntary receivership petition filed in the State District Court has resulted in the naming of Ed F. Dupree as receiver for the Southern Motors Manufacturing Association, Limited, maker of Ranger cars, trucks and tractors under a bond of $50,000.

Jacques E. Blevins, president of the company, asserts that the assets are approximately $2,000,000 and that the liabilities will not exceed $345,000.

Following the receivership, two local stockholders filed a petition of intervention, alleging mismanagement and asking for a court investigation. The court cited the president and officers to appear Dec. 6 to show what property had been sold, what amounts have been paid to the trustees during the past two years and what dealings the company had with the Union National Trust Co. and the Jacques E. Blevins Co., which are understood to have been connected with the financing of the automobile company.

The Southern Motors Manufacturing Association, Limited, was organized as a joint stock association Oct. 1, 1918, to build a plant and manufacture Ranger cars, trucks and tractors. The capital stock was placed at $10,000,000, and it is understood that nearly half of this is outstanding. Most of the stockholders are residents of Texas.

Shipments Overseas Gained in October

Government Notes Increase in Exports of Automobiles Priced Over $800

WASHINGTON, Dec. 2—Considerably increased shipments of passenger cars to the overseas markets were recorded during October, as compared to the previous month. The monthly compilation of automotive exports, announced to-day by the Automotive Division of the Bureau of Foreign and Domestic Commerce, gives 6446 as the number of cars sent abroad in October, the similar shipments in the previous month having been 5862.

This increase was entirely in the two higher classifications, those with a value of from $800 to $2,000 showing a total approximately 33 per cent larger in October and the higher priced group, having a value in excess of $2,000 having increased from 153 in September to 185 in the latter month. The shipments of lower priced cars, having a value of under $800, were practically unchanged in number for the two months, although the value in October was slightly higher.

Truck Exports Declined

Truck shipments underwent a marked decline, totaling 791 in October as compared with 1295 in September. The shipments of parts, except engines and tires, were practically the same in each month, the October value being $3,166,408.

In the three categories of trucks, the decrease in October fell particularly among those rated as 1-ton or under, but those rating up to 2½-tons also were somewhat lower. Of importance, however, was the increased exportation of the larger sizes rating above 2½-tons. The October shipments of 66 compared with 36 during September.

The export totals announced by the automotive divisions, pertaining only to the United States, are given in detail in the adjoining table and show that during the ten months ending with October the exports of passenger cars were 54,774, having a value of $42,125,847. Truck shipments for the ten months are given as 8871, valued at $6,803,655, and parts at $31,576,680.

Canadian Figures

WASHINGTON, Dec. 4—The foreign shipments of passenger cars from Canada reached the highest mark of the year during October, according to an announcement to-day by the Bureau of Foreign and Domestic Commerce. The October export trade of the Canadian factories consisted of 3667 passenger cars, valued at $2,365,409; 251 motor trucks, valued at $107,524 and parts to the total of $288,427. The September shipments from Canada consisted of 2943 passenger cars and 274 motor trucks. The principal Canadian markets consisted of Australia, the United Kingdom, New Zealand, South Africa, India and Argentina.

Table That Shows Shipments of Products of the Automotive Industry from the United States in October, 1922, and the Totals for the Nine Previous Months

	Month of October				Nine Months Ending October			
	1921		1922		1921		1922	
	No.	Value	No.	Value	No.	Value	No.	Value
Automobiles, including chassis	2,924	$2,707,737	7,253	$5,905,409	32,769	$37,800,972	63,854	$49,234,967
Electric trucks and passenger cars	....	....	16	21,742	....	....	209	305,465
Motor trucks and buses, except electric								
Up to 1 ton	595	755,096	....	....	6,540	9,469,719	....	....
Over 1 and up to 2½ ton	....	....	537	257,809	....	....	6,212	2,526,937
Over 2½ ton	....	....	188	265,352	....	....	2,046	2,561,769
Total motor trucks and buses, except electric	....	....	66	266,794	....	....	613	1,714,949
	595	755,096	791	789,955	6,540	9,469,719	8,871	6,803,555
PASSENGER CARS								
Passenger cars, except electric	2,329	1,952,641	....	....	26,229	28,331,253	....	....
Value up to $800	....	....	3,853	2,005,124	....	....	34,839	16,951,862
Value over $800 and up to $2,000	....	....	2,408	2,587,081	....	....	18,226	20,112,829
Value over $2,000	....	....	185	501,507	....	....	1,709	5,061,156
Total passenger cars, except electric	2,329	1,952,641	6,446	5,095,712	26,229	28,331,253	54,774	42,125,847
PARTS, ETC.								
Parts, except engines and tires	....	2,702,002	*12,609,734	3,166,408	....	33,824,455	*132,104,818	31,576,680
Station and warehouse motor trucks	8	9,680	5	5,822	307	239,065	128	131,947
Trailers	....	....	57	21,229	....	....	443	185,742
Airplanes and seaplanes	1	8,000	4	98,000	44	279,940	36	156,130
Parts of airplanes, except engines and tires	....	4,421	*275,199	185,205	....	136,955	*468,215	261,271
BICYCLES, ETC.								
Bicycles and Tricycles	....	36,352	1,866	11,867	....	1,383,586	9,094	108,330
Motorcycles	443	115,271	1,295	295,333	9,640	3,126,342	13,099	3,364,113
PARTS, EXCEPT TIRES								
Gas engines	37	10,090	332	58,249	935	278,447	4,003	575,934
Traction engines (steam) except agricultural	3	6,279	2	2,152	70	113,837	30	58,228
Aircraft engines	....	....	....	....	....	....	101	63,619
Complete tractors, except agricultural	39	74,298	4	12,350	5,174	5,708,363	41	116,205
Other internal combustion engines	217	16,544	728	81,939	6,917	1,434,666	4,143	651,414

*Pounds.

Packard's Dealer Force Increased 220 Per Cent

DETROIT, Dec. 4—Packard Motor Car Co. has increased its dealer organization 220 per cent in the United States and Canada during the year, giving the company representation in practically every important city. There also has been an increase of 48 per cent in distributors. Part of the increase, it is declared, is due to the discontinuance of branches by the company and some distributors.

As a result of the reorganization, R. E. Chamberlain, general sales manager, said a number of major changes in distributorships have been made where it was deemed that adequate facilities were not offered. Such changes were made in Buffalo, Pittsburgh, Washington, Baltimore, Toledo and Omaha.

Closer Contact Probable With Mechanical Schools

DETROIT, Dec. 4—As a result of the educational conference at the Hotel Tuller, the Federal Board of Vocational Education will undertake to establish a contact between those interested in automobile mechanical education and the automotive industry. The objective of this contact is to learn from the industry what it wants and expects from the automobile mechanical schools.

The conference was called by the Federal Board during the Regional Conference in Vocational Education and one session was set apart for the discussion of automotive educational problems. Seventy educators and representatives of the industry registered and practically all of them spoke during the day. Frank Cushman of Washington, Chief of the Industrial Education Service, presided and directed the discussion.

Most Mexican Sales Made on Cash Basis

Failure of Lacaud Bank, However, Has Not Destroyed Faith in Market

MEXICO CITY, MEXICO, Nov. 15 (*by mail*)—The failure of the Lacaud Bank (Banque Francaise du Mexique) and other financial institutions has affected practically every line of industry, including many automotive dealers whose business was financed by Lacaud and who, also, held their deposits. The result is a general feeling of unrest, but the concensus of opinion seems to be that this climax will have the effect of stabilizing activity and placing the automotive industry on a sounder basis from the general credit and financial standpoint.

Affected Some Companies

Some firms have lost considerable in cash and others have lost their chief stay in the matter of financing time payments. There has been no general rule here by which dealers have been governed in the extension of credit, and terms, apart from Ford sales, have ranged from three to ten months' and a year's credit, with an initial payment of from 20 to 50 per cent of the value of the car, the banks passing on the customer's credit and discounting the paper.

Several of the more important dealer organizations, however, have their own sources of financing. Two companies in particular which represent two of the best known lines of cars have their own finance organizations, and there is another which has back of it a silent partner who handles the financial paper on his own responsibility. Others have financing arrangements apart from the banks or such satisfactory relations with foreign financial institutions that they will be able probably to continue to extend some credit.

The result of the Lacaud failure has been an immediate tightening up of credit, and most sales are now being made on a cash basis. This probably will continue until conditions become easier.

New Buildings Going Up

This, however, does not mean that confidence in the market is lost. The Compania Automotriz Mexicana, which this year is doing a business of probably $1,200,000 gold, is even now constructing a huge new building further up the Paseo de la Reforma which will be used for the display of second hand cars and as a garage and service station. The Capital Motors Co., the Studebaker agent, is also about to build and will have 900 square meters of floor space for use as a used car showroom. The Moon agents also are about to build new premises on Reforma.

Hence, it would appear that the market is not depressed, although there is no doubt but that this crisis will affect sales in the immediate future and make collections more difficult. On the other hand, it will have the further effect of bringing the industry to less liberal terms of credit.

The used car problem is causing some concern, and there is some agitation among certain dealers to endeavor to standardize used car prices. This probably will not work out, and the safest plan seems to be that of taking in old cars on a consignment basis, crediting the new car buyer with whatever sale price is arranged. Two of the larger companies at least are opening special showrooms for used cars, the handling of which then will be a separate and distinct part of the business.

COUZENS APPOINTED TO SENATE VACANCY

DETROIT, Dec. 6—The naming of Mayor James Couzens as United States Senator from Michigan to succeed Truman H. Newberry, resigned, places in the Senate one of the foremost automobile men of the country.

Couzens became identified with Henry Ford in the early days of the Ford Motor Co. and served as Ford's chief executive for many years. His original investment in the company brought him about $29,000,000 when he sold out.

Since leaving Ford and his election as Mayor of Detroit, Couzens has devoted practically all his time to municipal affairs. He has been active in the advancement of the principle of municipal ownership of public utilities, the street car lines having recently been taken over by the city under his direction. By agreement Couzens will continue to direct the affairs of the street car company.

Little Motor Kar Opens Plant After Shut-Down

DALLAS, TEXAS, Dec. 5—The Little Motor Kar Co., Ltd., has resumed operations after being out of production for more than a year. Work is being carried on under the direction of a board of trustees for the stockholders, with C. H. Holtmann as manager and chief engineer.

The company is now building road machinery, pumps, etc., and has turned out a light motor truck which has undergone severe tests. While the company will not produce automobiles for the present, it is understood, it likely will turn its attention in that direction.

SEARS TIRE EQUIPMENT SOLD

DAVENPORT, IOWA, Dec. 4—James A. Kerrigan and Leon A. Hass, trustees for the Sears Tire Equipment Co., bought in the entire property at sheriff's sale for $[illegible].

Irvine May Address Export Heads Jan. 8

Official Expected Back from Orient in Time for Annual Meeting

NEW YORK, Dec. 5—The annual export managers meeting of the National Automobile Chamber of Commerce will be held here on Jan. 8 during the automobile show. This date, announced today by George F. Bauer, secretary of the foreign trade committee of the Chamber, was decided on at a recent meeting of the committee held in Detroit.

One of the topics of the program will be an address by William I. Irvine, who it is expected will have returned to the United States by that time, after a lengthy trip through the Orient as special commissioner of the Automotive Division of the Bureau of Foreign and Domestic Commerce.

Tariff to Be Discussed

Another discussion will center about ignition equipment for overseas vehicles. The distribution of gasoline and fuels in the foreign field will also be considered, and the chamber has requested that a representative of the Tariff Commission appear at the meeting to explain tariff policies.

Reports from several European countries indicate that readjustments of their automotive duties are being contemplated as a result of retaliatory features of the new American law, and the possibility of obtaining more equitable automotive tariffs throughout the world will be discussed at the export meeting.

Although the program is not complete, it probably will contain reports from several territories by recently returned travelers. Distribution abroad is another topic that has been suggested.

Speaking of the export situation, Bauer said:

> A very evident feeling of betterment as to the export trade was apparent in the Detroit district. Larger sales next year are expected and some companies have been shipping in large volume. A number of higher executives of some of the producing companies have recently returned from trips abroad, mostly to Europe, and they have been keenly impressed with the possibilities for extending the foreign efforts of their companies. It is to be hoped that more executives will familiarize themselves with the foreign field, particularly in such sections as Latin-America and the East, which are large and growing sales fields.

Bauer Works on "Drawbacks"

Arrangements were also taken up at Detroit for obtaining refunds from the Government on aluminum imported from abroad under heavy duties, but exported again in finished articles. Bauer is co-operating with Government officials to arrive at a simple method of accounts for handling "drawbacks" of this character.

SOUTH OFFERING GOOD SALES FIELD

Bank Reports Show Improvement There

Resume of Conditions Indicates Best Opportunities from Automotive Viewpoint

BIRMINGHAM, Dec. 4—Conditions in many industries and many sections in the South show marked improvement since Oct. 15, as indicated by the increase in bank deposits; the greater movement and consumption of lumber, the activity in the manufacturing areas of Alabama and Tennessee and the improvement in the textile manufacturing industry.

On the other hand the coal mining industry during the same period has received a set-back, owing to the difficulty experienced by the mines in securing a sufficient number of cars to move their production, particularly since the order removing the "coal priority for cars."

Notable among the indications of improvement is the statement of the secretary of the State Banking Association of Arkansas that the banks of Little Rock now have on deposit more money than at any time during the history of banking in that city, the increased deposits from Oct. 13 to Nov. 13 being in the neighborhood of $7,000,000. Another instance is found in the report of the condition of the Alabama State banks, which shows them as being in the best condition in the history of the State banking system.

Mississippi Bankers Meet

At a meeting of Group No. 1 of the Mississippi Bankers' Association held in Clarksdale, the feeling generally expressed was that Mississippi was well on its way out of the financial struggle brought on by the deflation and the resulting low price of cotton, together with the very short crop of last year. One of the leading banks of Tupelo showed a gain of $1,000,000 in deposits in its last report. The president of this institution gave it as his opinion that the banks of that county alone (the largest city being Tupelo) had gained in the neighborhood of $1,700,000.

This improvement in the financial conditions of the South is echoed in the bank statements of practically every town in Alabama, Mississippi, Arkansas and in parts of Tennessee and Louisiana. The banks of Birmingham showed the largest clearings in the history of banking here during the month of October, being an increase of almost $10,000,000 over the previous high record in September, 1922.

Birmingham, one of the largest lumber markets in the South, shows a condition from the point of view of the manufacturer, the wholesaler and the retailer that is unparalleled in the history of the trade in this section. The wholesalers report that in spite of the approaching winter and the car shortage November was a banner month. One of the most prominent of the wholesalers states: "I did the largest business this month that I have ever done. I did not make quite as much money, but my shipments exceeded anything on my records."

A prominent Birmingham manufacturer is sponsor for the statement that even in spite of the car shortage the actual shipments of lumber during the last two weeks of November were excellent for the season of the year, and added that the car situation had greatly improved and that the majority of the lumber shippers were now getting cars sufficient to take care of their needs. This is particularly true in the South, east of the Mississippi River; west of the river a great deal of trouble is still being experienced from the car shortage.

The iron and steel interests of the north Alabama area and the Chattanooga territory report an excellent business with orders that will take them through the balance of this year and well into 1923. A great many counties of the north Alabama area are producing good crops of cotton as the final figures are being tabulated. Notable among them is Madison County, in which Huntsville is located. The last figures on this county showing a production of approximately 25,000 bales, which at present

(*Continued on page* 1157)

Process Gear Authorizes Bond Issue of $2,000,000

SYRACUSE, Dec. 6—With the issuance of $2,000,000 in first mortgage serial gold bonds by the New Process Gear Co., Inc., of this city, announcement is made that the company's contracts assure a volume of business of between $7,500,000 and $10,000,000.

The bonds, maturing from one to ten years at the rate of $200,000 a year, consist of a first mortgage on the land, buildings and equipment, and serve as a lien on the net earnings of the company. S. W. Straus & Co. of New York has underwritten the issue.

The property of the New Process Gear, which was recently purchased by Durant interests, embraces seven acres of land with buildings having a floor space of eight acres. The output provides for equipping 600,000 cars annually. Its net tangible assets amount to $5,610,126, equal to $2,805 for each $1,000 of the new bond issue, with liabilities of $124,493. The mortgage for the bonds has already been filed.

Far West May Levy 2 Cent Gasoline Tax

Eleven Governors Favor Uniformity in Taxation and Anti-Theft Laws

SAN FRANCISCO, Dec. 2—A tax of two cents per gallon will be placed on gasoline next year in 11 western States, if the governors of those States are able to press such a law through their respective State legislatures.

This agreement between the executives of California, Arizona, Nevada, Colorado, Idaho, Montana, New Mexico, Washington, Utah, Oregon and Wyoming was reached at a conference held in this city, attended by Governors Louis Hart of Washington, Emmet D. Boyle of Nevada and William D. Stephens of California, and the secretaries of the other eight governors, the executives themselves being in attendance at the Colorado River conference at Santa Fe, N. M., and unable to leave. Funds from this tax are to be applied to building and maintenance of roads.

Consider Uniform Theft Law

The governors and their representatives also decided to present to their respective legislatures, as soon as it could be drawn, a uniform law for the pursuit, arrest, identification and punishment of automobile thieves seeking to escape by fleeing from State to State, or driving stolen cars from State to State in an effort to sell them.

The gasoline tax law will be copied after the one now in force in Washington, Oregon and Arizona, but all the governors will co-operate on an anti-theft law under which pictures and identification tags of known automobile thieves and of suspects will be broadcasted to the police of all these States immediately on the theft of a car, with full information concerning the car, and, if possible, a photograph of it.

Under this head also comes a plan for a State automobile constabulary, mounted on motorcycles, for the patrol of the highways and the immediate pursuit of automobile thieves. Insofar as possible, State lines will be eliminated in the work of these mounted police by making them members of the force of each State in the agreement.

More equitable automotive taxation and uniform traffic rules for all the States also are to be considered by the legislatures of each of the 11 States at their coming sessions. The present plan is to have a later conference between members of the legislatures of these States to draft uniform laws and to arrive at an agreement on more equitable taxation.

Men of the Industry and What They Are Doing

Alvin Retires Because of Ill Health

Recommended by his physician to take a rest as a result of an automobile accident in which he nearly lost his life a short time ago, Forrest J. Alvin will retire on Jan. 1 as general manager of the United States Motor Truck Co., Cincinnati. After recuperating Alvin has no definite plans for the future.

Olds Adds to Engineer Staff

Robert White and N. M. Ogilvie have been added to the engineering staff at Olds Motor Works. White was formerly identified with the Cubitt Engineering Co., where he served as assembly manager, and with other British motor car manufacturers. Ogilvie was connected previously with Cadillac.

Paige Appoints James Levy

James Levy has been appointed body engineer of the Paige-Detroit Motor Car Co. and Jewett Motors. He was identified with the Liberty Motor Car Co. for six years and previously was connected with the Chalmers Motor Co.

Prof. F. A. Wirt Joins Case

Prof. F. A. Wirt, formerly professor of agricultural engineering, University of Arkansas, has joined the advertising department of the J. I. Case Threshing Machine Co. He will be engaged in sales promotion and advertising work.

Benjamin Drewes Resigns

Benjamin Drewes, superintendent of foundries of the Kissel Motor Car Co., has resigned to become assistant general foundry superintendent of the Fairbanks-Morse Manufacturing Co., Beloit, Wis., under R. J. Barr, in charge of the casting shops of this industry.

Martin Succeeds Anderson

William D. Martin has been appointed assistant general manager of the Kenosha, Wis., works of the American Brass Co. division of the Anaconda Copper Co., to fill the vacancy caused by the resignation of James R. Anderson. Martin was transferred from the Waterbury, Conn., works in 1909 to Kenosha as purchasing agent and more recently has had increased duties in the sales department.

Hugh Sharp Goes with Dealer

Hugh Sharp, for ten years associated with the Harley Davidson Motor Co., Milwaukee, with important duties in the promotion division of the sales department, is now associated with the Northwestern Motor Car Co., Milwaukee, Ford and Lincoln dealer.

H. M. Fletcher with Haynes

H. M. Fletcher of Detroit is the latest district traveling sales manager to be appointed by the Haynes Automobile Co. Fletcher has been assigned to Kentucky, Tennessee, Alabama, Mississippi, Louisiana and Arkansas. He has been district manager for Cadillac, King, Cole and Studebaker.

EUROPE IS CHANGING VIEW ON AUTOMOBILE

DETROIT, Dec. 5—Commenting on his recent trip abroad, Roy D. Chapin, president of the Hudson Motor Car Co., declares that he noticed that foreign governments, for the first time, are recognizing the automobile as a business transportation vehicle.

"Europe heretofore has regarded the automobile as a thing to hang taxes on," says Chapin. "Europe already has the roads, which in this country had to be built before the use of automobiles could expand, and just as soon as the foreign governments' taxing authorities treat the automobile as a business proposition, its use will increase rapidly in Europe."

Government Interference, Theme at A. P. I. Meeting

ST. LOUIS, Dec. 6—At the opening session of the third annual meeting of the American Petroleum Industry, being held here, President Thomas A. O'Donnell, presiding, spoke chiefly against Government interference in business. He expects the overproduction of petroleum on the Pacific Coast to reach its peak soon and then to decline rapidly to normal.

A. C. Bedford of the Standard Oil Co. of New Jersey also emphasized the industry's aversion to other regulation in business except to uphold American rights abroad. He said that the petroleum industry has a ten to twelve billion investment primarily to supply the gasoline for the automotive industry. He predicted smaller profits in petroleum products in the future. Government interference with railways he said has resulted in shortage of transportation, but commerce has never halted through the failure of the petroleum industry to do its part.

Registration to-night numbered 600, with few automotive men in attendance.

TO DISSOLVE OHIO TRACTOR

COLUMBUS, Dec. 4—Stockholders of the Ohio Tractor Co., acting upon the recommendation of the board of directors, have voted to dissolve the corporation and liquidate its assets.

Foreign Field Good, Says Rickenbacker

Manufacturer Back Home Also Sees Wider Use Made of Four Wheel Brakes

NEW YORK, Dec. 4—Four-wheel brakes will be on most American cars within three years, predicts E. V. Rickenbacker, vice-president of the Rickenbacker Motor Co., after an extended European trip, which included both the French and English shows.

American traffic conditions, he contends, will force their adoption, and they will be just as essential as the self-starter. The need for acceleration in traffic and the control they give are the factors that will bring about their adoption, he thinks.

Regarding conditions as he found them, Rickenbacker says:

In both England and France I found the four-wheel brake coming into general use. Even cars as light as 1000 and 1200 pounds are using them. I should say that a majority of French makers have taken them up. And I believe that some of our own manufacturers are quietly investigating this European practice, for I heard of one big concern, whose representatives were abroad at the same time, buying three of the French four-wheel brake patents recently.

Tariff Discussed in France

France is talking about our new tariff. I do not believe France will meet our 25 per cent rate, but England probably will. The French apparently feel that they cannot hope to sell many cars in America and that if they cut their tariff to meet ours they will be opening the doors to a competition which will be formidable. In England they admit they cannot compete with the United States and they apparently welcome our cars. American cars, even with the duty, undersell those of English manufacture.

I believe the export situation is most favorable to us, and we ought to do a big business in England, Spain, the Scandinavian countries, Roumania and Greece. France, however, does not look so good, for there they go in strong for individuality and will pay good prices for French cars that meet their ideas. In England, to the contrary, while they have somewhat similar individuality in ideas, the matter of price figures.

None of the European countries are looking to the United States as a place to sell their cars. They are concentrating on South American business.

Germany is selling its cars in its own country, Russia and South America and trading in American dollars. Benz and Mercedes are each making about 4000 cars a year. Opel is building a few. Prices are holding up, too. No American cars are coming in.

Naturally, I am a great believer in racing. I feel that racing would re-stabilize our interests abroad, for our engines are not economical enough now for the foreigners. Racing would develop this economy

Kelly Tire Increases Lists; Akron "Waits"

Makers, However, Predict Higher Prices Will Come Within Next 30 Days

NEW YORK, Dec. 4—Announcement is made of a 10 per cent horizontal increase in the price of casings, tubes and truck tires by the Kelly-Springfield Tire Co. This applies only to dealers' orders placed in December. Increasing prices of rubber and cotton are said to be the reason for the increase.

Makers Wait for Each Other

AKRON, Dec. 4—Practically every tire manufacturer in the Akron district is frank to admit that tire price increases are entirely logical and almost certain to come within the next 30 days. None apparently, however, is ready to initiate the movement, each manufacturer waiting for the lead to come from his competitor.

The 10 per cent increase announced by the Kelly-Springfield company was not close enough at home to cause Akron manufacturers to fall into line. It will take an announcement by one of the major companies here to start the upward revision of prices, and when that initial announcement comes a grand rush may be expected.

A survey of Akron manufacturers shows that practically all of them hold the opinion that prices should be raised. They cite the fact that the price of crude rubber has increased more than 10 cents a pound in the last 30 days because of the Dutch-English agreement to curtail production. This agreement followed the passage of the British Stevenson law whereby an export tax is laid on all crude rubber exported, with graduation upward as the amount of crude rubber produced increases.

At the same time the increase in the price of cotton fabric for tires is cited as making a tire price increase logical. And, in addition to these, has been a gradual increase in the cost of labor, all three factors having cut the tire manufacturer's margin of profit to a minimum.

Present tire prices average about 40 per cent below the peak prices charged for automobile tires while they are from 10 to 15 per cent below pre-war prices when tires did not give more than half the mileage guaranteed for the tire today.

Tire production now is averaging more than 90,000 a day in Akron. By next April or May, manufacturers say, tire production in all probability will rise to new marks and may approach 125,000 tires a day in the Akron district alone.

British Accept Invitation

NEW YORK, Dec. 4—The Rubber Growers' Association of London will send a committee to this country shortly after the holidays for a conference with the special committee appointed by the Rubber Association of America to consider the new British restriction act limiting the production of crude rubber.

When this act went into force Nov. 1 the American association cabled to London asking for an international conference on the subject, fearing the effects of restricted production on the American tire industry. The British association suggested waiting until both sides had had an opportunity to see how the new idea would work out before conferring on the subject. Both now are agreed, evidently, that it would be best to get together as soon as possible.

It is acknowledged that the restriction act is the main reason for the price of crude rubber soaring to 27 cents, where it is to-day. It was quoted as low as 10 cents once within the past year, and most of the present tire prices were made when it was selling at from 15 to 17 cents. Since Nov. 1, however, there has been a gradual increase to the present level.

Americans fear that this restriction act may attract the speculators, and it is pointed out that a speculative rubber market would greatly hamper the industry in this country.

Goodrich Tubes Increased

AKRON, Dec. 7—The B. F. Goodrich Rubber Co. announces a 15 per cent increase in the price of its Silvertown tubes; 10 per cent, small size gray tubes, and 5 per cent in the price of its large size gray tubes. Tire prices remain unchanged.

December Is Opening With Big Production

(*Continued from page* 1145)

of about 30 daily is sold through the winter. Wills Sainte Claire, despite its temporary financial difficulties, is operating at the rate of about 20 cars daily.

Oldsmobile and Oakland are continuing operations at the rate of about 100 a day. Paige-Jewett schedules call for production of about 100 daily. Reo is approximating 100 a day in cars and speed wagons. Rickenbacker is building about 20 cars daily, and Durant about 100 daily each in both Durant and Star models. Gray is producing 100 daily and will increase this steadily to more than 200 daily by the first of the year.

Earl Motors, under the change in control, is outlining an extensive production for 1923 and is gradually increasing operations. Columbia has outlined a schedule of about 28,000 for 1923, on which it is now beginning. Liberty is arranging for its 1923 output and is operating on a regular winter schedule. Saxon is out of production pending completion of its financing.

Nash and Velie Output

CHICAGO, Dec. 4—Nash Motors at Kenosha, Wis., is now running on a schedule of about 170 fours and sixes a day. Velie Motors at Moline is running on a daily schedule of about 30 cars, production being somewhat restricted because of the scarcity of closed bodies.

Creditors of Saxon Seek Receivership

Officer of Company Says Failure of Financial Plan Precipitated Action

DETROIT, Dec. 6—Naming of a receiver for the Saxon Motor Car Co. has been asked in the Federal Court here pending action on a bankruptcy petition filed by three small creditors of the company. In the petition it is declared that the company has not been in operation for some time and that the plant at Ypsilanti has been left without any responsible person in charge. The petitioners are the Wire Wheel Corp., Detroit Insurance Agency and the Publicker Commercial Alcohol Co., whose claims aggregate $3,400.

An officer of the company said that the action of creditors was not unexpected in view of the failure of the financial plans of the company. Stockholders authorized 200,000 additional shares of stock on Aug. 3 last and arrangements were made for their sale. These would have placed the company in a position to continue manufacturing, but market conditions made the quick sale of the securities impossible.

Planned to Build New Models

With the additional money, the company had planned to exhibit new models at the national shows this winter and to develop its business for 1923 on the new cars. These were 6-cylinder models to sell at about $1,000 and had been fully developed. Failure of the sale of the stock made it impossible for the company to continue with its plans and the plant at Ypsilanti had been closed completely for upward of several months.

Since the retirement of Clarence A. Pfeffer as president last winter, Harry L. Bill, vice-president, had been in charge. The company has been reorganized several times and its stock is largely held by creditors under former regimes. The company relinquished its Detroit plant this year and moved to Ypsilanti as part of a retrenchment policy, but never has got into operation there.

Ford Factory at Trieste Is Included in Free Zone

WASHINGTON, Dec. 5—The Automotive Division of the Department of Commerce has received word of the granting of a concession to the Ford Motor Co. for the establishment of an assembling plant in the free zone of Trieste. When the question first came up the Ford company asked for the privileges of the free zone being extended to a plant lying outside these limits, which the company was desirous of acquiring. This request has been denied and an understanding reached whereby the plant will be located within the limits of the free zone.

Handley Reorganized and Takes New Name

Company Succeeding It Pays 40,628 Shares No Par Value Stock for Assets

KALAMAZOO, MICH., Dec. 4—Handley Motors, Inc., with an authorized capital of 600,000 shares of no par value stock and $1,000,000 preferred stock, par value of $10 a share, has been organized and has taken over all the assets, including cash on hand, inventories, receivables and plant of the Handley-Knight Co.

The incorporators of the new company are: James I. Handley, W. E. Upjohn, Charles A. Blaney, C. S. Campbell, W. H. Conklin, R. J. Fitness and C. V. Kean, Jr. Directors named for the time being are Handley, Blaney, Conklin, Fitness and Kean. Handley is president and treasurer, and Blaney vice-president and secretary temporarily. This is announced as a tentative organization only and in order to get the new corporation into operative form. A permanent board of directors and officers will be elected later.

Car to Have 6-Cylinder Engine

Future plans of Handley Motors, Inc., provide for the manufacture of the same Handley-Knight de luxe chassis, with a 6-cylinder engine, instead of the 4-cylinder heretofore used, and a smaller 6-cylinder car now being developed. The development of the new smaller car is well advanced, and it will be ready to show, in connection with the larger car, at the National automobile shows, in New York and Chicago.

Details of the reorganization and transfer are given by Handley as follows:

The purchase price of the assets taken over from the old company was 40,628 shares of the new company's no par value stock, and the assumption by the new company of approximately $170,000 of the old company's indebtedness, this consisting mainly of outstanding bonds on the real estate and buildings and bank lines secured by the unsold portion of the bond issue.

The 40,628 shares of stock are being taken by merchandise creditors of the old company on a basis of $10 per share. By mutual agreement, and at my earnest solicitation, the material manufacturers' taking the 40,628 shares on the basis of $10 a share will permit the sale of 109,372 shares of the same kind of stock at $2.50 per share, and the old Handley-Knight stockholders are to have prior right of subscription to all this stock.

Old Stockholders Benefited

This arrangement is for the express purpose of giving the old Handley-Knight common stockholders, 764 in number, the opportunity of acquiring stock of the new company at an inside price, low enough to wipe out their loss in the old company.

When the 150,000 shares of stock have been fully issued as above outlined, outstanding stock will have a book value of approximately $5 a share, exclusive of any good will items, and the old Handley-Knight stockholder who invests the same amount of money in the new company that he had invested in the old company, will own new stock worth what it costs him, including his old investment.

Handley further explained that this initial financing will all be done privately by the company, and the issuance of this amount of stock, in accordance with the foregoing plans will give the new company all the liquid working capital it will need for its operations during 1923. In case the 109,372 shares are not taken by the old Handley-Knight stockholders, right is reserved to sell the remainder to outsiders at the same price, $2.50 a share.

Handley further says:

After all this initial financing has been finished and the new company's manufacturing program is in operation, connections will be made with stock and bond houses throughout the country for the distribution of additional blocks of the authorized capital stock at higher prices, to supply additional working capital for the increased production for 1924 and thereafter.

The plant, except the service department and general repair work, has not been in operation for the past two months. The bulk of materials on hand and material commitments made in 1920 have been exhausted by the completed production program. It is the opinion of Handley that the new company, not being committed to any of the old high priced material contracts, will be in position to take advantage of present market levels right from the start, and, therefore, expects to be able to market the large car at about $1,000 less than the former price. The smaller new six is expected to sell in the $1,250 price field.

Elcar Awarded Contract to Build for Diamond Cab

ELKHART, IND., Dec. 6—Contracts have been signed by the Elcar Motor Co. of this city and the Diamond Taxicab Co. of New York City, under which the local concern will build the vehicles which will be operated by the New York organization. The Diamond company's initial order is for 1000 taxicabs of the landaulet type, and it is expected that the first shipment of five carloads will go East within a week.

The cab is the creation of A. M. Graffis, Elcar engineer, the feature of which is an adjustable top, which can be quickly lowered without interfering with protection from wind and dust from any angle.

Lorraine in Bankruptcy With $82,322 as Debts

DETROIT, Dec. 5—Lorraine Motors Co. has filed a voluntary petition in bankruptcy, showing assets in excess of $90,000 against debts of $82,322. The petition is filed by J. L. Dornbos, secretary and treasurer, and lists the assets as $52,000 in real estate, $11,579 in bills, promissory notes, etc., $19,025 in tools and machinery and accounts due, $8,372. The debts are practically all unsecured claims with about $5,000 due on taxes.

Inventory of Wills to Start Next Week

Intention of Receiver to Resume Major Operations at Plant First of Year

DETROIT, Dec. 6—Work of appraising the plant and properties of C. H. Wills & Co. will be started next week and will be completed, if possible, by Dec. 20. James G. Heaslet, Clarence A. Pfeffer and Robert H. Gordon have been named as appraisers of the Wills plant, to work under the direction of the Security Trust Co., the receiver.

The first two are well known in the industry as former heads of manufacturing companies. Gordon is a resident of Marysville, the site of the Wills plant, and has been selected for his special knowledge of the property.

Manufacturing operations at the plant have been discontinued for the present except for the work of completing cars in process of manufacture. It is the intention of the receiver to resume major operations the first of the year.

Hope for End of Receivership

Cars now on hand and in process of construction will be ample to meet sales requirements for the present, the receiver said to-day. It is hoped to bring the receivership to a speedy termination and a sale will be held soon after the first of the year. In the meantime the business will be operated on a sales basis and all orders from dealers will be filled without delay.

C. Harold Wills, John R. Lee and other officers of the company are working with the receiver in completing details for the appraisal and sale. Wills said the company would continue operations conservatively pending the termination of the receivership. Following the appraisal, he said, a statement would be made in which the company would outline its position and plans.

November Production May Aggregate 220,000

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while fewer cars are being sent by boat, that factor in transportation is still important.

All branches of the industry show a healthy condition. Trucks are meeting with better demand and plants are reporting increased operations. Tire makers are now working on improving their finished inventory situation to forestall any possible shortage. In the parts branch, manufacture is progressing with much less shrinkage than had been expected and shipments are being made on practically the same basis as in the past. Collections show an improvement over last month.

Complete Model Seen as Feature in 1923

This View Based on Replies to Questionnaire Sent Out by M. A. M. A.

NEW YORK, Dec. 5—Forecasting the trend in motor vehicles that will be exhibited at the national shows next month, based on the opinions of leading parts manufacturers who are contributing to its annual symposium, the Motor and Accessory Manufacturers Association declares that the dominant feature of 1923 will be the complete vehicle, not only of passenger cars but also of motor trucks.

There will be many other features stressed at the shows, such as the continued swing toward greater production of light sixes, the preponderance of closed cars, the emphasis on sport models, further emphasis on lightweight construction, a tendency to lower the cars to secure a racy appearance and an effort in the direction of simplification of design and greater engine efficiency, but outranking all these will be the trend toward making motor cars genuinely complete and ready for use in every detail.

"Extras" Part of Equipment

More and more appointments and devices which in the past have been regarded as extras are being adopted as standard equipment by vehicle manufacturers, declares the M. A. M. A. This does not mean the widespread standard installation of all accessories, but it does indicate that items that are indubitably useful and economical are being added in increasing numbers to the original equipment list.

Interpreting this development, M. L. Heminway, general manager of the M. A. M. A., says:

> Instead of bringing about indiscriminate use of accessories, this trend will put the car equipment manufacturers to the test; only those accessories that are really useful and sound will meet the rigid requirements imposed by the engineers and executives of the vehicle builders, who in turn must be open minded and constantly responsive to the dictates and needs of a public desiring more complete, more efficient and more economical vehicles.

Progress in Body Design

Special progress will be evidenced in body design and construction. This will apply not only to the more obvious elements, but to the small details, such as door handles, windows and other appointments making for easier riding and better ventilation.

A sharp upward swing in the standard equipment listing of shock absorbers and bumpers is typical of the current practice of the car builders.

Alfred Reeves, general manager of the N. A. C. C., says in a letter:

> After the automobile shows there will undoubtedly be a big campaign on closed bodies of various types, low priced and high priced. It is undoubtedly the car of the future. I doubt whether there will be very many mechanical changes in chassis except the possible tendency of a few more of the four cylinder car makers getting into the six cylinder field.

Detailed analysis of the changes in construction and design is offered by H. L. Horning, general manager of the Waukesha Motor Co., Waukesha, Wis., and a director of the M. A. M. A.:

> New truck designs will show greater engine efficiencies, more miles per gallon of both gasoline and lubricating oil, higher speeds and lower upkeep charges. On both trucks and passenger cars there will be shown decidedly better designs which have for their object more efficient vaporization of present fuels, less dilution troubles, smoother running of engines and more consistent performance in all details. All cars will be clean in lines and there will be a tendency to lower the cars by decreasing the height of the frame from the ground and also the tops, thus giving the racy appearance for cars of wheel bases of 110 in. or less.
>
> Lower tops will be carried down to such an extent as to cause a very small clearance between the driver's head and the top. Better finish will be general and the general lines will be smoothed out and cars will be improved in usefulness by supplying more convenient means for carrying luggage of all kinds. There will be a number of new body models, especially useful for traveling men and general business use.

G. Brewer Griffin, manager of the automotive equipment department of Westinghouse Electric & Manufacturing Co., looks forward to "more efficient engines, better gears, synchronizing transmission gear-shifting devices and probably 'closed bodies' will appear of the 'knock down, removable upholstery' type."

Harsher Treatment Given Now to Reckless Drivers

NEW YORK, Dec. 4—Law enforcement officials throughout the country are making determined efforts to reduce the number of automobile accidents by compelling motorists to drive carefully. A judge in Detroit brought the lesson home by forcing drivers who had caused accidents to visit one of the hospitals and look at children who had been maimed by automobiles.

Mayor Shank in Indianapolis has ordered that hereafter all motorists arrested for violating the speed ordinance shall be taken to jail in patrol wagons and each compelled to give a $5,000 bond.

Los Angeles is sending motorists to jail for 10 days. One of those to suffer such imprisonment is Ralph De Palma, who is now serving a 10-day sentence for speeding. The judge permitted De Palma to drive in the race at Los Angeles before going to jail.

CHEVROLET IN PHILADELPHIA

DETROIT, Dec. 4—Chevrolet Motor Co. has opened a new wholesale office in Philadelphia for the general supervision of wholesale business in that territory. The office will be in charge of Harry L. Porton, sales manager, and will cover eastern Pennsylvania, most of New Jersey and all of Delaware.

Stock Dividend Due Studebaker Holders

Directors Order 25 Per Cent Disbursement—150,000 New Shares Created

NEW YORK, Dec. 5—A special meeting of directors of the Studebaker Corp. held here to-day ordered a stock dividend of 25 per cent to common stockholders, payable Dec. 29 to holders of record as of Dec. 16. No action by stockholders is necessary, as the corporation has authorized common capital of $75,000,000, of which only $60,000,000 is outstanding.

The directors said: "The earnings of the corporation and its prospects are such that the management believes the present rate of 10 per cent dividends on the common stock will be continued on the new capitalization."

The directors also voted to transfer $15,000,000 of the company's accumulated earnings, which have been permanently invested in plants, equipment, inventories, etc., from surplus to capital account to provide for the continually expanding business of the corporation. Certificates for the 150,000 shares of new common stock created by the distribution will be ready Dec. 29.

This is the second stock dividend paid by Studebaker. The first one of 33⅓ per cent was paid May 5, 1920, when the common capital was increased from $45,000,000 to $60,000,000 by the transfer of $15,000,000 from surplus to capital.

Reporting on the business for the first nine months of 1922, President A. R. Erskine states that net sales reached $108,488,756 against $80,593,998 a year ago, and that net profits totaled $15,640,374 compared with $9,644,326 in the same period last year. After provision for common and preferred dividends, there was carried to surplus $10,631,999, against $5,979,826 in 1921. Profit and loss surplus on Sept. 30 last aggregated approximately $24,861,743, as compared with $14,229,744 on Dec. 31, 1921.

Hydro Tire Stockholders Discuss Company's Future

POTTSTOWN, PA., Dec. 4—Representing 400,000 of the 520,000 shares, more than 200 stockholders of the Hydro United Tire Co., which is in the hands of receivers, met here to discuss plans to save the company. Two plans were submitted to obtain funds to meet all the expenses of the company, but no definite action was taken. Charles A. O'Neil refused to surrender the chair to a chairman appointed by the stockholders and also refused to resign as a director.

One plan is to raise $700,000 by assessing the stockholders in order to lift the receivership and another is to raise $500,000 immediately to put the company on its feet on condition that the old board of directors resign immediately.

New Jersey Highway Plan May Be Model

Provides That All Taxpayers Build Roads and Motorists Maintain Them

NEWARK, N. J., Dec. 5—That the "New Jersey Plan" is likely to become basic in highway financing in a majority of States was brought out to-night at a dinner given at the Robert Treat Hotel by the Good Roads Association of New Jersey in celebration of the endorsement at the last general election of the $40,000,000 good roads bond issue, designed to finance the completion of the State highway system within the next five years.

This claim for national recognition of the importance of the plan was accentuated by the presence of Alfred Reeves, general manager of the National Automobile Chamber of Commerce, as the principal speaker. Reeves made it plain that the rest of the country is greatly interested in what promises to be a model law.

Reeves Approves Plan

"The plan is beyond question the soundest and most suitable method of raising the money necessary to build and maintain modern improved highways that I know of," declares Reeves.

Describing the "New Jersey Plan" briefly, it may be said that it calls on taxpayers as a whole to make the capital investment to build and reconstruct the highways, after which the motorists, by paying special registration fees, will maintain them. New Jersey is the first State to attempt anything of the sort, it being the common practice in States that have issued bonds to pay for road improvements to make the motorists not only pay for the maintenance, but also contribute largely to building and rebuilding them. Under the new law, therefore, the $40,000,000 necessary to complete New Jersey's 730-mile State road system will come from general taxation. After this has been done, the motorists' fees will maintain the highways.

State Worked Under Old System

New Jersey has been working under a plan which called for the raising of funds by the imposition of a one mill tax on each dollar of State valuations of real and personal property, which brought in only about $3,000,000 a year. That this was not feasible is shown by the fact that in 1922 alone it cost $2,250,000 to maintain the roads, let alone build any. It is figured that under the new plan this maintenance can be handled at an expense of only $500,000 and, further, the whole system will be completed within five years.

Continuing his remarks on the New Jersey Plan, Reeves said:

> This policy of yours makes possible the logical and legitimate development to which motor vehicle transportation is entitled. You have very wisely divided your highway financing activities into its two broad general phases—highway construction and highway maintenance.
>
> Then, on the theory that highway improvement is of supreme importance to society as a whole, you levy general taxation upon all classes of property to provide the money necessary to make the capital investment in the construction and reconstruction of modern improved roads and bridges; after the highways have been built, on the theory that the motor vehicle not only receives a particular and peculiar benefit from them, but also is responsible for the wear and tear and ultimate destruction of their surfaces, you place the cost of maintenance upon motor vehicle owners.
>
> On the other hand, the policy which aims to impose upon motor vehicle use not only the cost of maintaining improved highways but also that of constructing and reconstructing them has a tendency to stifle and discourage the use of the most efficient means of transportation that man ever has known.

Durant Increases Output of Star Car at Lansing

DETROIT, Dec. 5—Field representatives of the Durant and Star car products of the Lansing plant of Durant Motor Co. of Michigan were notified of changes of distribution policy of the two models at a meeting this week. The changes were occasioned principally by the greater production of the Star and by the largely increased dealer representation in the territory served by the Lansing plant.

Production on Stars is now approximately 175 daily and will reach 300 soon after the first of the year. A schedule of 90,000 for 1923 has been set, and this will be supplemented by 96,000 to be built at the Flint plant, now under construction. Shipments to the Pacific Coast have been discontinued with the completion of the Oakland plant.

Deliveries of closed bodies, which have handicapped production up to this time, have reached proportions required by sales, and within two weeks the company expects to be on an even basis. Durant car business is reported slowed down from the early season rush, but maintaining a satisfactory volume.

Hoover Bumper Claim Sustained by Court

(*Continued from page* 1146)

character sufficiently broad for the broadest possible doctrine of equivalents. The fact remains that he was the first inventor of a practical spring-bar bumper having universal resilience in a horizontal plane, and, therefore, is entitled to a reasonably broad interpretation and application of equivalents.

The elements of its construction were use of spring steel throughout; secondly, the construction involving the transverse spring-bar spanning the vehicle and the peculiarly shaped end loops and their supports, and, thirdly, the use of the flat strips of spring material of much greater vertical dimensions that are horizontal when the strips are in place. Hoover was the first to combine all these things.

Assets of Republic Truck Show Excess

Amount to $6,289,930, According to Receiver—Liabilities Total $5,181,862

DETROIT, Dec. 5—According to the Security Trust Co. of this city, receiver for the Republic Motor Truck Co. of Alma, Mich., that concern showed assets of $6,289,930 and liabilities of $5,181,862 on Sept. 28. The receiver's report shows:

Assets: Property account, $2,010,156; mortgages, $31,111; invested in and advanced to subsidiaries, $2,430,753; inventories, $1,561,486; notes and accounts receivable, less reserve, $29,788; liberty bonds pledged, $14,000; cash, $5,287; deposited with trustee, $200,000, and deferred charges, $7,329.

Liabilities: First mortgage, 7's, $2,500,000; accrued interest to Sept. 28, $94,722; mortgages on Cleveland property, $91,162; accrued interest on same, $1,597; bank loans, $144,764; accrued interest, $1,021; accrued local taxes, $74,164; provision for Federal taxes, $130,000; accrued excise, etc., taxes, $927; accrued payrolls, $15,063; unsecured current liabilities, $2,078,412; reserve for contingencies, $50,000.

The excess of tangible assets over liabilities, exclusive of capital, is $1,108,068.

Property Account

The property account is explained as follows: Land, buildings, machinery and equipment, etc., at depreciated values; factory land at Alma, $108,248; land not used for manufacturing purposes at Cleveland, $234,420; buildings and equipment, $1,146,454; machinery and equipment, $325,950; tools, dies and patterns, $116,825; motor trucks in service, $23,948; office furniture and fixtures, $54,311.

Town Takes Detroit Name in Preparation for Plant

WINCHESTER, VA., Dec. 4—Mystery continues to envelop the principals in the reported deal to construct a $10,000,000 automobile plant at Ridgeway, nine miles from here. Ernest L. Luttrell of Martinsburg, the attorney who is said to represent the financial interests, still refuses to mention names, but a contract has been let for laying out the town site, consisting of 2500 acres, which will be the home of the factory workmen.

About the only development that has been announced is that the name of the town is to be changed from Ridgeway to Detroit, W. Va.

Denial is made that the affair is a scheme to sell land, and Luttrell declares that those interested have nothing to offer for sale in the way of stock, bonds or lots. Among the persons mentioned in the transactions are Harvey S. Firestone and Henry Ford, but there seems to be no evidence that either of them is interested, although local reports say that all the deeds for the land are being made out in Firestone's name.

Tire Report Shows Increase in Output

Inventories and Shipments Also Gain in October Over Previous Month

NEW YORK, Dec. 5—October showed an increase in production of casings, tubes and tires over the previous month and a marked gain over October of last year, according to figures compiled by the Rubber Association of America, Inc., for the Department of Commerce.

An increase is also noted in inventories and shipments.

A comparative table of inventory, production and shipments is as follows:

PNEUMATIC CASINGS

1921—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan.	45	5,319,605	703,430	965,417
Feb.	45	5,193,018	819,892	1,073,756
Mar.	46	4,597,103	1,163,314	1,614,651
April	49	4,527,445	1,651,418	1,785,951
May	59	4,451,668	2,100,917	2,085,882
June	63	4,154,456	2,313,265	2,643,850
July	63	3,892,037	2,570,524	2,757,581
Aug.	66	3,934,853	3,043,187	2,894,442
Sept.	63	3,340,798	1,929,288	2,047,929
Oct.	64	3,545,930	1,928,271	1,675,169
1922—				
Jan.	66	4,174,216	2,055,134	1,596,806
Feb.	66	4,691,329	2,084,308	1,562,365
Mar.	63	5,183,286	2,645,790	2,073,963
April	65	5,464,336	2,401,187	2,086,651
May	65	5,523,095	2,721,503	2,639,273
June	64	5,642,147	2,838,890	3,133,260
July	63	4,834,106	2,476,636	2,695,095
Aug.	63	4,629,392	2,905,209	3,029,822
Sept.	64	4,612,037	2,504,744	2,502,106
Oct.	64	4,682,958	2,674,662	2,583,770

INNER TUBES

1921—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan.	47	5,586,163	740,824	1,042,617
Feb.	46	5,415,464	916,627	1,129,531
Mar.	48	5,044,861	1,346,483	1,643,690
April	51	4,916,772	1,762,122	1,983,571
May	57	4,751,880	2,210,040	2,342,567
June	60	3,835,098	2,359,928	3,232,673
July	61	3,122,815	3,020,981	3,603,248
Aug.	64	3,649,319	4,430,152	3,804,060
Sept.	62	3,827,850	3,274,822	2,645,758
Oct.	64	4,732,016	2,843,918	2,016,371
1922—				
Jan.	66	5,246,647	2,343,393	1,889,724
Feb.	65	6,141,956	2,596,774	1,702,583
Mar.	63	6,990,118	3,017,511	2,090,787
April	65	7,230,096	2,650,573	2,329,344
May	65	7,189,552	2,970,696	2,938,917
June	64	6,186,534	3,130,629	3,973,679
July	63	5,675,839	3 068,199	3,630,744
Aug.	63	5,207,228	3,808,224	4,220,055
Sept.	64	5,164,757	3,501,442	3,558,971
Oct.	64	5,488,033	3,787,758	3,420,680

SOLID TIRES

1921—	No. Mfrs. Reporting	Inventory	Production	Shipments
Jan.	12	303,753	21,220	29,116
Feb.	12	304,374	23,365	29,599
Mar.	12	283,300	28,710	43,926
April	12	269,985	28,859	42,080
May	12	264,663	35,156	40,122
June	11	240,336	28,295	49,867
July	11	220,003	35,123	55,678
Aug.	11	216,367	55,694	66,866
Sept.	11	161,832	37,441	50,276
Oct.	10	163,299	46,274	45,511
1922—				
Jan.	11	181,769	40,224	33,294
Feb.	11	183,448	39,492	36,805
Mar.	11	182,197	49,433	48,350
April	11	173,748	46,664	52,309
May	11	170,904	57,640	60,711
June	11	169,808	66,089	83,408
July	11	176,375	71,505	60,425
Aug.	11	189,698	84,212	69,435
Sept.	11	200,016	82,767	66,797
Oct.	11	213,942	85,480	71,275

"Production" and "Shipment" figures cover the entire month for which each report is made. "Inventory" is reported as of the last day of each month.

"Inventory" includes tires and tubes constituting domestic stock in factory and in transit to, or at, warehouses, branches (if any), or in possession of dealers on consignment basis, and as a total represents all tires and tubes still owned by manufacturers as a domestic stock.

"Shipments" includes only stock forwarded to a purchaser and does not include stock forwarded to a warehouse, branch or on a consignment basis.

FINANCIAL NOTES

Stromberg Carburetor Co. has declared a quarterly dividend of $1.25 a share payable Jan. 2 to stock of record Dec. 14. This increases the annual dividend rate from $4 to $5. For nine months ended Sept. 30, 1922, the company shows net profit of $378,716 after expenses and taxes; equivalent to $5.05 a share earned on outstanding 75,000 shares of no par value capital stock. This compares with $126,091, or $1.68 a share in the corresponding period of 1921. For the quarter ended Sept. 30, 1922, net profit was $156,121, compared with $74,547 in the third quarter of 1921. Consolidated balance sheet as of Sept. 30, 1922, shows notes and accounts receivable of $437,425, as against $303,901 in 1921, and accounts payable and accrued accounts of $146,412, compared with $32,015 in the previous year.

Nash Motors Co. has increased its stock by $22,500,000 preferred and 245,000 shares of common. The outstanding preferred stock of the company at present is $3,314,900. Of the authorized common stock of 55,000 shares 54,600 are outstanding. The present preferred stock outstanding, which is 7 per cent cumulative, has been called for payment on Feb. 1, 1923.

Ford Motor Co. has declared the regular semi-annual dividend of 3 per cent and an extra dividend of 3 per cent on the profit-sharing investment certificates to employees. This makes a total of 12 per cent for the year.

Kelly-Springfield Tire Co. has declared the regular quarterly dividend of 1½ per cent on the 6 per cent preferred stock, payable Jan. 2 to holders of record Dec. 15.

Hood Rubber Co. has declared the regular quarterly dividend of $1 per share on the common stock, payable Dec. 30 to holders of record Dec. 20.

Kelsey Wheel Co. declared a usual quarterly dividend of $1.50 a share on common stock, payable Jan. 2 to stock of record Dec. 20.

Motor Wheel Corp. has declared the regular quarterly dividend of 2 per cent on common stock, payable Dec. 20 to stock of record Dec. 12.

Hoover Steel Ball Co. has declared a dividend of 2 per cent on the common stock, payable Dec. 22 to stock of record Dec. 15.

SYRACUSE RUBBER CO.

In the issue of AUTOMOTIVE INDUSTRIES of Nov. 16 it was stated that the liabilities of the Syracuse Rubber Co., Inc., manufacturers of Syra-Cord tires, were $450 000, with assets of $360,000. This was due to a typographical error, and the statement should have read "with assets above liabilities of $360,000."

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Loans on call last week covered a range of 4 per cent to 5½ per cent, as in the previous week. Increased firmness developed toward the end of the week, which was due, doubtless, to end-of-month settlements. In time money, smaller offerings were noted and the quotations remained the same as in the preceding week, 5 per cent for all maturities from 60 days to 6 months. Prime commercial rates continued to be quoted at 4½ per cent to 4¾ per cent.

On Dec. 4 the cable rate for sterling exchange rose to $4.54. This is the highest point since 1919, when market support was removed from the pegged quotation of $4.76¾. The latest available statistics show that England's excess of merchandise imports over exports had been considerably reduced, and this is doubtless a factor in the advance of sterling.

Corporate financing during the month of November, including bond, note and stock issues, amounted to $217,713,750, which was a decrease of $38,224,050 from the total for November, 1921, but an increase of $47,131,350 over the total for October, 1922. For the first 11 months of 1922, total corporate borrowings amounted to $2,991,540,470, as compared with $2,316,533,800 for the corresponding months of 1921.

For the week ending Nov. 18, the total coal output was 13,404,000 tons, of which 11,213,000 tons were bituminous and 2,191,000 anthracite. The preliminary returns indicate a total of 11,000,000 tons of bituminous coal produced during the week ended Nov. 25. Both anthracite and bituminous production are now at a high level. The total production for this year up to date shows a decrease of 4.6 per cent in bituminous and 48.4 per cent in anthracite production, as compared with the corresponding period a year ago.

The Federal Reserve statement as of Nov. 29 showed a decrease of $10,467,000 in gold reserves and $10,873,000 in total reserves. Bills on hand increased $37,726,000, and total earning assets $47,065,000. Total deposits declined $29,765,000, while Federal Reserve notes in circulation increased $30,423,000.

Willys-Overland Takes Annual Inventory Early

TOLEDO, Dec. 3—The Willys-Overland Co. to-day finished its annual inventory-taking period, which had been moved up several weeks to enable the plant to get started on its 1923 program.

At the time of the inventory 5925 men were at work at the local plant.

From the early commitments of branches and dealers for both automobiles and parts, it is indicated that 1923 will undoubtedly top the successful present year for production at the Toledo plant.

South Is Offering Good Sales Market

Bank Reports Show Improvement There—Résumé Outlines Opportunities

(*Continued from page* 1150)

prices means prosperity in itself for this county, outside of the large textile operations at Huntsville.

The coal mines of Alabama have been greatly hampered in their operations during the past two months owing to the shortage of cars, and particularly since the removal of the priority order for coal. This condition is causing slack trading to a measure in the areas covered by the mines, especially in parts of Jefferson and Walker counties. The general improvement in other lines is taking care of this slump, however, and it is thought that as cars become available the mines will return to full time.

Territories With Prospects

From an automotive merchandising point of view the conditions outlined above show excellent markets in the territories of Birmingham (in spite of the slackening coal mining), Memphis, Little Rock, Montgomery, Mobile, Chattanooga, New Orleans, Clarksdale, and Huntsville.

The Memphis territory is worthy probably of first note. In this territory the Arkansas portion is in good shape, the Mississippi Delta portion is showing wonderful gains in bank deposits (this section includes Clarksdale, Mississippi), and the Tennessee and northeast Mississippi sections (the latter including Tupelo), are showing steady improvement in purchasing power.

The Montgomery and Mobile territories are affected by somewhat the same conditions, that is they both are feeling the effects of Alabama's excellent cotton crop that is being sold at a good price. Mobile, also, is getting some of the benefit from Mississippi's good crop, and the direct effect from the largest production of Satsuma oranges ever produced in the State of Alabama. Towns in the Montgomery territory worthy of note are Selma, Greenville, Prattville, and Demopolis, Alabama. Mobile serves Baldwin and Mobile counties, part of the Mississippi coast, and part of Florida as well as a large part of other counties lying to the north of it.

Little Rock Good Market

The prosperity of Little Rock and the section surrounding it is readily indicated by the large increase in Little Rock bank deposits. This will be a good market for automobiles undoubtedly during the balance of the winter months, and next spring when planting begins.

New Orleans, always a good market, should be considerably improved by the good crops surrounding it on all sides in cotton and the consequent liquidation of many accounts and cotton held on storage.

Chattanooga reports the best conditions prevailing in their city that have obtained for several years. This city and the surrounding territory should be a good market for sales the balance of the winter months.

Huntsville has been coming into its own during the past few months with the large cotton crop produced in the immediate county and the excellent operation of the textile industry. This county and the entire Tennessee Valley should be a good market for automobiles this winter, and during the spring months.

Chalmers Is Acquired by Maxwell Noteholders

DETROIT, Dec. 7—The plant and properties of the Chalmers Motor Co. were sold at receiver's sale to-day to Boyd G. Curts, representing the Maxwell note holders' committee, for $1,987,600. There were no other bidders. Bids for the property in separate parcels, also by Curts, were dismissed in favor of the bid for the whole property.

INDUSTRIAL NOTES

Twin Piston Ring Corp. will remove its plant from West Orange to larger quarters at 227-229 High Street, Newark, N. J. The new factory will be equipped with the most modern machinery and will be in production by Jan. 1. Preparations are being made for a much larger output. The corporation recently was reorganized by the election as president of Robert A. Bachman, formerly vice-president and general manager of the Thomas A. Edison Industries. The other officers are: Vice-president and engineer, A. W. Almquist; treasurer, Frank D. Reeve; secretary and assistant treasurer, F. B. Reeve, and assistant secretary, A. Horace Owen.

L. H. Gilmer Co., manufacturer of industrial webbing and belting, is erecting an addition to its plant at Tacony, Philadelphia. The new unit will afford 25,000 sq. ft. of warehouse space, equipped with the latest devices for handling freight, and a 6000 sq. ft. boiler plant. The boilers are for heating and process work only, as the plant is electrically powered from outside. The new building will be connected with the remainder of the plant on the second and third floors by enclosed bridges over the intervening streets, and served by a spur railroad track. It will be completed in March.

Chester A. Thompson, general manager of the Tire & Rim Association of America, Inc., has opened an office as manufacturers' agent in the Leader-News Building, Cleveland. He will represent Transue & Williams Steel Forging Corp., Alliance, Ohio, drop forgings and stampings and Boston Pressed Metal Co., Worcester, Mass., seamless drawn work.

Piston Ring Co. of Muskegon, Mich., is preparing to increase its output from 12,000 piston rings daily to 20,000 a day. This will be accomplished by a large addition to the company's foundry facilities.

Season's Last Race Gives Murphy Title

A. A. A. Declares Him Champion Driver of Year—Standing of Other Racers

NEW YORK, Dec. 4—Jimmy Murphy has been officially declared the champion driver of the year by the Contest Board of the American Automobile Association, following the running of the last of the 1922 championship events at Los Angeles yesterday. Murphy won the final race, although the victory was not needed to clinch the title.

Murphy captured the championship with a total of 3420 points, gathered in the 12 title races of the season, which included six firsts, three seconds and two thirds. His chief success was at Indianapolis. He also won at Fresno, Cotati, Uniontown, Tacoma and Kansas City. He is the fourth holder of the title, which had been awarded successively to Dario Resta, Gaston Chevrolet and Tommy Milton.

Captured French Grand Prix

Murphy has been in the limelight since last year, when he was sent to France by Albert Champion and, driving a Duesenberg, won the French Grand Prix, the first foreign victory ever achieved by an American in an American-built car. This year he drove a Murphy Special until yesterday when he piloted a Durant Special.

Twenty-four drivers in all were awarded points this season, according to the official table issued by Chairman Croselmire of the Contest Board. Murphy led the field ever since Indianapolis, with Tommy Milton runner-up. Milton won three races this year, but failure to get placed at Indianapolis set him back.

The final standing is as follows:

Driver	Total Points	Driver	Total Points
Murphy	3420	Thomas	124
Hilton	1910	Halbe	109
Hartz	1788	Fetterman	108
Elliott	875	Wilcox	50
Hill	459	De Paolo	43
Hearne	393	Alley	35
Wonderlich	375	Miller	25
Sarles	280	Vail	21
Cooper	260	Koetzla	19
Mulford	255	Shafer	17
Klein	229	Morton	15
De Palma	160	Melcher	5

Murphy Wins Final Race

The final race returned Murphy a victor in 2 hours, 10 minutes, 53.1 seconds for 250 miles, or 114.1 m.p.h. Earl Cooper, also in a Durant Special, just beat out Hartz and Hill in a brilliant finish. Ten cars started, of which six were officially finished as follows: Murphy, 2:10:53.10; Cooper, 2:12:13.41; Hartz, 2:12:14.45; Hill, 2:12:18.11; Milton, 2:14:22.92; Klein, 2:17:13.71. Thomas, De Paolo, Hearne and De Palma were placed as named.

Calendar

SHOWS

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8 - 13 — New York, Second National Automobile Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Dec. 15 - Jan. 2 — Paris, Aeronautical Salon, Grand Palace. Chambre Syndicale des Industries Aeronautiques, 9 Rue Anatole de la Forge.

Jan. 13-24 — Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

April - July, 1923 — Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

RACES

May 10 — Berlin - Grunewald, German Grand Prix.

CONVENTIONS

Jan. 15-19—Chicago, Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show.

Jan. 29 - 31 — Chicago, Annual Meeting, Automobile Electric Service Association, Congress Hotel.

S. A. E. MEETINGS

Metropolitan Section

Dec. 14 — Speaker, Charles P. Grimes, Research Engineer, H. H. Franklin Manufacturing Co.; Subject, Air Cooling in Automotive Engines.

March 15—Speaker, William P. Kennedy, President, Kennedy Engineering Corp.; Subject, Trolley Buses and Flexible Vehicles for Street Railway Service.

April 19—Speaker, Edw. E. La Schum, General Superintendent, Motor Vehicle Equipment, American Railway Express Co.; Subject, Engineering Features of Fleet Operation.

May 17—Speaker, F. P. Gilligan, Secretary, Henry Souther Engineering Co., Subject, Metallic Materials for Automotive Work.

Other Meetings

Jan. 9 - 12 — New York, Annual Meeting.

Jan. 31 — Chicago Meeting and Dinner of the Society at the Congress Hotel.

Government to Make Few New Purchases

WASHINGTON, Dec. 5—The purchase of new automotive equipment by the various branches of the Federal Government is contemplated in but two departments, according to estimates in the budget submitted to Congress for the fiscal year of 1924.

The largest single item in the budget is $150,000 for the Bureau of Indian Affairs. The budget committee recommends, however, that such equipment must be bought from the War Department if it is available. The Department of Agriculture is to be given $132,249.

An appropriation of $25,000 is asked by the Bureau of Standards to develop standards of quality of rubber and methods of measurement. A large part of the sum will be spent in the development of tires and for research in this field. A total appropriation of $105,966,000 is recommended for road work, of which $100,000,000 is for co-operative construction of rural post roads, representing an increase of $5,000,000 over the estimated expenditure for the fiscal year of 1923 and $9,000,000 over the sum actually expended in the fiscal year of 1922.

Distributors Shown New Model of Ruggles Truck

DETROIT, Dec. 4—Ruggles Motor Truck Co. showed a new ¾-ton model at its distributor convention, on which it soon will be in production. The price on the model has not been definitely set, but it is announced that it will be low and that the truck is designed to meet the requirements of light delivery business. A total of 1420 of the new model was signed for at the convention.

With this truck the company will have three models in production, the others being the 1 to 1¼-ton and the 2-2½. On the first two models, the company has manufactured 906 in its Saginaw plant during the year and 306 at its Canadian plant.

Gardner Model Is Powered with New Lycoming Engine

ST. LOUIS, Dec. 5—Announcement is made of a new Gardner model for 1923 which will be powered with the Lycoming four-cylinder engine, recently described in AUTOMOTIVE INDUSTRIES. The engine has a bore of 3 11/16 instead of 3½ in. and will develop considerably more power than the old one, which is also of Lycoming make.

Other features of the new model include an improved carbureter, a 16-in., four-blade fan, with bronze bearing and thrust washer, a larger (10 in.) Borg & Beck clutch requiring a pedal pressure of only 25 lb. as against 45 lb. on the 1922 model, an emergency brake on the transmission, a spoon type emergency brake lever release, larger and improved service brakes, a heavier rear axle, an improved frame front cross member which makes the timing gears and forward end of engine readily accessible, a heavier frame, improved, anti-rattle hood catches, genuine leather seat ends in addition to leather cushions and backs, door pocket flaps with metal fillers and improved trimming around the doors.

The new model will be furnished in four body styles, roadster, $965; phaeton, $965; coupe, $1,115, and sedan, $1,345, representing an increase in price of $70 on the open models and $20 on the closed.

MONROE BODY REBUILDING

LUDINGTON, MICH., Dec. 5—The Monroe Body Co., burned out Nov. 15, is rebuilding on an enlarged scale. The Ludington city commission has authorized the purchase of a 500-acre strip of land, near the Pere Marquette Railroad for its use, and the company will also be financially assisted in the erection of its new plant.

S. A. E. Makes Ready for Winter Meeting

NEW YORK, Dec. 4—A tentative program has been prepared for the annual winter meeting of the Society of Automotive Engineers to be held in this city Jan. 9 to 12. A meeting of the Standards Committee will open the proceedings on Tuesday morning and will continue through the afternoon.

It is probable that body engineering sessions will be held on Tuesday and Wednesday. L. V. Pulsifer will present a paper on the testing of automobile paints and varnishes, with actual demonstrations. George J. Mercer will read a paper on the design and construction of less expensive closed bodies and F. F. Murray will give a paper on standardization of various lumber sizes and specifications.

Paper on Steering Gears

Wednesday morning will be given over to reports and a paper by Herbert Chase on "Steering and Steering Gears." The following papers will be presented in the afternoon: "Practical Method of Securing High Compression Without Detonation," by Prof. G. A. Young; "Fundamental Laws Governing Detonation," by Thomas Midgley, Jr.; and "Means of Measuring Detonation and Comparing Fuels for Use in High Compression Engines," by Stanwood W. Sparrow and S. M. Lee.

Thursday afternoon, Robert E. Wilson will read a paper on "Fuel Volatility" and C. S. Kegerreis will give one on "Carburetion of Gasoline and Kerosene." The Co-operative Fuel Research Session will be held Thursday morning.

On Friday morning, S. D. Heron will give a paper on "Air Cooling of Passenger Car Engines" which will carry appendices by C. F. Taylor and E. H. Dix, Jr. Prof. E. H. Lookwood will present data and empirical formulas on the "Cooling Capacity of Automobile Radiators."

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Mr. Harding Pleads for Trucks as Railroad Feeders

President says in message to Congress highway transport should be aid to carriers instead of "destroying competitor." Apparently feels good roads should not parallel steam lines. Seems to regard motor vehicles from railroad viewpoint.

By James Dalton

A GOOD many people in the automotive industry were shocked when they read President Harding's references to motor vehicles in his message to Congress. It had been assumed he was a warm friend of the automobile and those who are familiar with what he is thinking insist that he is, but it is rather difficult to reconcile this point of view with some of the statements made in his discussion of the transportation situation.

Mr. Harding evidently has strong convictions on the entire transportation problem. The substance of his belief seems to be that present conditions are intolerable and that something must be done to better them, although he does not suggest concrete remedies. He scolded the railroads rather sharply in his message and it is possible he felt he should not place himself in a position where he could be accused of partiality toward highway transport. He didn't.

Careful analysis of his remarks shows, however, that he is at least reconciled to highway transport and that he does not propose to use his influence to crush it. He suggests, for example, that the motor truck should be converted into a railroad feeder "instead of a destroying competitor." His language is not especially friendly, but the idea is one which the industry has been trying to sell the railroads for a long time. As a matter of fact the sanity of this thought seems to be percolating through the minds of the carriers' executives.

While admitting that "we live in a motor age," it is rather unfortunate that the President and the railroads seem to regard motor transport in exactly the same light. The arguments he presents are the threadbare arguments the railroad propagandists have used so long. Most of them are based either on false premises or half truths.

"It would be folly," Mr. Harding says, "to ignore that we live in a motor age. The motor car reflects our standard of living and gages the speed of our present-day life. It long ago ran down Simple Living, and never halted to inquire about the prostrate figure which fell as its victim.

"WITH full recognition of motor car transportation we must turn it to the most practical use. We ought to turn the motor truck into a railway feeder and distributer INSTEAD OF A DESTROYING COMPETITOR. It cannot supersede the railway lines, no matter how generously we afford it highways out of the public treasury.

"If freight traffic by motor were charged with its proper and proportionate share of highway construction, we should find much of it wasteful and more costly than like service by rail. Yet we have paral-

leled the railways, a most natural line of construction, and thereby taken away from the agency of expected service much of its profitable traffic, while the taxpayers have been providing the highways, whose cost of maintenance is not yet realized.

"The Federal government has a right to inquire into the wisdom of this policy, because the national treasury is contributing largely to this highway construction. Costly highways ought to be made to serve as feeders rather than competitors of the railroads, and the motor truck should become a co-ordinate factor in our great distributing system.

"RAILWAYS are not to be expected to render the most essential service in our social organization without a fair return on capital invested, but the Government has gone so far in the regulation of rates and rules of operation that it has the responsibility of pointing the way to the reduced freight costs so essential to our national welfare.

"Government operation does not afford the cure. It was Government operation which brought us to the very order of things against which we now rebel, and we are still liquidating the costs of that supreme folly.

"The use of motor trucks as feeders for railroads, merger of lines into systems, a facilitated interchange of freight cars, the economic use of terminals and the consolidation of facilities are suggested as ways of economy and efficiency."

Taking up Mr. Harding's points in sequence, it certainly would be folly to ignore the fact that "we live in a motor age" when 11,500,000 motor vehicles are in use in the United States. The statement that the motor car "long ago ran down Simple Living and never halted to inquire about the prostrate figure which fell as its victim," is a striking figure of speech, but it is only a figure of speech.

Exactly what the President had in his mind is rather obscure and little is to be gained by speculating about what meaning he intended to convey. We sometimes wish that presidential language might always be such that there never could be the slightest doubt about its exact meaning. It frequently is more difficult to have it construed than it is to have an interpretation placed on some act of Congress, the meaning of which is not clear.

A figure of speech frequently illustrates a state of mind. There is no blinking the fact that most officials—Federal, State, county and local—are peevish on the subject of motor vehicles, although as individuals they may be devoted to their cars. For one thing, there are altogether too many accidents. Something must be done to reduce the casualties. If the President's message does nothing more than impress this fact indelibly upon the mind of every man engaged in the manufacture and sale of automotive products, he will have done the industry a real service.

It is useless to deny that there is a growing feeling of antagonism on the part of the public against motor trucks. Truck drivers in particular are responsible for this animosity. They frequently are "road hogs" and they often drive overloaded trucks at a speed which not only is a menace to other motorists but which causes needless damage to the highways they use. Employers and operators must stamp out this disregard for the rights of others.

State regulation of commercial vehicles is coming, whether the industry wants it or not.

State legislatures at their coming sessions probably will enact many unfair and burdensome laws designed to make the highways safer. The intent back of these statutes will be good, but they will be as useless as most of the laws now on the books.

The platform of the industry in this respect should be sane, simple laws with teeth in them and the motorist accused of violating them should be sent to jail if he is convicted after a fair trial.

The President next contends that "with full recognition of motor car transportation, we must turn it to the most practical use." The automotive industry will voice a hearty "amen" to that statement. No one in the industry expects it to "supersede the railway lines no matter how generously we afford it highways out of the public treasury."

Ever since motor trucks became a factor in the movement of freight, some five years ago when the railroads were unable to handle the business offered them, it has been the contention of manufacturers and operators that they never could take long-haul business from the carriers on an economic basis. The same is true of passenger traffic.

The railroads have failed to keep pace with the growth of the country and transportation would have broken down completely had it not been for the aid given by motor vehicles. With business on a normal basis the carriers can't handle the freight offered them with the facilities at their command.

Again, how could the railroads hope to carry the short-haul passenger traffic they would be asked to move today were it not for the automobiles in use? In 1917, when the roads began to take off passenger trains because the movement of freight was more important, less than 5,000,000 motor vehicles were registered in the United States. The number of motor cars in use has more than doubled, but it is just as difficult as it ever was to get a seat in a railroad train.

IT is unquestionably true that the motor vehicle has averted a complete collapse of transportation systems in the United States, but in some official quarters it seems to be given small credit and less thanks for this tremendous achievement.

Equally open to argument is Mr. Harding's statement that "if freight traffic by motor were charged with its proper and proportionate share of highway construction, we should find much of it wasteful and more costly than like service by rail."

Why should motor vehicles pay any more of the cost of building highways which are for the free use of everyone and which enhance by more than their cost the value of the real estate they pass? A comparison of the as-

THIS article replies to the criticisms of motor vehicles voiced by President Harding in his recent message to Congress. Some of the remarks made by the nation's chief executive about the motor vehicle seem to have been based on erroneous premises and deserve the close attention of all automotive interests.

Considering the proven utility value of the car and truck as transportation mediums it seems scarcely fair at this time to state that the motor car "long ago ran down Simple Living and never halted to inquire about the prostrate figure which fell as its victim."

This statement and others concerning the industry, made in the President's message, are fully discussed in this editorial.

sessed valuation and the sale price of real estate on improved highways with that on unimproved roads would give some conception of what road building has meant to the United States.

AUTOMOTIVE INDUSTRIES pointed out last week that the total tax bill of motorists last year approximated $341,000,000 compared with $276,500,000 for the railroads. This does not include corporation and other taxes paid by automotive manufacturers. Deducting an estimated $75,000,000 paid by motor vehicle users in personal property taxes, there was left $266,000,000 to apply on a total highway bill of $700,000,000 for that year.

The tax bill will be still bigger for 1922 and larger yet in 1923. Even in 1921 it was vastly more than enough to pay for the maintenance of all improved highways, if it had been used for that purpose, but much of it went into the construction of new mileage.

THE President also complains because highways used for motor transport have paralleled the railroads and "thereby taken away from the agency of expected service much of its profitable traffic." One is prompted to wonder if he would have highway engineers seek routes which would lead through sparsely settled sections merely to escape the railroads and not cut into their business.

When the railroads were built they were designed to pass through the larger cities and towns. Because these places are served by steam lines should they be deprived of good connecting roads or should motor vehicle users be barred from the use of such roads because they might reduce railroad revenue? We may be prejudiced, but we'll confess we can't find in our imagination any sound basis for such a contention.

Mr. Harding rather stresses the statement that "the Federal Government has a right to inquire into the wisdom of this policy because the national treasury is contributing largely to this highway construction." It is true that the Government is contributing $50,000,000 this year for road building, but this sum pays only a fraction of the road building bill and it must be matched, dollar for dollar, by the States to which it is granted. Most of the dollars supplied by the States are supplied by motor vehicle users and the discriminatory excise tax applied by the Federal Government to the sale of automotive products goes a long way toward making up the governmental appropriation for highways.

Promotion of transportation facilities always has been the policy of the Government. It would be interesting to know the present day value of the land grants and other subsidies given the railroads in the early days. They certainly would far exceed any sum spent by the Government up to this time for road building. It is safe to assert also that they added less to the total valuation of American property. Furthermore, the Government is not building highways for the benefit of motor vehicles, but for the good of the people as a whole. If motor transport did not afford universal benefits it would not have grown and prospered as it has.

No fault whatever can be found with Mr. Harding's assertion that "costly highways ought to be made to serve as feeders rather than competitors of the railroads and the motor truck should become a coordinate factor in our great distributing system." This, again, is what the automotive industry always has contended. Only the railroads have been unable to see its wisdom and there are encouraging indications that the light is breaking in the minds of some of the carriers.

Coordination of the motor vehicle—truck, bus and passenger car—in the transportation system is what the country needs, but if motor transport is permitted only where there is so little business that the carriers cannot tap the territory with profit, co-ordination is impossible.

The persons engaged in motor transport are not wailing and wringing their hands over the ruinous competition of the railroads. They have gone into a field which the carriers were supposed to serve and they have gotten the business because the railroads were unable or unwilling to give service. They have had the courage of pioneers, they have stood on their own two legs and they have won without the aid of special pleaders.

Reading the words of the President it almost seems that he feels the railroads should not be subjected to competition by motor trucks; but that cannot be his meaning. Why should they be given a monopoly of transportation? They can't take care of the business offered them now and they probably never can in normally prosperous times.

If they want the motor truck and the motor bus to serve as feeders for their lines they can bring about that coordination by operating the motor vehicles themselves or by co-operating in a friendly way with others who may operate them. If they give as good or better service than independent operators they will get the lion's share of the business. If they don't, they won't.

Mr. Harding asserts that the railroads are entitled to a fair return on capital invested and no one will quarrel with him on that point, but so are the operators of motor vehicles. This fair return to the railroads should not be insured, however, either by monopoly of transportation, Government pampering or any other kind of favoritism. They are not building highways, no matter how much they may argue that they are. Let them compete on a business basis, with reasonable rates, and no one will begrudge them as much as they can make. In the last analysis it is the people who pay the bill.

LACKING a clear and definite knowledge of exactly what was in the President's mind when he wrote that portion of his message, which sounds like an indictment of the motor vehicle, we are reluctant to pass judgment. It must be that he has heard so much about the woes of the railroads and has given so much thought to that question that he has lost sight of the importance of the motor vehicle as an agency of transportation as well as of the fact that the automotive industry stands head and shoulders over every other in the dollar value of its products.

Without special pleaders, without propaganda and without lobbyists, the automotive industry has worked out its own salvation. It has many difficult problems which it is trying manfully to solve, but it proposes to solve them alone. It always has borne and it is perfectly willing to bear its full share of the nation's tax burden. It even has paid special and discriminatory excise taxes without tearing its hair or crying aloud for help.

Up to this time there has been altogether too much of an atmosphere of tolerance, condescension or contempt in the treatment of the industry by various interests, governmental and otherwise.

The time has come for the industry and for the users of its products to stand fast for fair play. They are strong enough to insist upon their rights and big enough not to ask special privileges. The dollar value of the industry's products this year will be nearly $3,000,000,000, the capital invested in its plants exceeds $1,500,000,000, and it gives employment directly or indirectly to 2,500,000 workers.

Automotive interests are perfectly willing to go as far as any reasonable person can expect in co-operating and coordinating with the railroads, but they do not propose to surrender their business rights to the railroads nor to carry an inordinately heavy burden of taxation to assist them in their competition.

Reduction of Selling Costs May Save Weak Companies

Intensive cultivation of circumscribed markets may compensate for lack of capital to operate nationally. Refinancings have brought heavier burdens in period of keen competition. Plunging next year will be unwise.

WITH the year drawing to a close, it is none too early for automotive manufacturers to compute so far as possible the business probabilities of 1923. A solid foundation upon which to stand always can be found for a business conducted along sound lines. There were a good many companies in one field and another which came through the last depression without suffering seriously because they were planted firmly on such a foundation.

Surprisingly few automotive failures resulted from the economic convulsion, but many of the companies which came through suffered heavy losses. Bond issues were the most popular expedient for providing the funds essential for financial salvation. A good many companies also sold additional stock—if they could find purchasers.

As a consequence fixed charges for all except the most fortunate concerns are much higher than they were in 1920. With competition growing constantly keener it will be increasingly difficult to pay these charges and have anything left for working capital. Bond issues are prior liens upon the property and failure to comply with their provisions means ultimate foreclosure.

Quantity production as related to the given price-class is a prerequisite for standing the gaff of competition on a national basis. There may be two companies in exactly the same price class with assembled cars of equal value. One of them may have a distributive organization which permits sales of 10,000 a year, while sales of the other may total only 1000. The one with the larger distribution may operate at a substantial profit, while the one with the smaller sales volume may show either no profit or a loss. The chances are that the less successful concern will have piled up a heavier burden of fixed charges than its competitor.

Small Companies Must Cut Sales Costs

It must be obvious then, that unless the company with the smaller volume cuts down its selling costs by circumscribing its market, it cannot hope to succeed without bringing in additional capital which will add to its fixed charges and merely postpone the evil day. The period of sensational profits in the automotive industry is past except for a few companies which have established themselves so firmly in popular favor that they cannot be shaken.

The industry is in a period of transition and the coming year may bring many changes on the automotive map. There may be more failures than there have been in the past two years, but many of them could be avoided if business policies were re-vamped in time and the problems of the future were faced frankly and courageously. Some concerns probably are hoping against hope that something will happen to save them. If anything does happen, however, it undoubtedly will be the result of some wise plan formulated by a shrewd man.

The time has come for the responsible executives of a good many companies to get together with their bankers and perhaps with their creditors to determine what can be done in view of changing conditions. In most cases it is not too late. There are a lot of concerns turning out meritorious products at fair prices which can work themselves out of their financial difficulties by intensive and intelligent cultivation of the markets close to home.

Reduction of Factory Overhead

Quantity production is an absolute essential only when distribution is sought on a national basis. The same result may be attained in respect to profits by reducing selling costs and cutting down factory overhead.

This situation has no particular bearing upon the 1923 automotive market itself. Business in the aggregate promises to be very nearly as large next year as it has been in 1922. It is quite possible that not so many passenger cars will be sold, but increased demand for commercial vehicles, especially those of small capacity, undoubtedly will compensate for any falling off in this field.

Such a prediction about the automotive market for 1923 must be predicated, of course, upon the assumption that there will be no sharp slowing up in general business. No such misfortune is in sight at this time and there probably never has been a period in the history of the country when the volume of trade has been larger, although profits may have been more substantial.

Business is so good, in fact, that it is carrying the country into a period of secondary inflation. Any prediction as to how long this condition will continue would be only guess work. The rising price trend has caused no serious harm yet, but if retail costs continue to mount indefinitely there will be another "buyers' strike." That is as good a phrase as any to describe the refusal or inability of the people of the country to pay the prices which were demanded of them in 1920.

Sooner or later, unless the rise in commodity prices is checked, there will be a return of something like the conditions which caused the collapse of business and industry in the fall of 1920, although they are not likely to be anything like so acute.

The "buyers' strike" resulted in an unexampled shortage of all kinds of manufactured products. When prices dropped to what the public thought was reasonable levels,

and they began to buy, the demand was commensurate with the shortage. It brought business back with a bang. That is what happened in the automotive field.

It must not be forgotten, however, that the time will come when the dammed up demand will be satisfied and when the public can again get along for an indefinite period without replenishing supplies. When that time comes, unless prices are "right," there will be a temporary suspension of buying.

Everyone admits now that it was lower prices to the purchaser which enabled the automotive industry to make its sensational recovery. And yet, when price cutting began, there were loud wails from a great many people in the industry who contended that it would cause chaos.

So far as open models of passenger cars are concerned, prices are as low now as they can be brought with safety. It may be that some companies can afford to sell their closed models for a little less. As a matter of fact, as production of closed cars increases and of open models decreases, the prices of the two classes will come closer together.

Increase in Materials Cost Slight

It is true that the cost of materials is rising steadily but the aggregate increase thus far has not been large. The parts makers assert that they are the ones who are suffering from short profits and that the vehicle manufacturers can afford to absorb higher costs for supplies without raising their prices to the public.

This may or may not be entirely true, but in any event it will be interesting to note the effect on sales if any material advances in the prices of motor vehicles are made in the coming year.

One other factor which makes continuance of a record-breaking business doubtful, once backed up demand has been satisfied, is the fact that other countries are unable to absorb our surplus products. This is due in part to the tariff wall which has been set up. There has been a gradual economic recovery in Europe and in the other countries of the world, but America cannot take advantage of it because foreign trade, speaking generally, must be on an exchange basis inasmuch as the rest of the world has little cash with which to buy.

Considering the elements of doubt which enter into the situation, this is no time to plunge. Factory expansions and capital increases are dangerous.

For those companies justified in seeking national distribution, however, it is a good time to intensify sales efforts and seek substantial new markets. Most of them can make enough goods without enlarging their plants.

Plunging in 1923 Unwise

Those companies which lack the working capital to justify operations on a national basis can find a mighty good business within a comparatively few miles of their own doors. If they go after this trade they can come out whole.

Not only will the man who plunges in 1923 be unwise, but he will be still more foolish unless he scrutinizes credits with great care. This will apply all the way down the line from the manufacturer to the retailer.

There will be no justification for extending unlimited or even liberal credit lines to companies or individuals whose finances do not fully warrant it. Such companies already are extended as far as they can stretch and if they should run afoul a little adversity they would snap.

Summing up the outlook, those companies which are in a sound financial condition can afford to proceed with confidence as they enter upon 1923. Their prices will be as low as they can make them with a fair margin of profit; their inventories will be well balanced; they will have reasonably good selling organizations; they will have safe cash reserves and they will be in a position to slow up their operations expeditiously if slowing up becomes advisable.

The prosperity which the country is now enjoying is built on a solid foundation and sound companies have nothing to fear from the future if they continue to operate along sound lines. Business generally never has been able to operate at capacity for an indefinite period, however, and it probably never will be. It is governed inevitably by the law of supply and demand.

JAMES DALTON.

Addition to Federal Truck Line

A FOUR THOUSAND to 5000-lb. capacity truck has been added to the line of the Federal Motor Truck Co. and is known as Model U-2. The chassis will be made up in three lengths of wheelbase, the shortest being 12 ft., the standard 13 ft. and the longest 14 ft. It will be made with a short or dumping loading space of 110 in., a standard length of loading space of 134 in. and a maximum length of 158 in. The body allowance is 1500 lb.

The chassis is fitted with a Continental K-4 engine, a four-cylinder 4⅛ by 5¼-in. vertical, L-head, monoblock type with a three-bearing crankshaft and a rating of 35 hp. at 1300 r.p.m. An Eisemann G-4 high tension magneto is used, a Zenith carburetor, Pharo centrifugal oil-type governor, Borg & Beck clutch and Detroit Gear and Machine Co. gearset. The front axle is of Federal design and manufacture while the rear axle is a Timken.

The truck has four forward speeds and one reverse, the ratios in the gearset being 5.899, 3.206, 1.752 and 1 to 1 for the forward speeds and 7.078 to 1 for the reverse. For the final drive the standard reduction is 7.75 to 1 while two other options are offered namely, 8.5 and 9.25 to 1.

The chassis layout is along conventional lines, the transmission being mounted as a separate unit and the propeller shaft divided and fitted with four Spicer universal joints. Propulsion is through radius rods, while the torque is taken on the springs. The tire equipment comprises 36 by 4 front and either 36 by 7 single or 36 by 4 dual rear tires. The steering gear is a Gemmer with 18 in. hand wheel. A 20-gal. fuel tank is mounted on the chassis frame under the seat and feeds through a Stewart vacuum system. The frame is of pressed steel, the channel section side bars being of ¼-in. stock and 6 in. deep. The height of the frame above the ground when loaded is 29 in. at the front and 30½ in. at the rear. Chassis lubrication is by the Alemite system. The electrical equipment includes a Remy generator and side, tail and instrument lamps, an ammeter, a horn and an Exide special truck battery provided with a cushion mounting on frame brackets. A Remy starter is furnished at an extra charge if it is wanted.

Amphibious Tank, Novel Engineering Development, Swims Hudson River

Body rests on six wheels when out of water. Steering gear locked when crawler is used and steering accomplished by running one track faster than other. Screw propellers for water operation. Engine piston displacement is 665 cu. in.

A MACHINE that can take a 75 mm. at considerable speed over good roads and can also transport it over plowed fields, up steep embankments and across lakes and rivers has been developed by Walter Christie, of front wheel drive fame, and was recently demonstrated before army officers and others at Dyckman Street Ferry on the Hudson River. The machine is really a combination of three types of automotive vehicle in one, viz., a wheeled motor truck, a creeper or crawler and a motor boat.

The steel plate hull or body rests on six wheels when out of the water. The interior is divided into two compartments by a perforated steel bulkhead near the middle, the forward compartment being for the gun crew, ammunition, etc., and the rear compartment being occupied by the machinery of propulsion. Directly behind the bulkhead and projecting above it to some height is the radiator, and behind the latter is the engine, with its axis across the machine. The engine is a four-cylinder type, with its cylinders cast in pairs. Cylinder dimensions are $5\frac{1}{2}$ by 7 in., giving a piston displacement of 665 cu. in. The gearset provides three forward speeds and three reverse, which means, of course, that there is a reverse gear which can be used in conjunction with either of the forward gears.

When the machine is used as a wheeled truck it steers in the usual way by means of steering knuckles on the front axle. This axle is of tubular form and extends through the forward part of the hull, being secured to the walls thereof by means of flanged fittings on both the inside and the outside of the hull. The knuckles, however, are not pivoted directly to the ends of the axle but to forward extensions thereof, the torsional moment thus introduced being taken up on vertical brace rods extending from the forward ends of the extensions to the overhanging portion of the hull above. The reason for this construction is that the steering rods come out through the hollow axle, which would be impossible if the wheels were concentric with the axle.

When the vehicle is used as a crawler the regular steering gear is locked and steering is effected by driving the track on one side faster and on the opposite side slower. This is accomplished by means of brakes on both sides of the differential gear, which brakes operate in a bath of oil.

Water Operation of Tank

Similarly, when the machine is operated in the water, it is steered by means of the screw propellers, of which there are two, one very close to each side of the body at the rear. The propellers are 26 in. in diameter and have a pitch of 24 in. All of the transmission gears are located at the rear of the hull and are completely inclosed. The wheels have an outside diameter of 31 in. and are fitted with Overman dual $4\frac{1}{2}$-in. tires. There are three wheels on both sides, so the machine runs on twelve tires. Propulsion can be applied either to the rear wheels alone or to the rear and intermediate wheels,



Two views of amphibious tank. One shows machine used as a wheeled truck steering from front axle in customary way. Second view shows chain tracks which are placed over all three wheels on each side when machine is used as a crawler

the two wheels at each side being connected together by means of roller type driving chains on sprocket wheels located on the outer side of each wheel. When the machine is used as a crawler, chain tracks are placed over all three wheels on each side and the rear wheels are then raised off the ground, as it would otherwise be difficult to steer. Power is applied to the tracks by the rear pair of wheels which are made of cast steel and cast with driving bars between the two channels for the tires, with which the driving lugs on the track engage.

Climbs Approximately 40 Deg. Slope.

The machine, which was demonstrated opposite Dyckman Street, has a total reduction between engine shaft and rear axle of 60 to 1. Assuming that the engine develops a torque of 0.55 lb.-ft. per cu. in. displacement, which is a good average figure, the total engine torque is 365 lb.-ft. and with a 60 to 1 reduction this gives a rear axle torque of 17,500 lb.-ft., if 20 per cent is allowed for loss in transmission. With a wheel radius of 1.29 ft. this gives a limiting traction effort of 13,600 lb., which is practically the same as the weight of the machine, so there should be plenty of power for all occasions. At Dyckman Street on the Jersey shore the machine climbed an embankment about 30 ft. high with what appeared to be approximately a 40 deg. slope.



Amphibious tank operating in water. Steering is done by means of the screw propellers of which there are two

When operated as a truck the length of wheelbase is 102 in., but when operated as a crawler the wheelbase is 144 in. The total length of the body is 16 ft., the width, 7½ ft., and the height, 4 1 3 ft. The manufacturer is the United States Mobile Ordnance Co., successor of the Front Drive Co.

Duraloy, a New Heat-Resisting Metal

DURALOY is an alloy of chromium and iron that has been developed by the Cutler Steel Co. for various industrial uses. As a construction material in the automotive industry it can be used for engine valves, and it is also suitable for much of the equipment used in heat-treating plants. The outstanding characteristics of this alloy are said to be:

1. It is non-corrosive.
2. It retains good mechanical properties at high temperatures.
3. It has great resistance to abrasion.

It is these properties, together with its comparatively low cost of production, which determine its fields of application.

Different Commercial Forms

The new alloy can be furnished in different commercial forms, including castings, rolled and forged bars, sheet, wire and tubing. The physical properties, of course, vary with the form in which the material is furnished and also with the specific analysis and the treatment it has received. They range from properties somewhat better than those of cast iron up to those of commercial alloy steels.

In the cast state the ultimate tensile strength varies from 40,000 to 90,000 lb. p. sq. in. and the elastic limit from 30,000 to 80,000 lb. p. sq. in., while in the rolled state the ultimate tensile strength ranges from 80,000 to 130,000 lb. p. sq. in. and the elastic limit from 65,000 to 110,000 lb. p. sq. in. The elongation in 2 in. varies from 2.0 per cent to nothing for the cast material and from 26 to 8 per cent for the rolled material, while the reduction in area varies from 3.0 per cent to nothing for the cast material and from 50 to 10 per cent for the rolled material. The specific gravity is 7.6, the coefficient of heat expansion, 0.000009, the shrinkage allowance for castings, ¼ in. per foot, and the Brinell hardness, 170 to 600.

Duraloy castings are said to be clean, close grained and free from segregations, blow holes and other imperfections. They can be furnished in various degrees of hardness to meet different conditions. In the rolled form the material responds to heat treatment. Bars or sheets can be supplied sufficiently ductile to permit bending, punching, forming, stamping, etc., to be subsequently treated to increase their hardness and wearing qualities. The property of the material to retain a considerable portion of its normal tensile strength at high temperatures is brought out by the following test results furnished by the manufacturers, in which the upper line gives the temperatures of the steel in degrees Fahrenheit and the lower the corresponding tensile strengths in pounds per square inch:

932	1112	1292	1472	1652	1832
98,000	72,000	40,000	25,000	20,000	10,000

The machining qualities vary with the analysis and the subsequent treatment. Rolled sheets and bars machine readily after annealing. Castings can be made soft enough to permit of drilling and tapping, but where hardness is more important than easy machining qualities they can be made to show 600 Brinell, in which case, of course, they can be finished only by grinding.

Welding Process

Welding can be done by either the electric or the oxy-acetylene process, but hammer welding is impossible. For welds between parts of duraloy, welding rod of the same material should be used, whereas between duraloy and another metal standard welding rod can be used. Owing to the fact that the alloy is inoxidizable it cannot be cut by the oxy-acetylene torch. In connection with welding operations, preheating has been found advisable, especially in the case of castings.

It is claimed that the alloy will satisfactorily withstand oxidation up to 2100 deg. Fahr. It will resist atmospheric or salt corrosion indefinitely. It is highly resistant to such corrosive heat-treating materials as molten cyanide, potassium nitrate and sodium chloride. When made specially for abrasive resistance, duraloy is said to be superior to the hardest chilled iron and to manganese steel.

Great Industries Nearer Agreement on Gasoline Problems

Automotive and petroleum groups approach better understanding through study of utilization factors. Some refiners favor adherence to present government standards but with better volatility in winter. Significance of dilution not yet apparent.

By Herbert Chase

REPRESENTATIVE men in the automotive and petroleum industries are earnestly seeking the solution of problems of great importance to both and, through the medium of careful research work, appear to be nearing a solution of some of the difficulties. In the process they are getting a far better appreciation of troubles for which each was formerly inclined to blame the other. Furthermore tangible results instructive to both are being obtained as a result of their joint activities.

In general fuels are better utilized than they have been in recent years. Difficulties are still encountered, especially in cold weather, but the joint research of the automotive and petroleum industries being carried out by the Bureau of Standards is helping to bring a far better mutual understanding of the problems to be met by producer and consumer than has ever before existed.

What is perhaps the first instance of co-operative research sponsored by two of the greatest industries of the country representing on one hand the producers of fuel and on the other the manufacturers of the apparatus which consumes the fuel in providing transportation, has already proved the wisdom of the undertaking.

The desirability of close general adherence to a standard specification for gasoline, varied by the refiners only to the extent that changes in climatic and seasonal conditions demand, once considered almost impossible by the fuel refiners, is now advocated by some of the largest of them while one of the most prominent says that there is now no excuse for marketing gasoline which does not meet Government specifications.

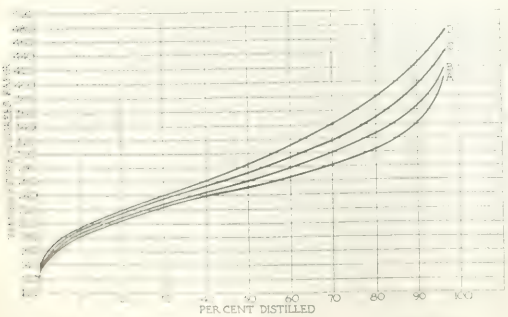


Fig. 1—Distillation curves of the four fuels tested

These are some of the important points of interest to the automotive industry which resulted from the annual meeting of the American Petroleum Institute held in St. Louis last week. Relatively few automotive men were present, due to the distance from automotive centers at which the meeting was held, but those automotive engineers who did attend included a majority of the men who have been prominent in fuel matters which have come before the Society of Automotive Engineers during the past few years.

Executives Interested in Research

Executives in both the automotive and petroleum industries are coming to appreciate the value of research and are giving it financial support as they may well do in view of the importance attached to the results already attained. Briefly stated the results of the co-operative research conducted to date have shown that, so far as warm weather conditions are concerned, there is practically nothing to choose insofar as miles per gallon on the four grades of fuel tested are concerned, providing the carbureter is given a maximum power setting in the case of each fuel. Such limited tests as have thus far been made in an endeavor to learn the relative effect of volatility on dilution of lubricant in the crankcase of engines indicate that this trouble increases as the mean volatility increases, but the effect of cold weather and other conditions known to have a pronounced bearing upon this trouble is yet to be definitely determined.

Reports presented by Director S. W. Stratton and Major R. C. Carlson of the Bureau of Standards, gave in detail results of the research work which have already been given in substance in these columns. These reports served as a basis for most of the discussion which is of interest to the automotive industry. It will be recalled that the fuels tested varied from a volatile gasoline, grade A, to one assumed to be about the least volatile that can be used in the average car in use to-day, grade D. Grade B corresponds closely to the average gasoline marketed in this country at the present time, while grade C is intermediate between B and D in volatility. Distillation curves of these fuels are given in Fig. 1.

B. B. Bachman, president of the S.A.E., expressed the view that with the average car of to-day it is possible to use grade C fuel in warm weather, but that there is grave doubt as to the feasibility of attempting to use grade D fuel in spite of the fact that it has shown the

same miles per gallon in warm weather tests recorded for the more volatile grades. Further tests must be awaited, he said, before conclusions in respect to winter operation, in particular, can be drawn.

Temperature control is proving more important but the true significance of dilution is as yet little understood, said Bachman. Damage to the engine may not be due to the dilution at least up to a certain point but to some effect which results from passage of the fuel by the piston, perhaps by the grit it carries.

J. T. B. Bowles, in common with most other speakers, commended the Bureau of Standards for its work and said that results had confirmed the conclusions of his own company—conclusions which would have failed of general acceptance, however, except for the impartial and thorough work of the Bureau. Bowles further voiced the view of many oil men when he said that it is up to the automotive industry to improve the induction system of the engines it produces. He made a plea for tests of a gasoline in which greater proportions distill at 212 deg. Fahr.

A possible future shortage of gasoline is less likely to occur, said Bowles, because the co-operation which has recently come about between the two industries most concerned is in the interest of conservation.

Adherence to Standard Fuel

Roger Chew of the Standard Oil Co. of New Jersey somewhat surprised as well as gratified his automotive hearers by advocating close adherence to the present government gasoline specifications. He said that the automotive engineer would do well to design engines for this fuel and then let the petroleum industry care for seasonal variations by such changes as may be required or possible —a program which is precisely the same as that advocated by some prominent automotive engineers.

Henry M. Crane, Chairman of the S.A.E. Research Committee, said that he is quite ready to accept the results of the joint research work already done but indicated that it is important to bear in mind that they cover only the favorable conditions of warm weather operation. He pointed out that, as the fuel grows poorer, it becomes increasingly difficult to secure good carbureter adjustment and that small differences in adjustment can, as the tests have shown, make much greater differences in the miles per gallon traveled than a change in quality of fuel within the limits under consideration.

It should be borne in mind, said Crane, that even poorer fuels than grade D, have already been extensively marketed by petroleum refiners, though conditions in this respect have been better in the past two years.

Crane said he had been greatly gratified by the desire of oil men to secure a better understanding of fuel problems as they concern the automotive engineer. He especially appreciated Chew's remarks in favor of producing a more uniform fuel than has been produced in the past. Crane pointed out that the Bureau's tests on the Post Office trucks had shown clearly that best results were obtained when the fuel used was closest to that which the men who adjusted the carbureters were most familiar with using.

Crane commended Thos. Midgley, Jr., and his associates in the General Motors Corp. for their early recognition of the detonation problem and their persistent efforts to learn its cause and find a remedy therefor. This, he said, is one case in which the automotive industry has sought to solve a distinctly fuel problem which the oil industry has only recently come to recognize.

The National Automobile Chamber of Commerce, though it has given financial and other support to the research program, was unfortunately not officially represented at the meeting. It was due largely to the automotive engineers that the co-operative program was initiated and it has devolved upon them to follow it through, though the whole automotive industry will profit by it.

T. G. Delbridge of the Atlantic Refining Co. heartily supported the plea for uniformity made by Chew and added that there is no excuse to-day for marketing less volatile fuel than that which corresponds to the present Government specifications.

O. C. Berry of the Wheeler-Schebler Carbureter Co. asked the refiners to provide more volatile fuel in the winter months and explained the importance which temperature plays in respect to vaporization. He suggested that kerosene should be used as fuel for trucks and tractors, leaving gasoline for passenger car use exclusively, but was not supported by others in this proposal.

H. L. Horning of the Waukesha Motor Co. said that he is of the opinion that the refiners are making sincere efforts to market better gasoline but that adulteration with kerosene by retailers often results in serious difficulties for the user. The oil industry should make every effort to control this situation, he said. Horning stated that, if we could always operate automotive vehicles at temperatures above 50 deg. Fahr., there would be relatively little difficulty with present average fuels. Since, however, the average temperature at points in this country which are further north than St. Louis is below 50 deg. Fahr., and since about 75 per cent of the motor vehicles are located in this area, it is of great importance to consider performance at such low temperatures.

A curve showing the relation between number of cars used by workmen at the Waukesha plant and temperature conditions was exhibited by Horning. This showed that the percentage of cars employed invariably decreased with the temperature. The percentage varied from 100 per cent at 90 deg. Fahr. to zero at minus 30 deg. Fahr., a condition which was attributed by the owners to the increased difficulties in starting as temperature decreases. This condition, said Horning, results in loss of business for the oil industry and is one which they should seek to correct by furnishing better fuel in cold weather, especially in localities where low temperatures prevail for several months of the year. Some companies are selling better fuel in the winter, he said.

Horning stated that he has recently developed an engine with 5 to 1 compression ratio which uses present commercial gasoline satisfactorily. Careful piston and ring design have aided in attaining this result.

End Point Illogical Basis for Comparison

R. Haskell of the Texas Co. stated that the end point is not the logical basis for comparing fuels. He said that engines which will burn less volatile fuels than are now generally sold can and will be built and that it is desirable to eliminate some of the personal elements upon which their satisfactory operation is now partly dependent by providing automatic temperature regulation.

H. C. Dickinson, manager of the S. A. E. Research Department, stated that better progress has been made in the co-operative research work than was anticipated. The effort has been to learn what fuel is best for both industries, conservation and all other factors considered. The effect of fuel quality on starting, lubricant dilution and carbon formation are among the items still to be fully investigated, but the tests made to date show that there is no increase in cost per mile of operation under warm weather conditions with the less volatile fuels. He pointed out that, whereas petroleum is consumed within a few months of the time it leaves the well, automotive engines which burn it not only require considerable time for design

and production but continue in use for several years thereafter. Hence the need for looking ahead in designing present cars.

R. E. Wilson of the Standard Oil Co. of Indiana pointed out the advantage of using the 85 per cent instead of the end point in comparing fuels; since the temperature at this point is in almost direct proportion to the condensation temperature and is thus a better index of volatility as well as the tendency to cause lubricant dilution. He gave the following table of data in this connection:

Fuel	85% Point, Deg. Fahr.	Condensation Temperature, Deg. Fahr.
A	318	82
B	342	98
C	377	120
D	400	149

Five points on the distillation curve of gasoline are too many to specify, said Wilson. He urges use of 85 per cent and and 25 per cent points, the latter being a good index of the starting characteristics of the fuel.

Frank A. Howard of the Standard Oil Co. of New Jersey said he regarded the meeting the most significant of any which the Institute has held. He said, in respect to research, that we have learned much concerning temperatures required for vaporization and much about the prevention of detonation. We must now concentrate our attention upon solution of the problem of lubricant dilution, learning how much dilution is possible without detriment and whether the added cost of gasoline which would be free from this dilution tendency is worth while in an economic way.

W. M. Welch of the Association of Natural Gasoline Manufacturers said that about 10 per cent of our domestic supply of gasoline comes from natural gasoline. This light distillate is an excellent fuel but because of blending with fuel which is not well suited for automotive uses has sometimes gotten a bad reputation. When properly blended it makes an excellent light end and is fortunately available in larger quantities in winter when these light fractions are particularly needed.

What Warm Weather Tests of Fuels Indicate

Practically the same miles per gallon consumed but greater dilution of lubricant is shown by less volatile fuels.

IN earlier issues of AUTOMOTIVE INDUSTRIES, especially that of Sept. 28, 1922, reference has been made to road tests being made by the Bureau of Standards, on four of the most widely used makes of cars now in use in this country, and some general conclusions as to the results obtained have been reported. Further particulars, including specific data in respect to the performance of the various cars tested were released at the meeting of the American Petroleum Institute last week and a somewhat detailed summary of these is here published for the first time.

The cars were tested over a 2.8 mile level course divided into tenth mile sections. The speed for each section was either higher or lower than that of the preceding section so that numerous accelerations were made. Fuel was measured for each tenth mile, and each car was handled in a precisely similar manner except that car which had a non-adjustable carbureter was tested with only this one setting.

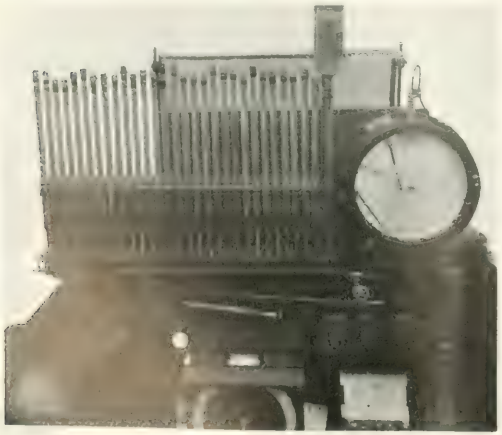


Fig. 2—Apparatus used for fuel measurement

A summary of the results is given in Table I. They indicate that, for the warm weather conditions involved, practically no difference in miles per gallon was found for the four fuels providing the carbureter was set in each case to give maximum power. In each case the comparison was with fuel B, the reference fuel, and under precisely comparable conditions on the same day, so that in interpreting the results comparisons should be made on the same basis.

The fuel measuring apparatus used is shown in Fig. 2. It consisted of a series of thirty-two burettes, each of 50 cc. capacity. These burettes were provided with a rubber tube and cut-off cock at the bottom so that by a single movement of the hand one burette could be closed and the adjoining one opened. Each burette was used during one-tenth of a mile around the test course, being opened at the beginning of the section when the stake was passed and closed at the end when the next stake was passed. Each of the burettes therefore indicated the fuel consumed while passing over a given section of the course with the car performing a fixed schedule of acceleration, constant speed, or deceleration. Inasmuch as zero was at the top, the burettes were direct reading and when the car had traversed the entire course the readings of all the burettes were recorded. The sum of these readings gave the total fuel consumption for the circuit.

The crankcase, differential and outlet water temperatures were recorded by means of long distance indicating thermometers, at the beginning and end of each run. Accelerations were made with wide open throttle and decel-

eration by closing throttle but without using brake. The time was obtained by means of a split second stop watch.

The tire pressures were recorded and the tires were pumped up to a fixed pressure each morning before the tests were started. Driving the car from the Bureau to Potomac Park insured that temperature conditions were fairly constant before the beginning of runs.

Relative humidity and barometric pressure data were obtained from the United States Weather Bureau.

The recording tachometer and vacuum gage gave an indication of the handling of the throttle and the speed variation of the car while proceeding along the course. By careful work it was possible to obtain results which agreed within 3 per cent.

In order to obtain information as to the effect of these four fuels on oil dilution in the crankcase two cars were given road tests between Washington and Frederick, Md., a distance of approximately 50 miles one way. This road is in fairly good condition and includes a relatively large number of hills. An average speed of 25 miles per hour was maintained.

Two round trips, representing a total of two hundred miles, were made for each fuel. In addition, check runs were made to get an idea of reproducibility of results. Before the start of the run on each fuel, the crankcase was drained, new oil put in and the engine run for five or ten minutes. This oil was then drained out and the crankcase filled with new oil. No additional oil was added during the 200-mile run. Eight-ounce samples were carefully analyzed for dilution and viscosity. Inasmuch as the runs were made under summer conditions and fairly high road speed, it was appreciated that the dilutions obtained would be relatively low, and for this reason a careful endeavor was made to keep the operating conditions as nearly alike as possible.

The curves in Figs. 3 and 4 show graphically the change in dilution and viscosity of the lubricating oil during these tests.

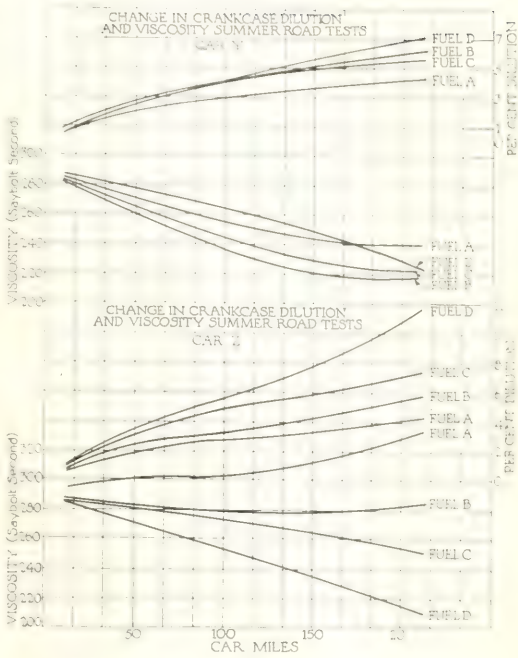
Analysis of Tests Under Summer Conditions

In the case of Car X, which had a fixed jet type carbureter, fuels *B* and *C* gave approximately the same miles per gallon, namely, 22.7. Fuel *A* as compared with fuel *B* gave less miles per gallon. Fuel *D* as compared with *B* gave more miles per gallon. It is probable that this difference can be accounted for by a consideration of the difference in density and viscosity of the four fuels tested. If the jets were of correct size for a gasoline such as fuel *B*, then more of fuel *A*, which has a lower density and viscosity, would flow through and the effect would be to give a slightly richer mixture. Conversely, less of fuel *D*, which has a higher viscosity and greater density, would flow through the jet and tend to give a leaner mixture.

Table I

Average results of mileage tests under warm weather conditions. Carbureter set with each fuel for maximum power except in case of car X which has fixed jet.

Car	Fuel	Average Time for Course, sec.	Miles per Gallon, average	Ton-Miles per Gallon, average
W	B	724.8	19.41	36.5
	A	728.2	20.49	38.53
	B	714.0	19.00	35.74
	D	715.5	18.23	34.28
	B	718.3	19.10	35.82
	C	721.6	18.34	34.47
X	B	707.9	22.72	28.65
(Fixed Jet)	C	696.4	22.67	28.58
	B	684.1	24.43	30.8
	A	684.7	23.98	30.25
	B	714.8	23.48	29.61
	D	712.0	24.07	30.34
	B	668.2	18.36	29.51
	A	672.4	18.89	30.36
Y	B	663.9	18.69	30.03
	C	661.8	19.08	30.65
	B	667.05	19.32	31.5
	D	666.5	19.2	30.8
	B	669.7	22.65	26.5
	A	669.3	22.9	26.7
	B	666.7	22.73	26.55
Z	C	666.1	22.38	26.13
	B	664.7	22.79	26.63
	D	663.3	22.25	25.97



Above, Fig. 3, and below, Fig. 4, showing effect of various fuels on dilution of lubricant

In the case of cars Y and Z when the carbureter was adjusted for maximum power for each test fuel, there is practically no difference in miles per gallon. The time required to make the circuit of the test course was within one or two seconds of being the same, so that under these conditions of test and carbureter adjustment the car performance was the same. In view of these results it is reasonable to state that in so far as the four test fuels are concerned, and under the conditions of these tests there was practically no measurable difference in miles per gallon between the four test fuels.

The effect of carbureter adjustment can be noted from a comparison of the general averages for the runs in which the carbureter was set for *B* fuel with the general averages for the runs in which the carbureter was adjusted for each test fuel. When the *B* fuel setting was used for all fuels, *A* showed less and *C* and *D* showed more miles per gallon, but when the carbureter was adjusted for each test fuel these differences were practically nil.

In so far as these four test fuels are concerned, it can be said that the effect of carbureter adjustment has a greater bearing on miles per gallon which it is possible to obtain than any difference inherent in the fuels themselves. In car *Y* the differences in dilution and changes in viscosity were not as marked as in car Z. Car Z had a

planetary type transmission, and it will be observed that with fuel *A* at the end of 200 miles the viscosity increased and with fuel *B* the viscosity was approximately the same as the new oil. The dilution obtained for these two fuels was between 4 and 6 per cent at the end of 200 miles, about the maximum distance which could be run without adding new oil, so that the ill effects of dilution in this car were in a measure, at least, ameliorated by the necessity of adding new oil before the dilution became so great as to be really harmful.

Although the dilutions obtained in these road tests were not high, they are of interest as a comparison between the four fuels, since the conditions under which the tests were made were kept as nearly constant as possible.

Dilution Greater with Less Volatile Fuels

From an examination of the data obtained through these road tests, it can be seen that a slightly greater dilution of lubricating oil resulted from the use of the less volatile test fuels.

Although the results of the summer tests showed no measurable differences in fuel economy for the same car performance, it is felt that this investigation would not completely cover the field unless it were continued to include tests under conditions of lower temperatures.

After considering the results of the summer tests, the Steering Committee of the S.A.E., A.P.I. and N.A.C.C. authorized the continuation of this work to include cold weather conditions. It was the consensus of opinion that if there were any marked differences between the four test fuels in miles per gallon, ease of starting, and crankcase dilution, these differences might be more apparent when the fuels were tested under winter conditions. In addition to obtaining purely comparative data, a broadening of the scope of the program was authorized so as to permit making a study of the conditions which should be of major influence on the questions under investigation, namely, economy, ease of starting, acceleration, and crankcase dilution.

On this basis, a program of low temperature tests has been laid out which aims to determine first what conditions influence results and then to obtain quantitative measurements under conditions as similar as possible to those likely to be encountered in actual service. The initial stages of this investigation are being carried out in the laboratory, where easy and accurate control of temperatures is possible. An electric dynamometer and inertia load are being used to give load conditions comparable to those encountered in actual service.

In general, the laboratory investigation aims to discover conditions under which a richer mixture is required with one fuel than with another for a given performance. When these conditions are found and the difference in fuel consumption measured the results are applicable to service conditions by determining through actual road tests or other means how often these conditions occur in ordinary driving. The maximum difference in fuel consumption to be expected between the four fuels in actual service would then be the difference in fuel consumption as measured by the laboratory under the worst conditions multiplied by some factor which would represent the proportion of total driving under which these worst conditions exist.

Cold Starting and Acceleration

As an example, suppose one of the fuels required a richer mixture than another during starting cold and accelerating to normal speed. If this richer mixture were obtained through the use of the choke and the carbureter adjustment were not changed, then the difference in fuel consumption between the two fuels would depend principally on the amount of cold starting and acceleration included in the ordinary day's driving under cold weather conditions.

If, however, the carbureter were adjusted to give a richer mixture and thus help starting, and if the mixture were not leaned down after the engine had warmed up, then the difference in fuel consumpton would be dependent largely on the number of car drivers expressed in per cent

Table II

Low Temperature Laboratory Tests—Co-operative Fuel Research

Series I— Test No.	Speed	Load	Mixture Ratio	Jacket Water Temperature	Inlet Air Temperature	Choke Position
1	Lowest for full throttle operation	Full, ¾, ½, ¼, 1/10 and no load	Varied for each load, full lean to full rich (appreciable drop in power)	Normal	Normal	Open
2	Same	Same	Same	Same	Lowest for steady running	Same
3	Same	Same	Same	10° C. below normal	Heated to give best performance and varied to lowest for steady running	Same
4, 5, etc.	Same	Same for each step	Same for each step	Reduced in steps of 10° C. until engine will not run	Same for each step	Same
Series II—						
1, 2, 3, etc.	Engine speed corresponding to 20 miles per hour	Otherwise same as Series I				
Series III—						
1, 2, 3, etc.	Intermediate or other speeds if found necessary	Otherwise same as Series I				
Series IV—						
1, 2, 3, etc.		Same as Series I except choke				Varied until closed as much as posible
Series V—						
	Acceleration runs under conditions of Series I, but with fixed maximum load					

Table III

Physical Characteristics of Four Test Fuels

	Fuel A	Fuel B	Fuel C	Fuel D
Initial	120° F.	128° F.	125° F.	130° F.
85%	316° F.	342° F.	367° F.	399° F.
Dry	403° F.	417° F.	446° F.	472° F.
Av. B. P.	250° F.	257° F.	275° F.	288° F.
Av. Mol. Wt.	111.5	114	119.5	123.5
Specific gravity (26° C.)	.727	.733	.736	.740
Index of Ref. (28° C.)	1.4100	1.4110	1.4150	1.4165
Viscosity (Cent. 26° C.)	.527	.533	.577	.592
Equil. Temp.	304° F.	325° F.	349° F.	378° F.
Dew Point 12:1 Mix.	52° F.	88° F.	117° F.	153° F.
Doctor	Sweet	Sweet	Sweet	Sweet
Unsat.	5.5%	6.5%	6.0%	6.0%
Moisture	None	None	None	None
Acidity	None	None	None	None
Reaction test	None	None	None	None

of total who do not adjust the mixture to the engine's requirements.

The laboratory investigation will be supplemented by such road tests as may be found necessary.

Table II shows the series of tests now under way. The tests shown in Series I, II and III, are for the purpose of determining what mixture ratio is required for a specified performance. These tests are being made using each of the four test fuels at full, ¾, ½, ¼, 1 10, and no load at engine speeds of 400, 800, and 1200 r.p.m., and with the mixture ratio changed for each run from the leanest to the richest possible. The temperature of the entering air and jacket brine is varied as outlined in the table from normal air and jacket down to coldest air and jacket brine.

The runs in Series I will be repeated with the choke closed as much as possible. These runs should give the following information for each fuel:

(a) The leanest mixture at which each fuel will operate.

(b) The influence of load upon that mixture.

(c) The influence of jacket temperature upon that mixture.

(d) The influence of air temperature upon that mixture.

(e) The influence of air pressure on the action of the fuel jet.

The last item (e) will be obtained from the runs with the choke closed as much as possible.

In order to obtain information as to the effect of mixture ratio on acceleration, the runs shown as Series V in Table II will be made. The dynamometer is provided with an inertia disk so proportioned that its acceleration requires the same energy output by the engine as the acceleration of the car from which the engine was taken. If a difference in the rate of acceleration is found between two fuels which difference could not have been predicted from previous runs, then this difference must be due to the difference in the rate of vaporization of these fuels.

The preceding tests will show the limiting conditions of temperature under which the engine can run and also under which it can accelerate for various conditions of temperatures and mixture ratios for each of the test fuels.

In order to obtain information concerning the relative ease of starting with each of the four test fuels, the following procedure will be observed: The lowest jacket and air temperature will be selected at which the engine will run steadily. Under these conditions a series of starts will be made using five needle valve, three throttle and three choke positions. The number of revolutions necessary to obtain the first explosion, as well as the revolutions and time required to obtain steady running, will be recorded. The fuel required during this period, as well as the fuel required until the engine will run steadily and accelerate, will be measured. After the engine has attained steady speed the readings will be taken to give mixture ratio. These runs will not only give an indication of the relative ease of starting when the four fuels are used, but also as to the effect of compression pressure and manifold suction as well as fuel consumption during starting and acceleration.

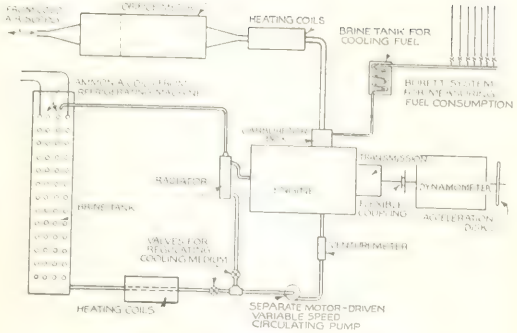


Fig. 5—Arrangement of apparatus for winter tests

In order to obtain information as to the relative effect of the four fuels on oil dilution and change in viscosity of the lubricating oil, a series of runs will be made at various loads and with mixture ratios varied to correspond with those ordinarily used by average car drivers.

The arrangement of the apparatus necessary to carry out this program of winter tests is shown in Fig. 5. The engine, circulating system and air supply system are all inside of a heat insulated chamber. Low air and jacket brine temperatures are obtained by direct expansion of ammonia in coils. Temperatures are measured by means of thermocouples.

The operation of the apparatus is apparent from an examination of the diagram. The set-up has been given preliminary trials and so far appears to be adequate for the work contemplated.

The program for winter runs as described above may be varied slightly, as the results of tests indicate the necessity for doing this. This whole laboratory work should determine what difference exists between the test fuels under various conditions, in order to determine when and where these differences are found, this laboratory investigation will be supplemented by such road tests as may be found necessary to permit of a quantitative measurement of fuel consumption under the worst and under the best conditions of operation which might be expected to occur in actual cold weather car operation.

It is too early to give here any data obtained from this winter program, but every effort is being made to push this work so as to make the results obtained available at as early a date as possible.

Table IV

Characteristics of Test Cars Used

Car	W	X	Y	Z
Year	1920	1920	1920	1920
Number of cylinders	6	4	4	4
Bore and stroke	3⅜x4½	3⅛x4	3⅜x4½	3⅜x4
Piston displacement cubic inches	241.6	171	212	177
N.A.C.C. Hp. rating	27.3	21.75	24.03	22.5
Wheelbase, inches	118	102	...	100
Weight, lbs., including equipment and crew	3760	2450	3210	2335
Tires	33x4	31x4	32x4	30x3½
Gear ratio	4.0	3.67	4.166	3.63
Miles run, approx.	15,000	10,000	15,000	12,000

Electrical Equipment Standards Modified by Committee

Tentative specifications for generators and starting motors altered at recent session of Standards Committee. Changes suggested by letters published in *Automotive Industries*. Work progressing rapidly with broadening possibilities.

THE Standards Committee of the Automotive Electric Association, which undertook last spring the task of standardizing electric generators and starting motors for motor vehicles of all classes, recently held a session in Cleveland to consider various suggestions that have been received from the industry on the tentative specifications agreed upon at the annual meeting at Old Orchard, Me., in August. As a result of the deliberations of all of the manufacturers the specifications were more or less altered. The new specifications arrived at are not final, but represent a step forward in this standardization program.

Chairman Joseph Bijur of the Standards Committee, who presided, was more than pleased with the progress toward standardization and the unanimous co-operation given by all members. The work is progressing faster than was anticipated and the possibilities of standardization are broadening with each meeting of the committee. President A. D. T. Libby of the Automotive Electric Association, who is very strongly in favor of a vigorous standardization program, attended the meeting.

Following the publication of these tentative specifications there appeared in AUTOMOTIVE INDUSTRIES a considerable number of letters from men prominent in the industry commenting on the proposed standards and offering suggestions of various kinds. During this interval the members of the committee have had opportunity to confer with their engineering staffs and all of the views thus obtained were thoroughly discussed. The committee went over each one of the letters in AUTOMOTIVE INDUSTRIES and as a result of this study and of their own reflection the members decided upon some modification of the specifications previously set up.

Omit Cold Test Requirements

All of the manufacturers agreed that in specifications of generators the cold test requirements could be omitted to advantage because it is the hot output of a generator that is most important. In omitting all reference to the cold performance of the generator, the committee had in mind that their output is lower at high temperatures due to the increased electrical resistance of the machine, and that an output based on a hot machine would be a more conservative rating. Furthermore, in actual operation, the generator warms up very quickly due to the heating of its current and therefore soon reaches a comparatively high temperature at which it continues to operate. It was thought that the cold output was merely a good indication of what the generator would do but not as accurate a criterion of its capacity as its hot performance.

The committee further decided that the cut-in speed of a generator, that is, the speed in r.p.m. of a generator at which it begins to charge the battery, should be eliminated from all future specifications. This conclusion was based on the fact that a generator must balance the load it has to carry at a low speed, that is, a speed below what might be described as the average speed of the generator; and the generator should, at higher than average speeds, be more than capable of carrying the load.

Chairman Bijur, in commenting on the elimination of cut-in speed from future generator specifications, explained it as follows:

Generator Output

"The output of a generator should be such that at car speeds which can be relied on to be reached under any reasonable conditions of driving, the generator current should slightly exceed the amount consumed in all electrical devices. At higher car speeds the output should increase sufficiently so that at what can be relied on as average speed, the surplus available to charge the battery should more than compensate for the drain on the battery during periods of ultra low car speeds, or with the vehicle at rest.

"To put it more briefly, the generator must balance the load at a low speed and at a high speed be capable of doing considerably more.

"The precise point where the generator begins to do anything at all, comparatively speaking, is described as the point of cut-in, but this has little or no effect on the adequacy of the machine as a satisfactory source of current. It is very much as if a man who wanted a hundred bushels of wheat on Aug. 1 specified when this wheat should begin to grow in the fields.

"An examination of the current curve of a generator will disclose that the average output below the speed where it carries the load varies little whether the cut-in begins at 5 or 7 m.p.h. provided the speed of balancing the load is the same in either case. Furthermore, it would be apparent that the time of this ultra-low speed operation is such a small fraction of the total time during which the car is in motion that variation of the average current value during this period has a negligible effect on the essential factor, namely, the total ampere hours supplied by the generator while the engine is running."

The new generator specifications have been broadened to include a wider range of generators covering cars, trucks, buses and gasoline railroad cars. In the tentative specifications drafted at Old Orchard Beach the committee had agreed on two sizes of generators to serve the pas-

senger car field but has now added one. There are three suggested sizes for passenger cars; two suggested sizes for motor trucks, and three additional suggested sizes for buses, gasoline railroad cars, etc., making a total of eight generator sizes to cover the entire field. As the specifications of generators as now drawn permit voltage-generators to be included under them, the separate reference to voltage-regulator generators has been omitted. The new generator specifications make no reference to the speed of the vehicle, or to the class of car on which the generator is used.

Three Generator Standards

The consideration of all of the data before the committee showed that to cover the range of the great majority of cars a selection of three generators would be advisable and that these generators could well be rated at one speed for all, but with differing outputs to agree with the varied demands of the different sized vehicles. For machines of the lowest outputs it was recognized that working temperatures have been in successful use which are higher than the committee would prefer to see in generators of larger capacity in which a more liberal margin of reliability is also demanded.

The committee thought it now possible to eliminate the range of speed included in the old specifications and to give a definite speed in armature revolutions at which, for example, the current output should balance the load. Similarly, the critical output of the generator has been fixed at a definite rate of amperage. The generator specifications now call for a drop in the current curve of all generators as the speed of the generator increases. This curve characteristic was not incorporated in the smallest generators in the earlier specifications.

The eight different types of generators, their speed, current output, etc., are given in the following tabulation:

Generators Intended Primarily for Drive at 1½ Times Engine Speed (Mostly passenger cars)

Generator Speed Rev. per Min.	No. 1 Generator Amperes	No. 2 Generator Amperes	No. 3 Generator Amperes
1050	Not less than 7	Not less than 8	Not less than 10
1600	Not less than 10	Not less than 12	Not less than 15
2200	Not over 9	Not over 11	Not over 13
Maximum permissible temperature rise at maximum load.	100 deg. C.	90 deg. C.	80 deg. C.

Generators Intended Primarily for Drive at Engine Speed (As from magneto shaft of 4-cylinder engines on trucks or cars)

Generator Rev. per Min.	No. 4 Generator (Output same as No. 1)	No. 5 Generator (Output same as No. 3)
700	Not less than 7	Not less than 10
1050	Not less than 10	Not less than 15
1400	Not over 9	Not over 13
Maximum permissible temperature rise at maximum load.	90 deg. C.	80 deg. C

Generators Intended Primarily for Buses of Various Kinds (Generator speeds not yet determined)

	No. 6 Generator	No. 7 Generator	No. 8 Generator
Maximum output in watts	200	300	450
Nominal voltage of generator terminals	8 for 3-cell bat. or 16 for 6-cell bat.	16 for 6-cell bat.	16 for 6-cell bat.

The specifications as actually drawn up by the committee covering the generators tabulated above are the following:

"The ratings are based on a test in which the machines are operated at maximum load until the temperature ceases to rise more than 2 deg. in one-half hour, after which they are to give performance as listed below.

"Where regulation is by means of third brush alone the following classification is recommended, but where regulation is by other means, equivalent performance is recommended.

No. 1 Generator

"At a speed not exceeding 1050 r.p.m. to give not less than 7 amperes at 8 volts.

"At a speed not exceeding 1600 r.p.m. to give not less than 10 amperes at 8½ volts with a rise of temperature not exceeding 100 deg. C. when measured with a thermometer not over 1 16 in. away from the commutator.

"At a speed not exceeding 2200 r.p.m. it will permit the current to be maintained at a value of not over 9 amperes.

No. 2 Generator

"At a speed not exceeding 1050 r.p.m. to give not less than 8 amperes at 8 volts.

"At a speed not exceeding 1600 r.p.m. to give not less than 12 amperes at 8½ volts with a rise of temperature not exceeding 90 deg. C. when measured with a thermometer not over 1 16 in. away from the commutator.

"At a speed not exceeding 2200 r.p.m. it will permit the current to be maintained at a value of not over 11 amperes.

No. 3 Generator

"At a speed not exceeding 1050 r.p.m. to give not less than 10 amperes at 8 volts.

"At a speed not exceeding 1600 r.p.m. to give not less than 15 amperes at 8½ volts with a rise of temperature not exceeding 80 deg. C. when measured with a thermometer not over 1 16 in. away from the commutator.

"At a speed not exceeding 2200 r.p.m. it will permit the current to be maintained at a value of not over 13 amperes.

No. 4 Generator

"At a speed not exceeding 700 r.p.m. to give not less than 7 amperes at 8 volts.

"At a speed not exceeding 1050 r.p.m. to give not less than 10 amperes at 8½ volts with a rise of temperature not exceeding 90 deg. C. when measured with a thermometer not over 1 16 in. away from the commutator.

"At a speed not exceeding 1400 r.p.m. it will permit the current to be maintained at a value of not over 9 amperes.

No. 5 Generator

"At a speed not exceeding 700 r.p.m. to give not less than 10 amperes at 8 volts.

"At a speed not exceeding 1050 r.p.m. to give not less than 15 amperes at 8½ volts with a rise of temperature not exceeding 80 deg. C. when measured with a thermometer not over 1 16 in. away from the commutator.

"At a speed not exceeding 1400 r.p.m. it will permit the current to be maintained at a value of not over 13 amperes."

Specifications Still Tentative

Chairman Bijus, in emphasizing the fact that the newly drafted specifications are not final, expressed the thought of his standards committee as follows:

"It should be clearly understood that these specifications are only tentative. The work has not as yet been submitted to the Board of Governors of the association for approval and the figures are consequently subject to further revision.

"I think that I am expressing the sentiments of our committee when I say that we found the suggestions received in the contributions to AUTOMOTIVE INDUSTRIES very helpful in assisting us to arrive at this new specification. We shall welcome any further comments on this specification which readers may care to contribute."

Uniform Regulation of Engine Speed

Engine speed does not usually vary directly with displacement of throttle lever. Connecting linkage of control lever and steering column can be so arranged as to make variation of speed more nearly proportional to lever movement. Layout described.

By Heinrich Dechamps

IN most present day cars a uniform displacement of the throttle lever on the steering column does not result in anything like uniform variation of engine speed. A slight displacement from the idling position gives the impression of great sensitiveness of the control and produces a rapid increase in the speed of revolution, but the last one-third of the control lever range generally has little effect, the speed increasing almost imperceptibly.

This phenomenon is based on the fact that the speed of an engine is by no means proportional to the area of throttle opening. When the throttle valve is nearly closed, there is a strong depression in the inlet manifold, which results in a higher gas speed through the throttle and, consequently, in a proportionately more complete filling than with a more open throttle.

If a co-ordinate diagram is constructed in which the engine speeds in r.p.m. are drawn in as ordinates and the corresponding positions of the throttle lever, expressed in percentages of its total range of motion, as abscissas, a curve of the type represented by A in Fig. 1 is obtained. At first it rises very rapidly but later becomes gradually more nearly horizontal. For sensitive control of engine speed there would be required a mechanism giving a rather different curve, one rising slowly at first and then substantially uniformly, as shown by D in Fig. 1.

Profiling Throttle Opening

The simplest method of obtaining such an ideal curve, which has been repeatedly used in the past, consists in suitably profiling the throttle opening, so that for uniform displacement of the throttle lever the opening increases at first slowly and then constantly more rapidly, as shown in Fig. 2. A sliding type of throttle valve of this form, however, becomes materially heavier, more expensive and more bulky than an ordinary butterfly valve. The gas passage, also, is less favorable, as there are abrupt changes in the sectional area, at the edges of which any incompletely vaporized fuel has a tendency to collect. For this reason, the simple butterfly valve has almost completely displaced all other forms of throttle. With this design, the opening automatically increases at first more slowly and then more rapidly than the throttle lever displacement, but this non-uniformity is not nearly sufficient to give the desired control curve. It is, therefore, necessary to insert a variable transmission between the throttle lever and the control lever, so that a uniform displacement of the former produces at first a very slight and then a constantly increasing displacement of the latter. Inasmuch as these two parts, located some distance apart, are connected by a link and lever system, it is possible to attain the desired end by merely arranging the levers in proper relation to each other, as will be shown in the following. All that is necessary is a careful layout in order to insure that each step in the motion of the control lever produces the same increase in the number of engine r.p.m.

How to Determine Control Curves

Although it is possible to determine theoretically the relation between throttle opening area and speed of rotation, and, consequently, the transmission ratio required for every point of any particular control curve, the graphical method is simpler and much quicker. In Fig. 3 the different methods of connecting single armed levers lying in the same plane are represented diagrammatically, A and B being for rotation in the same direction, and C, D and E for rotation in opposite directions. The range of motion of the lever at the right, which is regarded as the driving member, is divided into four equal parts, and the corresponding positions of the left hand driven lever are indicated by small circles. If the levers are connected symmetrically, as at A, the transmission is uniform, the divisions of both arcs of motion being equal. On the other hand, if the connection is made so that the levers lie nearly at right angles instead of parallel to each other, as at B, equal divisions of the right hand lever correspond to very unequal divisions of the left hand one. The total range of motion is somewhat smaller and the transmission of motion is far less favorable, in that resolution of the transmitted pressure into its components results in increased bearing pressure and the influence of any possible slackness in the pivots is increased. However, since in the regulation of throttle opening the forces transmitted are very small and play in the pivots may be eliminated by the use of a counterspring, these matters are of no great practical importance.

With opposite directions of rotation of the two levers, the transmission is substantially uniform if the location of the link in the middle position corresponds to the common inner tangent to both arcs, as at C. By shortening the link, as at D, or lengthening it, as at E, the transmission ratio becomes non-uniform, in that, with the shortened link, the motion of the driven lever is at first large and then becomes smaller and smaller, while with the lengthened link the reverse relation holds, as may be seen from the diagram. It is necessary to become thoroughly familiar with these relations—which are not directly obvious—before attempting to determine the proper position of the levers of a carbureter throttle control.

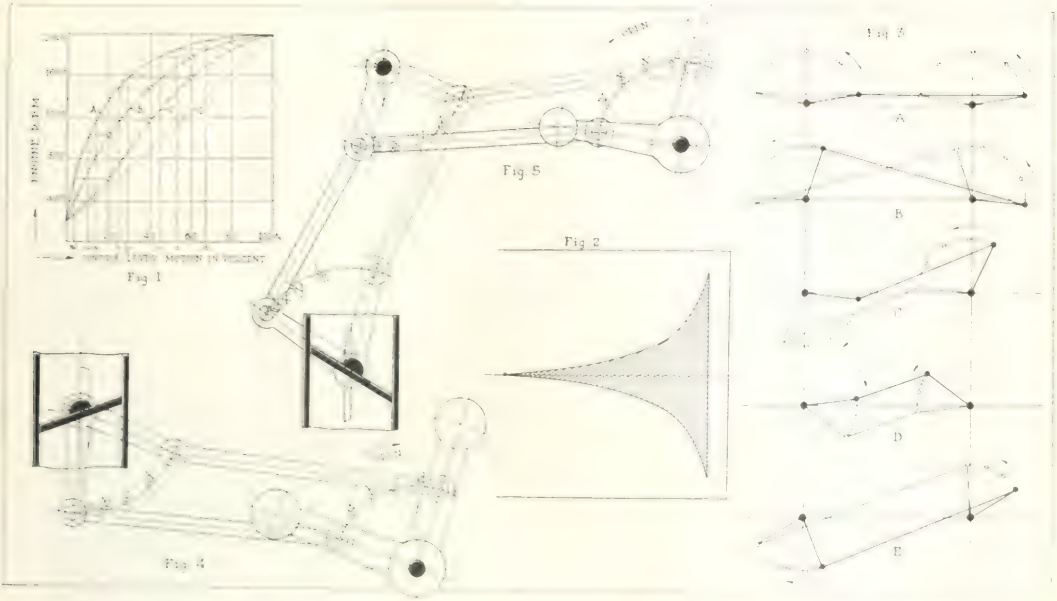


Fig. 1—Control curves with different transmissions
A—Control curve corresponding to direct operation of butterfly valve
B—Control curve for lever transmission according to Fig. 4
C—Control curve for double lever transmission according to Fig. 5
D—Ideal control curve

Fig. 2—Throttle valve with profiled port

Fig. 3—Diagrams of lever and link connections

Fig. 4—Control with simple lever connection

Fig. 5—Control with an intermediary lever

The effect becomes plainer by reference to Fig. 4, which corresponds to Diagram D of Fig. 3. In practice there is, of course, a greater distance between the throttle lever and the control lever, and besides those shown there are additional levers and links, which, however, if they are arranged symmetrically, do not influence the transmission and may, therefore, be neglected. The full lines indicate the idling position. The range of motion of the control lever is divided into five equal parts, of which each, therefore, corresponds to 20 per cent of the total motion. If the control lever is moved to point *a* (20 per cent) the throttle lever moves through only 11 per cent of its total range. On the contrary, the last 20 per cent of control lever motion, from point *d* on, corresponds to 35 per cent of throttle lever motion.

Effect of Variable Transmission

To bring out the effect of this variable transmission, there are plotted in Fig. 1 on the axis of abscissas the thus found displacements of the throttle lever in per cents. A vertical line is drawn to the intersection with the control curve and this height is transferred to the axis of ordinates which corresponds to the control lever position. If this is carried through for the positions a, b, c, d, the dash control curve B is obtained which represents an improvement as compared with the speed curve A, but is still very far from the ideal curve D.

If the transmission ratio variation is increased by introducing an intermediate lever in the link which is out of parallelism with both of the other levers, as shown in Fig. 5, the two effects will be additive. With the arrangement shown in the drawing, the first 20 per cent of the control lever motion, to point w, corresponds to only 4 per cent throttle opening, while the last 20 per cent of control lever motion, from point z on, corresponds to 47 per cent of throttle opening. The effect is shown by line C in Fig. 1, which was obtained in exactly the same way as line B. Such a control curve approaches so closely to the ideal curve D that it meets all practical requirements, more particularly because, with few exceptions, the arrangements found on present cars are not nearly as favorable.

Non-Uniform Transmission

Besides the ordinary lever connection, there are other mechanisms which may be used to obtain the desired non-uniform transmission, such as roll lever combinations, eccentric gears, cam drives and crank motions. Of these only the crank motion is at all likely to see practical application, for the reason that it also is quite simple and gives substantially the same opening diagram as Fig. 5. It is generally unnecessary to resort to any of the other mechanisms mentioned, as the connections in any case comprise lever arms, which it is only necessary to give a proper angular offset in order to obtain satisfactory control characteristics. Painstaking work is necessary in this connection, and often several layouts must be tried out before the best solution can be found. To direct the attention of designers to this point, which in the past has been very much neglected, is the object of this article.

THE city of Madrid has passed a resolution in favor of purchasing 12 motor ambulances at a cost of 250,000 pesetas. It has declared its intention to reconstruct the street-cleaning service, and will purchase motorized street sweepers, sprinklers, and rubbish wagons.

Twenty-Two Miles of Highway Sell Hundreds of Cars and Trucks

Sales value of surfaced roads well illustrated by experience of Indiana community. Analysis shows new highways responsible for motor vehicle sales. City dealers profit from rural roads.

By Harlow Hyde

TWENTY-ONE AND A HALF miles of new county hard surfaced roads have sold hundreds of automobiles, established a very successful Ford agency in a village, inaugurated half a dozen service garages in the territory, brought three modern brick and concrete filling stations and about ten other roadside pump stations. The story of these roads will interest the executive who wants to know if hard surface roads are real automotive trade builders or just nice things to ride or haul on.

These are rural roads, and yet two-thirds of the benefits to automotive merchants have gone to city dealers who rarely trouble their heads about promoting rural roads. The twenty-one and sixty-three hundredths miles form a compact system running north over three routes and with a new connecting crossroad just finished this fall. They lie to the north of Indianapolis and are connected by paved streets with the city. Four years ago there was not a mile of hard-surfaced road in this north section of the county, which now has 150 miles of hard-surfaced rural road built by county authorities. Before the construction of these twenty-one miles, gravel roads were all that the region knew. It is a pretty country, fairly rich, and yet the farmers had not bought motor cars to any great extent. As a distant suburban region for the expansion of the city and those who wanted to live in the country the region had been well known to many people. But the dust of the gravel and its outrageous condition in many seasons of the year made it unpleasant for the city people, and of very little joy to those who lived on the country-side.

FOUR years ago there was not a subdivision of rural suburbs laid out. There was a small section on both sides of the White River where a few people had country or summer homes. Scarcely an all-the-year country home of a city man was to be found in the region. Contrast this with the present.

There are six subdivisions that have been opened this year, all outside the old city limits. Three of them are practically sold out. All the people who will live in those restricted districts will have to depend upon automobiles for transportation. The summer colonies of the River section have increased until one of them counts more than 1200 summer residents, all of whom depend upon motor cars. Hundreds of cars have been bought since the hard roads began to go in about two years ago. More than 2000 people live on the River from 5 to 7 miles beyond the city limits; and at least fifty families have converted their summer homes into all the year places from which they ride to and fro every day. Many of these families have from one to three cars. A few large country homes have already gone up in farm regions away from these summer colonies, and they will average from two to four cars each, most of them additions to the one vehicle that sufficed when their owners lived in the city. The large part of all the cars bought for the region were purchased in Indianapolis.

THERE are three bus routes that now use these roads. Two of them go to Noblesville, about 25 miles north. There are at present three buses on these routes, with more in sight when the farther north stretches of one of the roads is complete. Another bus line that runs to one of the series of summer colonies has purchased seven light delivery trucks equipped as buses. Three of these were used this year, and they will not average more than a year of such service, after which they are converted into delivery use for ice, etc. There are ten speed wagons and light trucks bought by the region. A huge gravel pit has gone in since the hard roads made hauling possible. From five to ten huge 5-tonners operate from this place and several lighter types, all bought since the roads went into the region.

The farmers have increased their motor vehicle equipment, and a few of them on or near these roads have bought trucks this year. Consolidated schools have bought three buses.

One block of farm property that lies in an angle between these roads has increased its motor vehicle equipment from four to sixteen. Two city families have constructed country homes in this block. They operate six cars between them, four of them additions to former holdings. All but four of these vehicles sold in this small farm section were bought in Indianapolis.

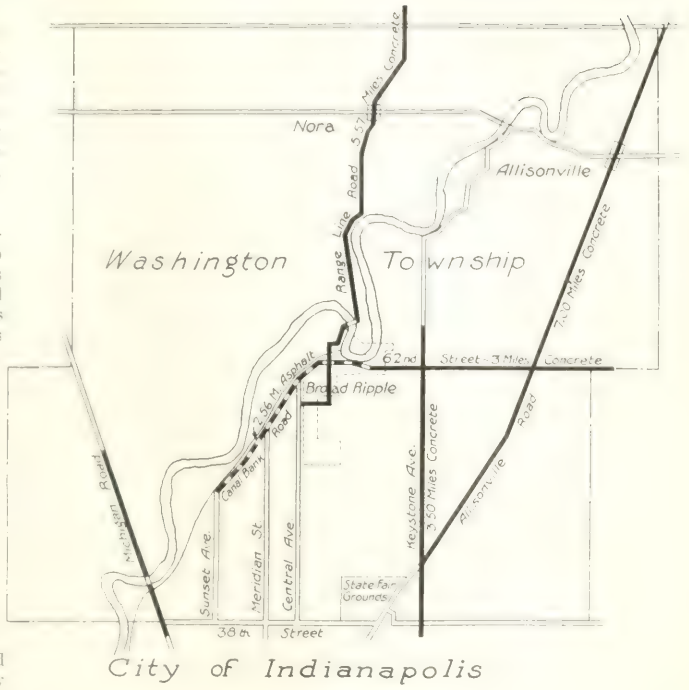
Practically all of these road profits noted have been automotive profits. What of the new three-story consolidated school that gives the country children as good schooling as the city schools with no crowding at all, and with bus delivery to the school in all sorts of weather? These people are not going to move to the city for school advantages. The cars their families buy will get more use than those of the city men. They will wear out faster, and they will always be motor vehicle users.

The little village of Allisonville, that lies 10 miles from the city, has blossomed into life after years of slumber. When founded more than eighty years ago it was thought to be the future site of the metropolis. The railroad went another way. The hamlet has been cut off for years. Now it is repainted. One general store has been enlarged and

restocked, and trade increased greatly. This place and two others maintain filling pumps. There is also a garage. Refreshment places have been established, and the people of the hamlet and the near-by farms have gone in for cars. In five years the wise men say it will be a growing suburban town. All because of the new cement road, for all the twenty-one miles except two and a half are of this type.

COUNTING but 600 cars in the summer and country colonies that go to and from town each day, these vehicles deliver 12,000 vehicular miles of travel each day. This is fully four times as much as the same number of city cars would deliver in taking the men and the women to business each day. Every month at this conservative figure some of the vehicles must wear out. New cars for the dealer to sell. The suburbanite is always the best customer if he drives back and forth daily. Here is a demand that will never be fully satisfied. Tires, supplies, accessories! How much better customers are these habitual drivers than the city fellows who use their cars but occasionally for business driving!

With this slight digest of the automotive profits and sales from the twenty-one miles of new hard-surfaced rural roads, one would think that every dealer in the region should be a good roads man, and working for more of them. Far from it, this city and region has not had a good roads meeting in years. The automotive men have not urged these or any other roads of which we have heard. It has been left to the farmers, the real estate men and the county officials to found and build these roads. Our section is full of anti-highway yap, and the dealers have not (to anyone's knowledge) gone into printed record against the calumnies heaped on hard-surface roads by some of our politicians and anti-highway interests. Perhaps they are too busy selling cars and supplies to such people as they of whom we have talked. When the hard surface road punches the automotive cash register, and when it is easily proved that the highways are to the advantage of the public, it would seem that the dealers might at least put a little energy into selling the public and their customers road sense. Such effort would redound greatly to the dealer's advantage.



Good Roads Campaign Makes Strides in Sao Paulo, Brazil

THE highway program of São Paulo, which has been extensively developed during the last two years, comprehends the construction of a network of roads leading out of this city to provide rapid and easy communication to all parts of São Paulo and to the adjoining states. Five leading roads under this program have either been completed or are in process of improvement.

The road to the coast, which has as its terminal the seaport of Santos, has been built and in use for some years. The route to Minas Geraes is the farthest advanced of the other four, as it has been opened for traffic to Ribeirão Ireto, within a short distance of the State boundary line. This highway, the construction of which has been previously reported, is 344 kilometers in length and is an excellent and picturesque highway leading through some of the richest parts of the coffee country.

Work is well under way on the remaining roads that lead to Matto Grosso, Rio de Janeiro and Parana, and it is estimated that an average of 100 kilometers has been thrown open for use on each of these highways. The Matto Grosso road has been carried to Itú and the Rio de Janeiro highway is already past Jacarehy.

All of these roads are excellent not only for touring and automobile pleasure driving, but they will carry as well an immense traffic for business and commercial purposes. All in all, some 1000 kilometers of state roads are being improved.

The work of the Associacião Permanente de Estradas de Rodagem (Good Roads Association), which is the center of the highway campaign and which devotes its entire attention to the promotion of road improvement, has been an important factor in building up the present fine system. The association maintains permanent connection with the various states of the Republic, with road organizations and other institutions, and in this manner it is serving not alone São Paulo but the entire nation.

Steering System Stresses Reduced With Transversely Raked Pivots

Layout in which knuckle axis produced strikes road in central point of tire contact is also said to decrease greatly effort required in steering, especially when front wheel brakes are locked. Tendency of wheels to toe out is also lessened.

By Otto M. Burkhardt

SEVERAL articles dealing with steering systems of motor vehicles which have appeared in recent issues of AUTOMOTIVE INDUSTRIES have aroused considerable discussion among engineers and show clearly the need for further study of the subject. The following notes are intended to clear up some points on which in general engineers do not seem to agree.

In one of the articles in AUTOMOTIVE INDUSTRIES of Oct. 5, 1922, we read:

"The second common fallacy is that inclining the swivel transversely, so that its axis produced strikes the road at central point of tire contact, neutralizes the turning moment about the swivel due to rolling resistance. It reduces it a little, but so little as to be of hardly any moment."

This conclusion is very misleading and correct only if we assume that the rolling resistance is merely the resistance of the bearings upon which the wheel is mounted. We must bear in mind, however, that by far the larger forces tending to interfere with the steering have their origin at the point of contact between the tire and the road. The following example will make this clear:

A wheel carrying a load of 1000 lb. when mounted on first-class anti-friction bearings is subject to a bearing friction moment of about ½ lb. ft. when turning over at a rate equivalent to a road speed of 25 m.p.h. If f is the tangential force required at the periphery of the wheel to overcome the bearing friction and R (= 17 in. = 1.417 ft.) is the radius of the wheel, we have the following equation:

$$f \times R = M = 0.5 \text{ lb. ft.}$$

From this follows that

$$f = \frac{0.5}{1.417} = 0.353 \text{ lb.}$$

This is indeed a small force—so small that we may say that bearing friction is negligible. If we agree on this, then the quoted statement ceases to be true.

Vastly greater forces are acting at the point of contact between the tire and the road. For instance, on the best level roads, the resistance between tire and the road for 1000 lb. load at a speed of 25 m.p.h. would be about 10 lb., which is considerably more than the bearing friction. Moreover, if an obstacle is encountered, similar to that shown in Fig. 1, it is obvious that the instantaneous center of rotation will be at A. The impact is balanced by reaction of the wheel bearings. The direction of the force F is toward the center of the wheel. The magnitude of this force must exceed the weight on the wheel, in this case 1000 lb., if the wheel be raised. Consequently, a force of 0.353 lb. can be safely neglected.

If we resolve the impact force F into components W' and H, it will at once be evident that the wheel cannot surmount the obstacle unless W is at least equal to W'. W and W' we note form a couple the moment of which is negative (counter clockwise). This couple is balanced by the couple H and H'. Hence $H - H'$ must be equal and opposite to $W - W'$. H' is the horizontal component of the reaction of the wheel spindle against the bearings.

In the case of Fig. 2, which illustrates an axle design with vertical swivel pin, we note that the weight W is imparted to the wheel in a truly vertical direction. The force W is then parallel to the vertical component of impact force F. The horizontal component of F, as previously mentioned, determines magnitude and direction of the force H. The reaction of H is the force H', which originates from the momentum of the car and is imparted through the springs to the front axle. The linkage through which H' acts is free to rotate about axis B-B of the swivel pin. It is therefore evident that with the design under consideration, H' will set up a moment $H' \times a$. This moment if not resisted through the tierod by an equal and opposite moment, originating from the other wheel, must be absorbed within the steering gear or by the driver on the steering wheel.

Center Point Steering

Fig. 3 represents a design in which the king pin is inclined tranversely so that its axis B-B intersects the road at the central point of tire contact with the road. This type of design is sometimes called center point steering. This term suggests that we are not taking into consideration the fact that the tire does make contact with the road over a measurable area rather than at one point. The two designs, Figs. 2 and 3, represent extremes. At one end of the scale the swivel pin axis is parallel with the plane of the wheel. At the opposite end transverse inclination of the swivel pin axis is at a maximum, for further inclination would certainly bring difficulties when oversize tires are fitted.

In Fig. 2, the load W is transferred from the axle to the steering pivot through a horizontal surface, whereas in Fig. 3, the load W is transferred to the wheel through an inclined surface. The force induced by W must act normal to this inclined surface, as indicated by W'' in Fig. 3.

The forces H and H' necessarily fall in the same plane as W'. Hence H' does not act through the steering pivot on a lever of length a. In other words, we have $H' \times a = 0$. Within reasonable limits, a design such as that in Fig. 3 will resist road shocks which in other designs are counteracted by the steering mechanism or the driver. With the design of Fig. 3, there is no continual tendency for the wheels to toe out. Excessive fluctuation of these forces induces wobble if the design is not well carried out.

If front wheel brakes are fitted to the axles here under consideration the force H may well amount to 600 lb. per wheel when the wheels are suddenly locked. Taking first the design shown in Fig. 2, assume that the distance a is $2\frac{1}{2}$ in. If we now wish to turn the wheels while the front wheel brakes are locked through an angle of 90 deg., let us say from extreme right to extreme left, we would have to do the work.

$$W = 600 \times 2\tfrac{1}{2} \times \frac{\pi}{2} = 2355 \text{ in. lb.}$$

Inasmuch as there are two wheels in contact with the road, the driver has to do twice as much work, namely, 4710 in. lb.

With a steering wheel of 18 in. diameter and a mechanism which necessitates $2\frac{1}{4}$ turns of the wheel for the maximum wheel travel, the following force would be required at the steering wheel:

$$P \times 18 \times 2\tfrac{1}{4} = 4710$$

Hence $P = 37.1$ lb.

Assuming that the efficiency of the steering mechanism is about 75 per cent and that two hands are used for steering, we obtain the force necessary for one hand,

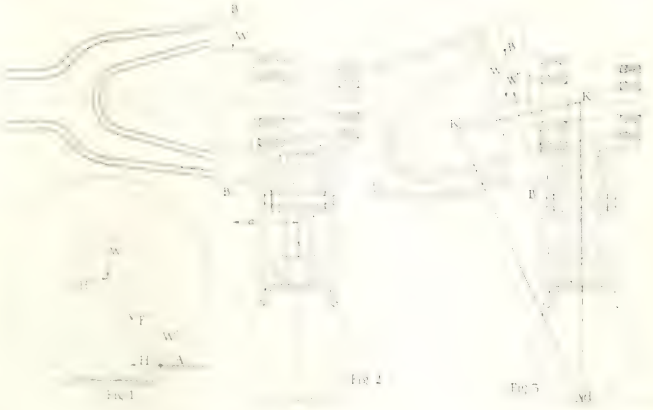
$$P = \frac{37.1}{0.75 \times 2} = 25 \text{ lb.}$$

This is approximately what would be required for a car with a knuckle having a vertical pivot as in Fig. 2.

Now consider Fig. 3. We again imagine that the car is standing still and that the wheel is restrained from any movement except rotation about the swivel pin axis *B-B*. Then every point of the wheel must travel in a plane perpendicular to the axis of rotation. When turning the wheel of the steering mechanism, the point K of the steering pivot will travel to position K'; its path will describe the base of the cone $K\,K'\,H$. The apex of the cone is H and the axis is that of the center line of the swivel pin *B-B*. It is obvious that while turning the wheel about axis *B-B* with the front axle held stationary, the point H will not move, consequently no effort should be required at the steering wheel to turn the wheels from one extreme position to the other. In reality, we do not have a point contact between the tire and the road. For this reason, there will always be a frictional force between tire and ground and, as the mechanism is not 100 per cent efficient, it will certainly require some effort on the steering wheel to accomplish a change in the position of the wheel. It is clear, however, that in principle there is a marked difference between the two designs under consideration.

It is an acknowledged fact that with both center point and vertical king pin steering there is difficulty in maneuvering a car while at rest or in close quarters. It cannot be conceded that cars with vertical king pins are easier to maneuver under such conditions. To explain the reason for this, let us assume that the distance a, Fig. 2, is equal to $2\frac{1}{2}$ in. and the contact area in a radial direction taken from the center of the king pin (d) is equal to 3 in.; then, for a turning angle of 90 deg., the relation of the sliding motions will be $R = \frac{a+d}{a-d}\,\frac{2}{2} = \frac{2a+d}{2a-d} = 4$.

In other words, the contact points remote from the king pin must travel four times as far as the points near the king pin, from which it may readily be seen how much sliding will take place. As long as there is sliding we have to overcome the friction of rest, which is very much larger than the friction of motion, for both types of steering gear. As a rule, the wheel is swung around in a series of angular movements; every time it is set in motion—and hence broken loose—an appreciable angle is turned. A new grip is then taken and the cycle repeated



Diagrams showing stresses involved in steering systems with vertical and with transversely raked pivots

United States Backward in Passing National Air Laws

FORTY countries have national air laws regulating the operation of civilian aircraft and designed to decrease flying accidents due to reckless piloting, according to a survey which the Aeronautical Chamber of Commerce of America to-day forwarded to the Department of Commerce.

The survey says that twenty-six nations which ratified the International Air Convention drawn up following the armistice, have established national legislation providing for safe and sane flying within their own borders. Fourteen other nations have various kinds of national air laws.

Of the remaining countries on earth, those which have not yet passed air laws tending to safeguard the passengers and the lives and property of the public include Abyssinia, Persia, Bhutan, Nepal, Oman and the United States.

All aviation organizations have co-operated in urging the passage of the Wadsworth Bill providing for a bureau of civilian aeronautics in the Department of Commerce. The measure, if it became a law, would regulate all civilian flying, provide penalties for reckless pilots and purveyors of unsafe machines and would prescribe means for protecting property on the ground.

Manufacture of Jewett Sedan Shows Progress in Pressed Metal Work

Pressed shapes, formerly made in two or three parts, now made in one piece. Deeper draws make possible new methods in production. More accurate work reduces hand fitting to a minimum. Body made in three plants presents special problems.

By J. Edward Schipper

BETTER handling of pressed metal work has been responsible for many of the economies effected in closed body building during the past three years. Pressed shapes, formerly made in two or three parts, can now be made in one piece because deeper draws are possible and because production men have a more complete knowledge of handling sheet metal work in the dies and of conditioning the metal before the stamping operation. Pressed steel panels are being made more closely to form than in the past and, consequently, little hand fitting is necessary in applying them to the wood framing. This production progress has made it possible to employ progressive assembly methods in body building more fully than ever before.

Improved pressed metal work is resulting in the elimination of a great many wood parts and in the substitution of pressed metal parts in their place. The latter are not only lighter and more rigid, but are also more readily made interchangeable.

A good example of modern body production methods is offered in the manufacture of the Jewett sedan. This body is made in three different establishments. The pressed steel work is handled by the J. W. Murray Mfg. Co., the framing and assembling of the panels to the frame by J. C. Widman & Co., and the trimming and upholstering by the American Auto Trim. The pressed steel work handled by the Murray company is of particular interest in view of the fact that it must be adapted to the progressive assembly system in use at the Widman company. To make large pressed steel parts so accurately that they will fit into the progressive assembly system of another concern would have been considered almost impossible not long ago. The object is accomplished in this case by accurate die work and by holding the various parts to shape and dimension by jigs constructed with great precision.

Stamping the Wheel Housing Panel

One of the most interesting stampings in this body is the panel which forms the wheel housing (Figs. 1 and 2). It has a 4¾-in. draw over a sharp edge. This is the deepest draw utilized in any of the stampings made by this concern and is probably very close to a record in this particular type of operation. With the two-wheel housing panels and the back panel forming the rear of the body, three pieces are used in place of five. Formerly it was considered impossible to make this deep draw over the wheel housing and, as a result, it was necessary to weld two stampings together. The present deep draws are accomplished by first passing the sheet metal through breaking rolls to eliminate stretching strains.

Another interesting example of very good pressed steel work is in the instrument board. The embossing and complete shaping of the board is accomplished in two draws.

The door panels are made in one draw with the molding pressed in (Fig. 3). In a subsequent operation these are pierced, flanged and expanded, and made ready for the door framing. The finish cowl assembly in this body consists of a top and two side pieces. The steel dash inside the cowl assembly is spot-welded in place. A ventilator lining also is welded into place on this assembly.

The two side panels, left and right, for the finished cowl are drawn together and cut apart afterward. They are then welded to the top piece to form the complete cowl assembly (Fig. 4).

Pressings Have Intricate Shape

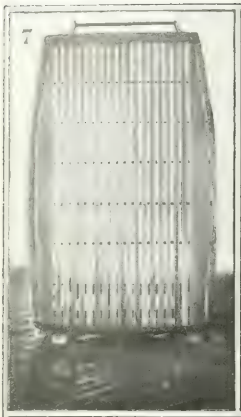
Many of the pressings are of rather intricate shape and are quite advanced examples of the pressed steel art. A good part of the work, particularly in the larger pressings with the deeper draws, is handled on a 500-ton Bliss toggle press. The equipment also includes a 300-ton Bliss press capable of seven strokes per min. and a 300-ton Ferracute capable of 9 strokes per min.

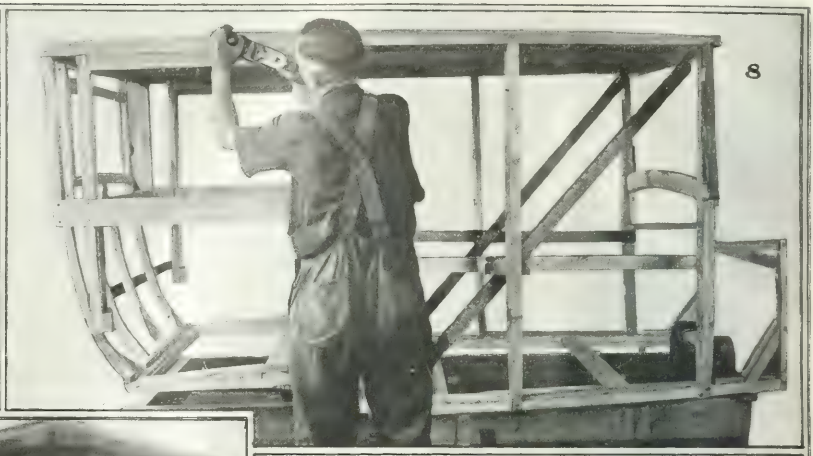
The pressed steel parts leave the Murray company drilled and ready to be put on the wood framing. This, of course, requires accurate jig work that the holes may come where they should when the metal sheeting is put in place. Some very interesting jigs are employed, a good example being the jig for the fenders, Fig. 5. The dimensions are checked very thoroughly. The contour of the fenders is checked by arms on the jig itself. The fender is placed on the jig in about the same position as if it were being bolted on the car. There are gages, Fig. 6, for the outside and inside dimensions, as well as for the curves. There is also a jig for lining up the wheel housing bolt holes and another for use on the press, which puts the holes in the gusset piece known as the fender wing or tail piece.

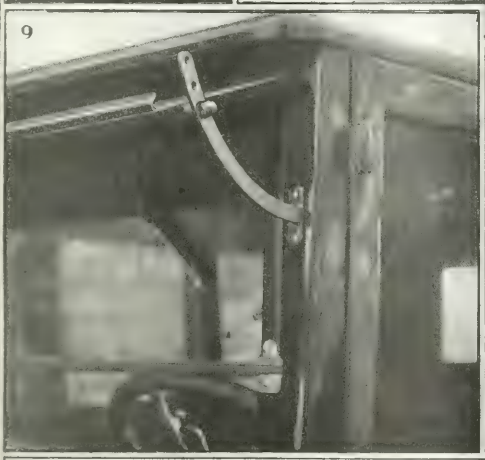
Much of the pressed steel work which is sent to the Widman company for assembly is in the nature of subassemblies. The back and side panels are welded together, as well as the ventilator opening on the cowl

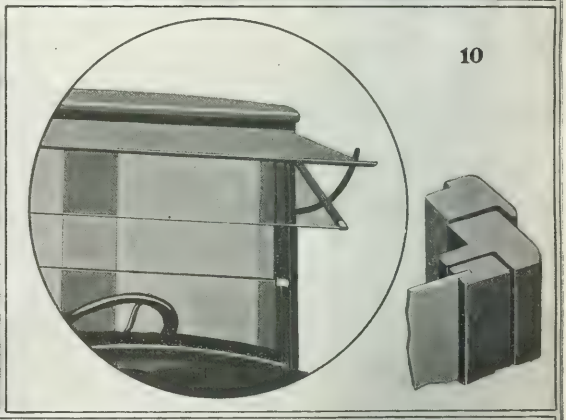


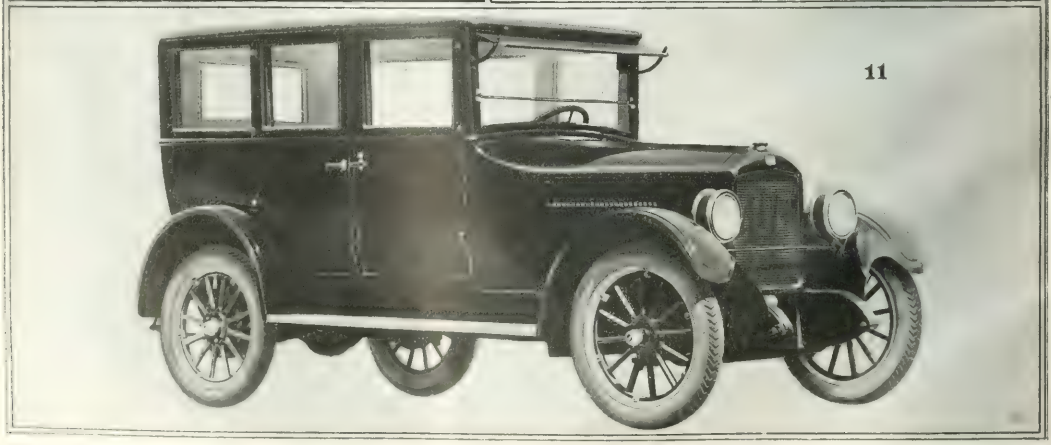
1—Assembly of the back panel and the two side panels with the wheel housing welded together ready for shipment to the body assembly plant. 2—Five-hundred ton Bliss press putting a 4¾-in. draw for the wheel housing for the side panel. 3—Finished door panel and blank panel. The blank shown in the center is the result of one operation on the press. 4—Cowl assembly showing the blanks for the dash, cowl top and sides. The left and right sides are stamped out together and then cut apart. 5—Jig for putting in bolt holes. The jig is curved to conform to the finished shape of the fenders so that the holes are properly located. 6—Gage for checking fenders as to contour, length, width and mounting dimensions











7—*Roof of the Jewett sedan. It is a very complete wood frame and acts as a part of the body structure.* 8—*Final operation on the wood frame.* 9—*The windshield is built into the front pillar and the visor is turned up at the forward end to act as a rain shed.* 10—*To keep the front pillar as narrow as possible and to cut down the obstructions of the view of the windshield, the windshield frame fits into a rabbett in the front pillar.* 11—*The finished Jewett sedan. Note the deep door paneling, the molding about the belt of the body and relatively narrow pillars with low, flat roof*

and the lining piece, and the fender and fender tail piece. Practically all of the stock employed is 20-gage material.

At the plant of the Widman company, where the wood framing is put together, the production practice is similar to that of most body framing shops, with the possible exception that a little further effort has been made to utilize progressive assembly methods. Instead of following the usual practice of having one or two men frame an entire body, the production run is put through by having individual workmen fit certain pieces in place and then pass the frame along to the next operator. Greater speed is secured by handling the work this way. In the first place, the men become more expert in handling their individual jobs. In the second place, it is possible, if desired, to use the gang system of handling the labor so that the workers are paid in proportion to the number of jobs which come off the end of the line. Such a system of body framing work is possible, of course, only where a reasonably large production is maintained in straight runs.

The actual framing structure as employed in the Jewett sedan is noteworthy for one very definite point. An unusual amount of wood is used in the roof of the body for a sedan of this type. The roof, being the most remote point from the neutral axis of the body, is subject to great stress and is the part which ties together the entire closed body. This has been recognized in the system for framing this sedan (Figs. 7 and 8), and the roof woodwork is rather more complete than in the usual soft top.

The structure of the front pillar into which the windshield is mounted is another feature of interest in this body (Fig. 9). The windshield fits into a notch in this pillar, which greatly reduces the blind area in front of the driver as compared with the usual practice of putting the windshield frame inside the front pillar. The sketch (Fig. 10) shows the method of arranging this front framing. The visor has at its forward end a turn up acting as a rain catcher, which acts as a scupper along which the water is carried and allowed to drain off the side.

The effort to stamp in the molding on this body has been abandoned in favor of a bead which is afterward applied as a separate bead piece. While the advantages of the formed mold are recognized, particularly in view of the fact that there is less tendency to streak the finish below the mold, the difficulties in assembly and in handling the bodies through some of the other phases of production were in this case sufficient to offset the advantages.

The trimming, which is handled by the American Auto Trimming Co., is also applied on a progressive basis. In the American plant the work is handled by carriers mounted on circular tracks. Each circle of track is sufficient to handle the trimming work on about fifty bodies per day. So far as the actual procedure in trimming is concerned, there is little departure from usual practice, the chief exception being that each individual workman handles a particular job instead of two or three men trimming and upholstering an entire job, as is more common.

New Hy-Lift Truck

ONE of the most recent developments in the material handling field is the Baker Hy-Lift truck which has been put on the market as an addition to the line of Baker industrial tractors and trucks. This machine is in effect a combined electric truck and portable elevator. It is built to carry material and also to raise it, for the purpose of placing loads directly on drays or in freight cars from the ground, for tiering packages or for unloading into upper tiers of bins. The truck is capable of hoisting a two-ton load to a height of 6 ft. from the floor by means of a cable hoist. Briefly described, the truck consists of an electrically-driven truck mounting two vertical I-beam members which act as a track for the lifting carriage. This carriage runs on four steel wheels and carries the load platform which is hinged to it. The hoist is a two-drum type, with electric motor drive through a forty-to-one worm reduction. An automatic limit switch opens the power circuit at the limits of travel and the load is held in any position by means of a solenoid brake. The controller for this mechanism is mounted adjacent to the driver's platform.



Baker Hy-Lift Truck used for loading motor truck

THE need for extension of American patents on automotive products in foreign countries is emphasized in a letter received by the Department of Commerce from an American Consul in Portugal. It is reported that certain firms in Portugal buy American truck bodies and parts and use them for patterns.

The bodies and parts are then made locally at prices averaging from one-half to one-third of the present American prices. Automobile manufacturers are warned, for their own protection, to secure patent rights in all European countries.

Under the Bern treaty American manufacturers are given one year grace in which to file application in European countries, for patents, after application has been made in the United States.

Cuban Motor Vehicle Sales Now on Up-Grade

Financial and business condition of country improving as sugar and other staples reach higher price levels. Unsold motor vehicle stocks no longer severe handicap to sales. Highway construction needed. Retailers must have financial backing to go ahead.

A CAREFUL survey of automotive conditions throughout Cuba, but more particularly in the city of Havana, gives rise to an undoubted feeling of rising confidence, although it is not to be expected that sales conditions will change for the better with any startling rapidity. The majority of dealers and distributors, however, feel that better business is on the way, and the present outlook is much more optimistic than has been the case since the prices for sugar and other Cuban products took such a disastrous slump in 1920.

The facts about the automotive industry in Havana are that several firms already have experienced a satisfactory volume of business. This, unfortunately, is not everywhere the case, as some firms have scarcely made the sale of a new car for many months. The companies whose business has prospered are those which are well financed, strongly entrenched in the trade and represent well and widely known lines. They are, of course, in an exceptionally good position to take advantage of any change in conditions, and also they have been sufficiently powerful to keep sales efforts under way without any let-up during the depression period.

As in other countries, sentiment among members of the industry is somewhat divided, but it seems apparent, as the result of a detailed study of Cuban business conditions, that automotive sales should improve materially. The financial situation has brightened a great deal, there has been a relaxation of the strained conditions of credit which have been such a drag on all commerce, and, above all, the chief crops of the Island are at satisfactory price levels. Sugar, which forms the backbone of Cuban economic structure, is commanding prices well above the cost of production. The hold-over stocks from the last crop, which was the largest the Island has ever produced, were sold at a good figure and the new crop is awaited with the expectation that it also will be large and command good prices. As goes the sugar market, so goes prosperity or its failure in Cuba, and certainly every indication at the time of writing points to a satisfactory condition for the new crop.

CUBA is the sugar center of the world and there can be no doubt but that it will continue at least for many years as the largest producer. Thus, so reason many Cuban business and automotive men, the Island is confronting a period of long prosperity. It is hoped among the clearest thinkers that nothing of a boom or a sudden excitement will come but that present conditions will slowly become better, carrying with them a satisfactory volume of automotive sales for those companies which conduct their affairs sanely and effectively.

Many automobiles have been sold in Cuba since the boom broke two years or more ago. Stocks were top-heavy at that time, particularly of some makes of cars and trucks, and these were thrown on the market at extremely low prices. The dealers suffered the same difficulties that were met with in other lines of trade and in other countries, but these hold-over stocks have been liquidated fairly well. Some few companies yet have a number of unsold cars and there are numerous trucks that have not gone into the hands of owners and users. The truck situation is not so clear as that in the passenger car field, but of passenger cars the unsold stocks are not now considered as a great handicap to present sales.

MUCH has transpired here in recent months. Some companies have gone out of business and others are not certain of the future. It is possible to point out firms which have been forced to seek smaller and less commodious quarters, and there have been many changes, both in personnel and in financial control. But the unfortunate experience of these companies, much as their troubles are to be regretted, does not mean that the automobile business is not now on a solid foundation.

The sales of accessories also have shown an improvement, although no revolutionary changes are to be noted and none to be expected. More cars are in operation to-day than was the case a year ago and naturally accessory sales are better. Tires are being sold in heavy volume, as tires are severely used here, and competition is very strong.

Underlying the automotive markets of Cuba are merchandising problems of a character vital to every concern. These, perhaps, are the same as are encountered in other countries, and they are as important in one locality as in another. The chief of these may perhaps be given as finances. The companies which have best weathered the past months are those which have been the strongest financially. Cars are being sold very generally on deferred payment terms, often of long duration. This is particularly true of some of the higher priced cars, making it necessary for the local companies to be ably backed if they are to compete successfully. It is scarcely possible to start a paying automotive business on a small amount of capital any more.

The banks and financial houses are rather reluctant to come to the assistance of the automobile companies. This is not true in every case, but the banks here have been very conservative in regard to extending their facilities to all lines of industry. Perhaps the automotive industry is suffering just the same as other lines of trade, but the impression among the dealers is that the banks frequently discriminate against them.

Probably the reason is that the bankers have not been converted to an understanding of the essential utility value of the automobile as a vehicle of transportation. They may still regard it merely as a luxury that can be dispensed with in times of financial storm. The dealers themselves, if the bankers are discriminating against them, should take some of the blame on their own shoulders and seek to remedy the condition by presenting the true facts to the financial houses. The automobile, of course, is to-day a great factor in Cuban business and economic life. For one use of the automobile for pleasure purposes, there are many for business purposes. For instance, many business and professional men are now enabled to live in the suburbs because of the transportation benefits of their automobiles. If the bankers really understood just what the automobile has come to mean in the daily life of this country, how much it has contributed to the economic progress of the Island and what part it promises to take in its future development, they probably would be much more inclined to treat the automotive industry as well as they do other lines of commerce.

Merchandising methods have changed to a certain extent, but improvement might be effected in many directions. Only a comparatively few companies are advertising their products on a strong basis; those which are, it is needless to state, are the four or five most successful ones. The same condition is true practically in regard to exhibition and salesmanship. The methods of some companies are quite weak in this direction. The salesrooms of a number of concerns are difficult to find, cars are sometimes poorly displayed and better service could be rendered. This must be stated with well-known exceptions, as some of the sales and service stations here are of the finest sort, their maintenance work is of high quality and customers are given the best kind of treatment. Some of the jobbing firms particularly have developed satisfactory sales methods and are developing trade with much energy.

It is possible to point out companies handling meritorious products that cannot display them to possible customers, as these products have not been stocked for many months. The difficulty in competing with other concerns is obvious.

THE trading-in of used cars is a fairly common practice here. This has reached such proportions that, at times, it becomes a problem to dispose of the traded-in cars. Where the appraisal values of the old cars have been kept low enough to make it possible to move these vehicles, the used car problem is not a handicap and the trading-in privilege has been used as a great factor in keeping the business under way.

Whether an automobile exposition will be held here during the first half of next year is problematical, and in fact few indications are to be encountered that such a show will be staged. Some representatives of the industry believe that a longer period of prosperity is essential before this can be done; on the other hand, it is pointed out that there is still much wealth in the country, that an exposition would give an impetus to sales, and that it perhaps would be an important merchandising factor in building up business to a higher level. Likely the volume of sales during the next few months will determine the show question. It is of further importance that the Havana dealers have not become accustomed to the idea of holding an annual exposition and there is a consequent hesitancy about getting it started.

HAVANA continues to be the chief automotive market and the sales in other sections of the Island are still small. The number of automobiles outside of Havana is large and they are in constant use; nevertheless, it will take at least the new sugar crop to restore these outside localities to any great improvement.

Cuba possesses many good highways and an extensive construction program has been mapped out. This program, of course, was halted by the financial difficulties of 1920. Now that these are disappearing and conditions becoming more stable, it is possible that the road work will be gotten under way again. Cuba undoubtedly has insufficient railroads and the need of more satisfactory ways of communication is apparent. Low transportation costs would materially aid the business revival, but it is probable that street paving in Havana may have to come before the improvement or the construction of rural roads. Many of the Havana streets should have new paving or repairs. Many serious-minded business men here believe that the road problem is one of the most important factors concerning the economic progress of the Island and they believe every effort should be made to promote highway construction. A modern road clear across the island, with branches to the important interior cities, is sorely needed.

WE are indebted to El Automovil Americano correspondence for this excellent survey of the Cuban automotive market.

The survey shows that sugar is the backbone of the Cuban economic structure and that the automotive business is gaining strength with the steady market recovery of that crop.

The dealer's needs, the trade practices of the country and the factors which influence the market are all brought out. The American exporter can get valuable ideas from this survey on which to take future action.

Automobiles and automotive products are being sold to-day at prices as low or lower then ever before. The dealers have almost without exception passed on to the buyers all of the numerous factory price reductions. This is fairly well understood by the great body of motorists, who keep in close touch with all automotive matters. It is being realized that the Cuban dollar will buy either as much or more from the automotive dealer than it did before the European War, although quality has generally been improved. This is one of the factors making for increased sales, as lower prices in the automobile word are in keeping with or ahead of the readjustment occasioned by the changing commercial conditions. Motor fuels are being better distributed than in previous years and gasoline prices have been lowered considerably. The advent of an alcohol fuel, which is being used widely in certain makes of cars, has been welcomed throughout the Island and it is being produced in large quantities. Although it is not used in all cars, its use has influenced gasoline distribution, and from this standpoint, if from no other, has justified itself.

The automotive dealers of Cuba have carried a heavy burden for two years and more. That they have been successful in overcoming the many problems confronting them testifies eloquently to the possibilities of future progress.

Motor Car Fleet to Cross Sahara

Four Citroens equipped with Kegresse type rubber and canvas creeper bands, begin attempt to traverse desert in two to three weeks. Gasoline consumption expected to be 9 miles per gallon.

AN automobile journey of more than two thousand miles across the Sahara desert, from Algiers to Timbuctoo, thus linking up the French colony of Algiers with possessions on the west coast of Africa, is being attempted by a convoy of four Citroens under the control of G. M. Haardt, managing director of the Citroen Company and Lieut. Audouin-Dubreuil, flying officer and explorer. The expedition is starting as this article goes to press. The French Government, which is interested in the trade possibilities of automobile transportation across the Sahara, is sending Lieut. Estienne, representing the Air Service, and Dr. Castelnau on behalf of the geographical department.

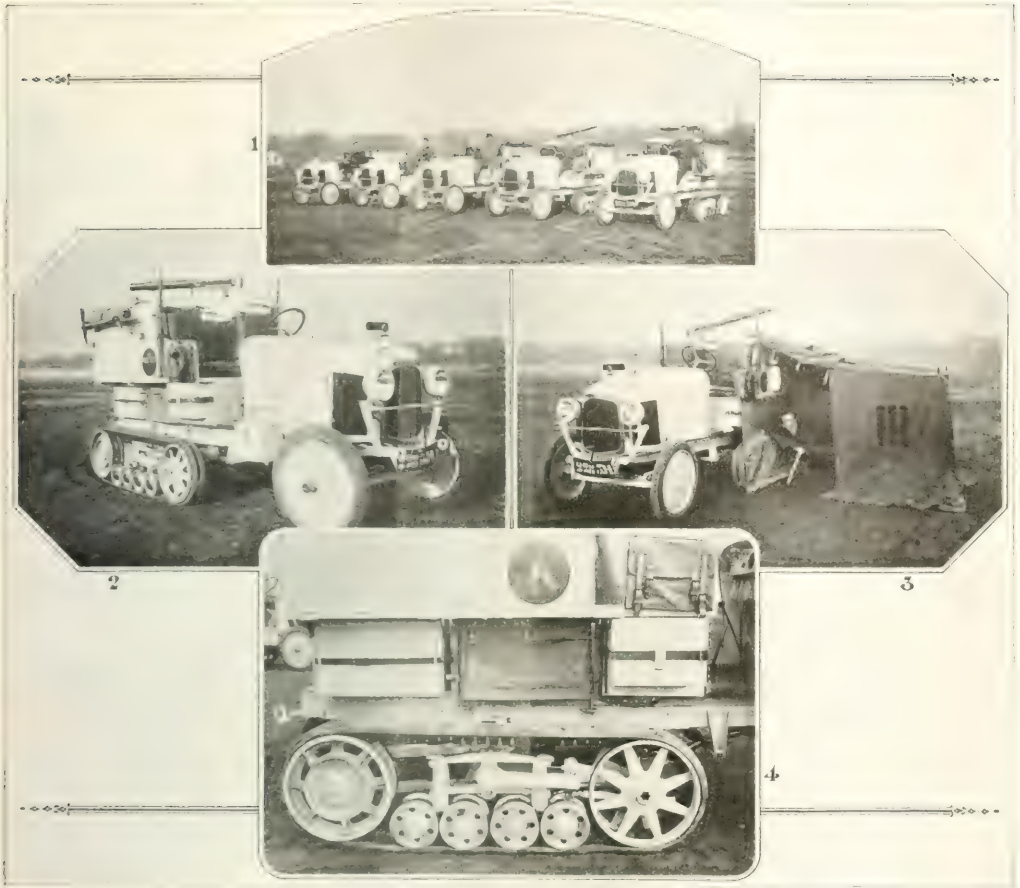
From Touggourt, the most southerly town in Algeria, to Timbuctoo, where there is rail and water connection with the West African Coast, occupies from six to seven months by camel caravans with normal load, although the distance can be covered in two and a half months by caravans with specially selected animals traveling light. Averaging 120 miles a day, the Citroen motor caravan expects to cross the Sahara in from two to three weeks.

This journey is intended to show the possibility of a regular automobile service right across the Sahara desert through territory which at present is closed to all vehicular traffic. To build a railroad across the Sahara will occupy from six to twelve years and will entail enormous sacrifices. By the use of automobiles a wealthy but undeveloped region may be opened up and an overland route will be provided between French possessions on the West Coast and those in Northern Africa. The possibilities of such an automobile route are unlimited.

Four Citroen automobiles with the Kegresse type of



Map of route which motor car fleet will take to cross Sahara Desert



1—The Citroens which are attempting to cross the Sahara Desert. 2—A general view of one of the cars fully equipped for the journey. 3—Camping outfit which constitutes a part of the equipment. 4—Kegresse type of rubber and canvas creeper bands used on cars in convoy

rubber and canvas creeper bands, are being made use of for the Trans-Sahara trip. The power plant is practically identical with that used on the Citroen passenger car and comprises a four-cylinder engine of 68 by 100 mm. bore and stroke, with a plate clutch and three-speed gearset forming a unit with it. Cooling is by thermo-syphon flow, with a bigger capacity radiator than used on the passenger cars, a condenser on the top of the radiator, and a couple of lateral radiators to left and right of the hood, just to the rear of the main radiator. The cooling system is so laid out that if traveling slowly with a following wind the current of air can pass from rear to front instead of from front to rear.

The electric starting equipment has been removed as unnecessary and in order to save weight. The usual electric lighting set is maintained. The engine equipment comprises Solex carbureter and magneto ignition. No important changes have been made in the lubrication system.

Front axle, steering and front wheels are as on the passenger cars, the wheels being fitted with Michelin tires of 710 mm. by 90 mm. size. The banjo type forged rear axle carries two direct drives. Thus, with the three-speed gearbox there are six gear combinations giving a speed range of from 1 to 25 miles an hour at normal engine speeds.

The system of propulsion by endless rubber and canvas bands is the one designed by Kegresse primarily for travel over snow in Russia. Since it was taken up by the Citroen Company, detail changes have been made in this device, one of the most important being the adoption of leaf in place of coil springs for the suspension of the intermediate rollers and the free pulley.

All-metal bodies are fitted, aluminum being very extensively employed, with a use of duralumin in certain cases. The driver sits on the left, with the mechanician on his right, there being a staggered seat between the two for a third person. Back of the seats is a gasoline tank with a capacity of 80 gallons and around this a series of lockers for tools, spares, general equipment and stores. One of the cars carries 175 gallons, this constituting a reserve to be distributed among the others.

In the desert the gas consumption will be at the rate of about nine miles to the American gallon, which will give the normal cars a range of action of about 700 miles, which distance can be extended somewhat by drawing

on the reserve supply. A camping outfit is attached to each car; one of the machines is fitted up with a moving picture outfit, two of them have aviation type machine guns mounted on the top of the platform, and in every case a rifle is kept by the side of the driver and the mechanic, for attacks from robber bands are feared.

To get over the gasoline supply difficulty, which was one of the most serious problems to be faced, Citroen-Kegresse tenders have been sent out from Touggourt in the north and Timbuctoo in the south. The northern convoy has gone as far south as In-Salah, establishing supplies on the way, and the southern convoy is now working northward to Kidal and may possibly reach the wells at Tin-Zaouaten, 120 miles north of Kidal. If this is done there will be left a desert stretch of 800 miles, from In-Salah to Tin-Zaouaten with no gasoline stations, no outside supplies of any kind, and only one station for water at Tit. This section, which will have to be traversed by the use of the compass, will be the most difficult portion of the whole journey, and while crossing it the convoy will be entirely out of touch with civilization. For use on this section one of the cars will carry 15 gallons of drinking water.

The cars were shipped by rail and steamer from Paris to Algiers. From there they ran under their own power through Constantine and Biskra to Touggourt, the starting point of the desert expedition. It is intended to go over 120 miles a day on an average. On the early portion of the journey, over parts of the desert having been thoroughly explored, some night traveling may be indulged in. After In-Salah the convoy will only travel by day, for no tracks exist and observations will have to be taken to determine position. All the men selected for this work are experts with Sahara experience and they will be under strict military discipline throughout the entire trip.

Constructive Function of Trade Associations Receives Greater Attention

THE growth of trade associations has been forcibly called to the attention of the industrial world by the program of co-operation between the government and industry. This movement has been led by the Department of Commerce under the guidance of Herbert Hoover.

The evils of some trade association practices has blotted out in the eyes of many the good which may be and is brought about through this form of industrial co-operation. The Department of Commerce has done valuable work in defining good and evil trade practices, but has done even greater service by giving to the organizations themselves new conceptions of their functions.

"Trade Association Activities and The Law," by Franklin D. Jones, which has recently been published by the McGraw-Hill Book Co., Inc., handles the subject in much the same manner as has the Department of Commerce. In the discussion of the legal and economic aspects of collective action through trade organizations Jones gives the meaning and purpose of the law and illustrates by examples the good which has resulted and may still result in larger measure from such associations.

What may seem harmless practice may in the long run prove detrimental to common welfare and the "twilight zone" may shade rapidly into darkness, hence a book of this nature is valuable to anyone dealing with this subject. It should serve not to guide one through the "twilight zone" but rather to direct toward lawful, beneficial activities.

Herbert Hoover's conception of the trade association's activity may well be repeated here. He has said: "The trade association is a college of business. So long as its activities are such as to fulfill that primary educational function, no question of law will ever bother it. It is when it steps outside of this educational field that it goes into the 'twilight zone'."

* * *

A VERY complete compilation of motor vehicle regulations, legislations and their developments has recently been made by Henry C. Spurr, editor of "Public Utilities Reports." This work is published under the title "Motor Vehicle Transportation" by Public Utilities Reports, Inc., Rochester.

The contents are divided into three chapters. The first deals with the contemporary development of the automobile and the existing theory of public supervision. The second chapter is devoted to a review of general rules, regulations, and legislation governing rates, operation and service, while the third gives the State Commission rulings and policies as expounded and applied in actual controversies.

The entire problem of motor vehicle regulation has come upon us fast. To handle the question sanely requires that it be considered from every possible angle, and this new comprehensive work should serve to view it from the legal side.

* * *

THE control of quality in manufacturing has by no means reached perfection. It will still bear a lot of hard study. With the intention of showing that it is the correct starting point for economy in manufacture George S. Radford has written "The Control of Quality in Manufacture," which has recently been published by the Ronald Press.

In this work Radford shows what the manufacturer must do to secure quality and how to maintain it. Methods in actual operation are outlined and numerous examples given to illustrate the point.

The angle of his approach is well illustrated by the following quotation: "The idea seems to prevail that, because quantity production has been desired, quantity itself is the proper starting point in attacking production problems. * * * As a result quality control has been disregarded and the demand for quantity has been kept in the forefront." Radford goes on to say:

"The misapprehension that quality is costly doubtless arises from the fact that it is used as the chief inducement to make people spend money. In current use moreover, the phrase 'quality production' as distinguished from 'quantity production' does not imply the idea of manufacturing to certain predetermined standards of quality so much as it does that the quality of material and workmanship is of unusually high grade."

Radford says this has given widespread belief that quality is expensive and it is cheaper to make things to a lower standard. This he says is true if working intentionally to a lower grade and definite standard, but usually this implies slipshod manufacture.

It seems to us that this idea that quality and quantity may be found in combination might be played up better in automotive advertising.

Used Car Is Automobile Industry's Most Serious Problem

Sales prosperity has not minimized issue. Prevailing method of handling trades on inflated valuation causes enormous losses. Menace lies in unsound economic practice, not in size of problem.

By Alvan Macauley*
President, Packard Motor Car Co.

THE used car problem is the most serious issue now before the motor car industry. It need hardly be explained that by the "used car problem" I refer to the prevailing methods and practices of handling sales involving trades and of disposing later of the replaced vehicles.

Six or eight months ago, when trade conditions were stagnant and thousands of replaced cars were choking the channels of distribution, everyone was discussing this situation; they were compelled to do so.

When business revived and the distribution of these cars began to get under way we allowed ourselves to believe that the replacement problem was being solved.

In my opinion, *the used car is as much of an issue in the prosperous present as it ever was.* Stated in figures of the current year it is probable that half of this year's sales have been made and are being made on the basis of trades. The percentage of trades may be as low as 40 or it may run as high as 65 per cent. Several persons of wide experience in the industry have assured me that the latter figure is more nearly accurate.

IF the production of new motor vehicles of all kinds this year will approximate a total of 2,400,000, as it is now believed, and since sales are keeping pace with production, it is apparent that the used or replaced car problem is one of huge dimensions.

However, the greatest menace in the situation is not the size of the problem, but the fact that the unsound economic methods which have governed the sale of used vehicles in the past are still the governing factor to-day as heretofore. Used cars are being sold without regard to the overhead cost. Used cars are being accepted on an extravagant basis of valuation.

The overhead cost of selling a used vehicle, according to prevailing experience, is hardly less than the cost of selling a new vehicle. Counting the labor necessary to put the replaced car into a salable condition the average overhead of such sales is certainly not less than 10 per cent. Nevertheless, it is not an exaggeration to say that except in a very small percentage of cases the used or replaced vehicle is sold quite regardless of this.

On the score of valuation most observers agree that the case is as bad. I have heard various estimates from competent persons. On the whole, I believe that the average valuation allowance is about $300 and that the average loss in closing out these vehicles will run not less than 10 per cent. In other words, the prevailing practice is such that there is being incurred in all used car transactions a valuation loss of at least 10 per cent and another loss of 10 per cent more due to the non-accounting of overhead costs. The figures covering the situation are interesting.

Number of new motor vehicles sold in 1922 (partly estimated)	2,400,000
Percentage of sales involving trades	50%
Number of vehicles in trades	1,200,000
Average allowance	$300
Total amount of allowance	$360,000,000
Selling cost of used cars	10%
Total amount of selling cost	$36,000,000
Percentage of loss on trade-in sales in addition to selling cost	10%
Amount of such loss about	$36,000,000
Total loss on trades	$72,000,000

THESE figures will no doubt be questioned. They are not mine, but they have been drawn from competent sources and I believe that on a whole they reflect the situation as it is.

However one may discount them, it is obvious that the present method of handling the used car is still a very serious burden to the motor car industry. For the moment it is being carried with some degree of ease because consumer demand is considerable and profits throughout the industry are satisfactory. It is, nevertheless, a burden. It is more than that. It is a huge item of waste which in some way must be eliminated. Under less favorable conditions than those at present prevailing, it may prove such a handicap to the industry as to check its development and bring serious distress to a considerable number of those who are devoting their energies to its upbuilding.

The conclusions implied in this exhibit are that sales replacement vehicles are being handled without due regard to the actual overhead costs; that these vehicles are being accepted on an extravagant basis of valuation; that there is a loss of many millions of dollars in this phase of distribution—on the basis of the figures cited this loss being upward of seventy million dollars—and finally that this evil condition is the basis of 50 per cent of the sales of new vehicles made in a prosperous year.

IT will, perhaps, be sufficient at this time merely to state the crude facts in the case. Certainly they are startling enough to give any one cause for thought. Something can be said as to the responsibility of this situation —much more as to what can be done to remedy it. But first of all the problem must be seen in its full outlines and recognized for what it is—the most serious issue confronting our industry.

*Reprinted from *Motor World*.

Should Manufacturers Control Dealer Advertising?

Value of local appeal often greater than standardized claims, reiteration and emphasis. Inflexible policies less efficient than those which can be modified to meet local considerations. Competency of dealer should be determining factor in long run.

By Harry Tipper

LETTERS to AUTOMOTIVE INDUSTRIES in the past few weeks have brought to the surface again a controversy which has waged from time to time in the trade and among representatives of the factories. That is the question of the control of dealer's advertising by the manufacturer. The topic itself is sufficiently alive to justify some consideration and the proper examination of it is important to the manufacturer. The objects of advertising through the dealer are:

(1) To secure the advantage of the tie up between the local market and the dealer.

(2) To see that the proper amount and character of advertising is done by the dealer in his locality.

(3) To take advantage of the local circumstances in making the advertising definitely applicable to the user.

How to secure these objects most effectively is the question to be answered in dealing with the problem.

The strong dealer with a knowledge of his own business and a fair control of his trade, is a big business man in point of retail volume in his community, except, perhaps, in the metropolitan centers. Even in those centers he is a big business man in his own conception and understanding of big business.

A retail business which turns over in volume from $250,000 to many millions a year is a big retail business in any field and the man who heads such a concern has his own very definite conceptions of the matter.

The manufacturer who has watched his business grow from a small shop to a great factory and has successfully financed, operated and developed the business, is not likely to take kindly to the idea of anyone else insisting that he do thus and so.

THE dealer who has watched his business grow from a one-man shop to a building which is as good as any in town, and his own standing arrive at an equality with other business men of his community, is not likely to view with any greater pleasure the constant insistence that he must do thus and so, with its inference that his judgment is not to be considered.

It is not easy for any man to be a subordinate and an executive at the same time. The man who gives instructions does not take kindly to receiving instructions in any case. Where the man gives instructions because he owns and has built the business, he is less inclined to view with any kindliness the demand that he must accede to.

This human outlook is of great importance. The manufacturer feels that he has made the dealer possible, while the dealer feels that he provided the working capital for the manufacturer and made his progress real. Of course, the smaller dealer, struggling with the necessities of his development, will accept the demands of the manufacturer until he grows sufficiently strong to kick. His acceptance does not argue an agreement, however, and it will cease to be acceptance when he feels sufficiently powerful to act independently.

Moreover, the manufacturer needs the dealer a good deal more than the individual dealer needs that individual manufacturer. As the business becomes more stable, the competition for good, reliable dealers will become keener—as it has in other fields—and the manufacturer will, of necessity, make his proposition more attractive in one way or another to secure dealers and hold them.

THE dealer must finance, operate and risk his business and the man who does this will escape from the instruction and demand in regard to his operations as fast as he can.

These things do not make it unnecessary for the manufacturer to make specific and definite demands on the dealer, but they do suggest that such demands be made only when the matter is of such importance that its necessity is clear and when the demand can be proved of more efficiency than the suggestion or discussion.

Most of the complaints of the dealer rest on the fact that the demands by the manufacturer have to do mainly with the business which the dealer is conducting at his own risk and which affects his profit. The dealer says he pays 50 per cent of the advertising charge in his locality, but he must agree to let the manufacturer handle the entire advertising.

In view of this controversy, how best can the objects of the advertising be secured?

The objects of the advertising were referred to in the beginning of this article, but it is necessary to consider the fundamentals of advertising for the moment in order to determine how these objects can be secured most effectively.

Advertising has certain definite values which increase its effectiveness in proportion as they enter into the advertising methods and copy. Presenting the name of the product over and over again will make some impression on the buyer because the familiarity with the product secured by this means gives the manufacturer a considerable advantage over the product which is not fa-

miliar. Consequently, the primary value of advertising is secured by virtue of reiteration. Where there is a large amount of advertising reaching the user, attempting to secure his attention for a number of competitive products, it is necessary to add emphasis to the reiteration, in the attempt to secure a larger degree of familiarity with one product than with another. This adds a further value to the advertising as it breeds a stronger impression by virtue of the difference in the emphasis so that some products become more familiar than others.

FAMILIARITY, however, is not sufficient to induce a buying attitude for any particular product on the part of the user, so that the advertising should be used to convey information in order that the consumer will be enabled to determine the value of the product as well as become familiar with its appearance and name. This adds a considerable additional value to the advertising by individualizing the impression, answering the problem to some extent, and bringing it more closely to the consumer's need.

The fourth and most important value of the advertising comes from the application of the product value to the needs of the individual consumer. This means specialized advertising. It has a value which is rarely to be found in advertising copies because so little advertising is specialized, either because the audience is too general or because the advertising writer has been attempting to provide general copy for a number of different specialized publications. The application can only be secured when it is especially applied either to the activities of the consumer or the surroundings. The general advertising done by the manufacturer can provide all the necessary reiteration and emphasis. It can also add some of the information, although this must be more or less indefinite because of the widespread and heterogeneous character of the audience.

The local advertising to be done through the dealer is the only place where the application can be properly determined and unless the advertiser takes advantage of the situation to apply the car to the local conditions and surroundings, one of the most important possible effects of the advertising will be lost. For instance, in my small town in New Jersey, there is a particularly steep hill which the demonstrators use when they desire to indicate the hill-climbing qualities of the car they are trying to sell. Time after time I have heard this hill discussed by motorists as they were explaining the difficulties or qualities of their cars to one another. This particular hill, while it may not be as steep as Pike's Peak or as difficult as many others, is important in the comparative considerations of any motorist in the community.

If I were advertising an automobile to the residents of that town, I should hope to give them specific information as to how the car climbed that hill, its speed at the bottom, its speed at the top, and the conditions at the time. I know that this particular test and information would be read and discussed with at least ten times the emphasis that would pertain to any information not related to that locality. I have yet to see any advertising of automobiles in that town take advantage of this situation to make an impression of lasting quality. The examination of those conditions would reveal a number of other local advertising possibilities far more potent in their effect than the general conversation which appears in the advertising copy used by the dealer. The question as to whether the dealers in that town would write such advertising is another matter.

Of course, it would be manifestly impossible for the manufacturer to send out newspaper copy, direct mail letters and other advertising material which would appeal to all localities. It is therefore impossible for the manufacturer, through his own organization, to secure the great possibilities of this local application in his advertising work. It is true that he can control his advertising, make sure that the claims are standardized, the illustrations the same, and the same emphasis and reiteration is used, but the question which must be determined by the manufacturer is whether, in order to control the minimum possibilities of impression, reiteration and emphasis, he has lessened possibilities of impressions of much more value in the inability to provide thorough information and local application.

It is also evident that it would be difficult for the manufacturer to control the amount of advertising done by the dealer unless the work of the advertising were standardized so that the operations can be conducted with fairly simple requirements. It is also true that the manufacturer is interested in the advertising to be done by the dealer because that advertising will represent to the people in the locality the car itself as well as the dealer. Perhaps the trouble with the situation arises from making a flat policy in regard to the advertising and including this in the contract as a flat policy with no exceptions, calculated to take advantage of the situation where local conditions permit.

THE question of the control of dealer's advertising by the manufacturer is one which has appeared from time to time and has been revived recently through letters to "Automotive Industries."

* * *

Harry Tipper considers, in this article, the fundamentals of advertising and points out how the desired objects can be secured most effectively.

* * *

He maintains that the necessities of competition will oblige the manufacturer to re-examine the question of promotion by the individual dealer and arrange his program to obtain maximum advantage of local appeal.

SOME of the stronger dealers, in fact, a good many of them, do excellent advertising on their own account. It is applied strictly to their local situation and is very valuable on that account. Many of the dealers are not organized so that they can do advertising effectively. This fact, however, does not seem to be any good reason for losing so much of the value of the local application in the advertising where the dealers are sufficiently well equipped to undertake this advertising themselves with the proper co-operation of the factory.

One of the reasons for the strength of store advertising in each locality to the householder, is the strict application of the advertising to the local circumstances.

All standardized policies in marketing are less efficient in their final analysis than policies which can be individually modified to meet the possibilities of local considerations.

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Human Phases of Service

"HUMAN relations between the service station and the owner are of even greater importance than the mechanics of service work at the present time," Clyde Jennings, managing editor of *Motor Age*, told the N. A. C. C. service managers at their convention recently. The statement points out a necessity of present-day service work that has not been adequately recognized in the past.

Good mechanical service is the basis, of course, of satisfaction. But the difference between profit and loss may be determined by how the service is given.

Factories have had traveling service representatives for some years. These men have visited the various distributor and dealer establishments to help out on difficult or constant mechanical troubles. They have directed their attention almost exclusively to the mechanical phases of service and have performed a useful and necessary function. But they are dealing with only half of the service problem. Dealer education is badly needed on the more general aspects of service.

Far more dealers are capable of handling the mechanical problems of service than the merchandising. Few of them really know how to sell service. They do not understand the "human relations between the service station and the owner." Education along this line is necessary.

Design Drops Behind Production

ONE of the great accomplishments of an age of wonders has been the development in this country of an automotive transportation system far superior to that evolved in any other country. American manufacturers have been wonderfully favored in respect to raw materials and fuel supply but more than that has been needed to bring automotive transportation to its present position of importance.

What amounts to a positive genius for mass production has enabled the motor vehicle manufacturer in this country to make convenient and efficient transportation available at a price within the means of a large percentage of American families.

To produce motor vehicles at present low prices in the face of high labor and material costs has been, in itself, no mean achievement. Largely because of intensive cultivation of production facilities, American makers are able to undersell foreign manufacturers in their home markets, although their labor is far cheaper than ours.

So far as comfort, durability, speed and all around efficiency are concerned, remarkable strides have been made in the manufacture of American motor cars in the past decade. Luxurious and commodious bodies have been placed on low-priced cars which will run smoothly up hill and down dale.

But has progress in design and construction kept pace with the improvements in production methods?

Is it not worth while occasionally to stop and try to visualize the advances made in this respect over a period of years?

Consideration of the present-day passenger car as compared with those in general use a decade ago does not reveal as great an advance, except in detail, as is often asserted in casual statements.

We have the same arrangement of units in a car which, so far as the average user is aware, is substantially identical mechanically with that which he owned ten years ago, although its external appearance has changed.

The same throttling type engine, which is decidedly inefficient at the loads or normal service, is still employed, although its compression ratio is lower so that its economy, insofar as it is affected by this factor, is worse rather than better. Fuel handling is improved by the use of better carbureters and manifolds, but this was forced by the decrease in fuel volatility.

Engine lubrication is probably better on the whole, although the all-loss system had certain advantages

not now realized. Fuel dilution of the lubricant, at least, was avoided.

Gearsets and axles have undergone many detail changes but are basically the same in most respects. Spiral bevel-gears are less noisy. In fact the whole car is rather quieter than heretofore.

Frames are generally stiffer but are basically little changed otherwise. Some improved types of wheels are used, but the artillery spoked type is still most extensively employed. Demountable rims have given added convenience, but have in general added weight.

Marked improvement in tire durability stands out as a notable achievement. The cord tire has also improved riding qualities and contributed to better economy. Springing is generally better, due more to the use of longer springs than to any change in type.

The addition of electric starting and lighting equipment was a step in the right direction, but the present electric system leaves much room for improvement in the way of dependability, especially in regard to the battery.

Bodies are, in the main, much improved in appearance as well as in comfort though not always in durability either of the structure or the finish.

There is difference of opinion as to whether the modern car must visit the service station less often than its predecessor. Certainly the service problem is little less acute and there always will be room for improvement on the score of dependability.

Thanks largely to lighter reciprocating parts, better mixture preparation and lower gear ratios, the modern car handles or "gets away" better than did most earlier cars, but a part of this gain is often at the expense of good fuel economy.

It must be admitted that the chief advances which the industry has made are in respect to production. There is still much room for improved design and construction.

Having achieved the goal of low production costs is it not time the industry turned its attention to bettering quality without rise in price rather than to further decreasing price?

Standardize Gearshifts

THE shifting of gears becomes second nature to the car driver and he does not have to stop to think what position he should throw the gearshift lever to produce the necessary result. Very fortunately in the early days of automobile history, makers imitated one another in the matter of general control so that all cars now have the foot brake to the right and the clutch to the left. Steering wheels also all turn the same way and a hand lever is used for the emergency brake. This makes it easy for a man who can drive one make of car to drive another make. But the matter of gearshifting has not been standardized, with the result that the driver who is used to one make of car finds difficulty in changing gears on other cars. The Society of Automotive Engineers, in 1916, adopted a recommended standard in which the low gear is back left, intermediate, front right, high, back right and reverse, left front. While many makers have adopted that form of control, there are enough makers who are using other forms of shifts to seriously interfere with the standardization program.

From the sales standpoint, the lack of standardization is serious. The man who has owned a car, say with a standard gearshift, likes to try driving a new car being demonstrated to him and if this car shifts gears differently he finds a great deal of difficulty in shifting gears, has to center his attention on gears and has little opportunity to observe the other fine points of the car. Dealers and salesmen have been known to lose many sales because they had difficulty themselves in shifting gears on used cars they were demonstrating and there is quite a string of accidents to the credit of the unstandardized gearshift.

There are no design or construction difficulties in the way of making any gearshift standard and a great benefit would be conferred on dealers and owners.

Helping Dealers to Sell

MANUFACTURERS in all branches of the industry are profoundly interested in plans for the education of their dealers and for increasing the sale of their products. Ray W. Sherman, merchandising director of the Automotive Equipment Association, makes a suggestion in a recent issue of *The Sales Executive* which can be adopted with profit by the makers of many parts and accessories.

"There is one thing," he says, "every dealer wants to know about the product of every manufacturer: How to make money with it.

"Unless the dealer can know this one thing about the product, he doesn't care anything about all the rest that might be said about it.

"If there is one man in all the world who should know how the dealer can make money with the product, it is the man who makes the product. He designed it. He has lived with it, dreamed about it, studied it and is the source of all information about it.

"If the maker of every product could tell the dealer in a piece of printed matter specifically how the dealer could make money with it, the dealer should be interested in the story and should appreciate this help from the manufacturer. Literature of this kind could be mailed direct, used as a return key in advertising and distributed through jobbers and their salesmen or the manufacturer's own men.

"Such a piece of literature doesn't need to be expensive or elaborate. It doesn't need to be filled with thousands of 85-cent words. It needs plain Anglo-Saxon, stripped of all the glorious pictures of factories and reasons why you think the product is good and told from the standpoint of the dealer.

"If each manufacturer would get out one such piece of literature and arrange for its distribution, it would aid greatly in the work of business education. The man who got the idea to the dealer would profit because the dealer would sell that product."

November Output Reaches 232,000

Total So Far in 1922 Placed at 2,346,120

Industry Seems Assured of Reaching 2,500,000 Production Figure This Year

NEW YORK, Dec. 13 — Eleven months' production of motor vehicles in 1922 is greater by 140,923 than the entire previous best year on record—1920, when 2,205,197 cars and trucks were built. With another month to go it appears that the estimated production for the year, 2,500,000, will be easy of accomplishment.

November, a short month inclusive of a holiday, proved to be another record breaker, according to shipping returns received by the National Automobile Chamber of Commerce, figures showing an output of 232,000 vehicles. Total output for the 11 months is 2,346,120.

This made the eighth consecutive month to pass 200,000 and indications are that December will be included in this group. Despite the fact some factories are taking inventory this month, it is hardly likely that the December figures will be below 200,000. Granted that they will not be, it looks as if the annual production will be in the neighborhood of 2,550,000.

That the railroad situation is not getting any worse and possibly is improving is indicated by the N. A. C. C. reports. Compared with October, carload shipments in November were greater, while driveaways and boat shipments have fallen off. Unless big storms tie up the railroads, it is thought that shipping conditions will improve from now on.

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Moline Plants Working at 75 Per Cent Normal

EAST MOLINE, ILL., Dec. 11—The R. & V. Motor Co. within two weeks will be operating on full schedule and indications are that after the plant gets under way on this schedule further additions to the force will be made.

A general survey in the manufacturing field in this community shows an average working basis 75 per cent normal with promise that there will be no let-up in activities during the winter. Implement factories are operating on a scale about 60 per cent normal.

The American Motor Parts Co. and Aluminum Manufacturing Co., both relatively small concerns, are anticipating no reduction from present production and the Troy Laundry Machinery Co., recently located in the R. & V. Motor Co. buildings group has orders sufficient to justify operation with its present force through until June.

About 2200 men are employed in the manufacturing industries here.

Business in Brief

NEW YORK, Dec. 14—Retail buying has been stimulated by the first touch of real winter. Footwear, heavy apparel and holiday buying lead. Primary lines show a general seasonal slowing down. Collections are fair.

The car supply is better. This is particularly true through the grain centers. Traffic is the heaviest at this time on western roads for several years. Car shops are working at capacity and equipment is rapidly being placed in better condition.

Car loadings for the week ending Nov. 25 totalled 955,495, a reduction of 13,599 from the previous week. This was far in excess of the same period for 1920 and 1921.

November pig iron output was the largest in two years. Good buying of that product resulted from a steady ten weeks' price decline. Steel remained fairly steady. Railroads continue to buy cars, locomotives and tools, and makers have a year's business ahead. Coke prices eased.

Coal output increased with a quickening in the demand for soft coal. Anthracite output was at a peak, and a large shortage still exists. Domestic consumers have been advised to utilize steam sizes to avoid later hardship.

Estimate of winter wheat acreage shows a cut of 10 per cent over last year. Grain movement from interior to primary markets is large. Farmers, on the whole, are not free sellers of corn.

Stocks showed irregular movement during the week. Bonds likewise were irregular and active. Liberties showed an increasing firmness.

Sterling set a new high record for the year, rising to 4.57⅛ for demand. Bank clearings increased 46.4 per cent over the holiday week of Nov. 30, aggregating $8,035,407,000. Business failures increased over the previous week and numbered 462.

Industry Preparing for Output in 1923

Inventory Taking Will Cause Break in Plant Operations During December

NEW YORK, Dec. 11—The automotive industry, with a record back of it this year unsurpassed in its production history, is beginning to prepare for an even greater output in 1923. Factory operations are taking on a more conservative tone as the month advances toward the annual inventory period, during the holiday season, with the result that December will fall somewhat short of the average maintained during the previous months of the year.

This is an expected situation and does not indicate that there has been any pronounced lull in the demand for cars. The surprising feature of the last few months is that the volume of sales in a naturally dull season enabled manufacturers to operate on schedules that brought the total output for 11 months to exceed that for all of 1920.

Body Shortage Still Drawback

Production is taking care of current demands as well as the many back orders that have been held up because of the lack of closed bodies. The shortage of bodies is still a great drawback to prompt deliveries. Shipments of finished cars are going forward as fast as rail facilities can handle them.

With December on a satisfactory basis, even in comparison with the best months of the year, brisk activity will be resumed after the first of the year when New York ushers in the show season and such plants as now are operating on curtailed programs return to quantity production. The end of the inventory period will find factories in a condition to enter the production year with greater facilities to take care of the anticipated demand.

The New York show will present for the first time a number of new models, as indicated by the showing of the higher priced lines at the New York salon last week. Keen interest already evidenced doubtless will set a

(*Continued on page* 1203)

Reorganized Dunlop to Open Plant

Operations to Start at Buffalo by March

Edward B. Germain Heads American Company—New Financing Accomplished

NEW YORK, Dec. 11—Reorganization of the Dunlop Tire & Rubber Corp. of America has been completed, following a month's meeting in this city of the directors of the English company. The $20,000,000 plant at Buffalo will be put in operation not later than March 1. At the start the plant will produce about 20 per cent of its daily capacity of 12,500 tires, which also will include solids. Ninety per cent of the machinery already has been installed.

The personnel of the American organization will be new throughout, with Sir Eric Geddes, brother of the British Ambassador at Washington, as chairman of the board, and Edward B. Germain as president and general manager. Germain sailed for England Saturday with Sir Eric for a meeting with the English company's directors in London, and no further announcements of the personnel will be made until his return the latter part of the month.

Walcott Serves on Committee

Frederic C. Walcott, originally president of the American company and liaison officer between the English and American interests, while the Buffalo plant has been idle, will be one of three to serve on the executive committee. He also will continue to act as president of the Utica Spinning Co. at Utica, N. Y., which is a Dunlop subsidiary and which will manufacture the cord fabric for the Buffalo plant.

On the American board of directors serving under Sir Eric are Frederick W. Allen of Lee, Higginson & Co., representing the banking interests; Pierre du Pont, J. J. Storrow, Sir George Beharrell, Robert K. Pomeroy, Louis Bergen and Charles A. Proctor. Directors of the English company are Frederic C. Walcott and J. Westren. Sir Eric is chairman of both the English and American boards.

Germain is an organizer rather than a tire man. He comes from the Bethlehem Shipbuilding Corp., with which he was identified for seven years, latterly in charge of the Moore plant at Elizabeth, N. J. He is given credit, as a Bethlehem executive, for directing the construction of Hog Island during the war. As general manager, he succeeds P. D. Saylor, formerly with Goodyear in England, who now is president of the Batavia Rubber Co.

The refinancing of the American enterprise was accomplished through the issue of $15,886,000 first mortgage 7 per cent bonds to a syndicate of New York bankers, the entire issue having been already oversubscribed. This syndicate is headed by Lee, Higginson & Co. and Brown Bros. & Co., who are offering a new issue of 7 per cent first, closed mortgage and collateral trust sinking fund convertible gold bonds of the Dunlop Tire & Rubber Corp. of America at a price of 95 and accrued interest to yield more than 7.60 per cent. The American series (A) amounts to $11,000,000, and the British series (B) to £1,000,000, both equivalent at par of exchange to $15,866,700.

The bonds are dated Dec. 1, 1922, and due Dec. 1, 1942. They are convertible after Dec. 1, 1924, into 8 per cent cumulative preferred stock and common stock of the Dunlop Tire & Rubber Corp. of America at the rate of $1,000 par value of preferred stock and two shares of no par value common stock for each $1,000 of bonds. A sinking fund, payable semi-annually, first payment Oct. 15, 1924, must call and retire the issue at 105, and is sufficient to retire the bonds at or

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There Will Always Be a Place in the Automotive Industry for Smaller Producing Companies

By J. I. HANDLEY,
President of Handley Motors, Inc.

Detroit, December 11.

Automobile manufacturing will probably reach its highest peak in 1923, exceeding the high totals established in this year by many thousands, but following this there will probably be a tapering off, with the business holding about even thereafter and with gains or losses according to the general business condition of the country.

In 1923 the industry will catch up with the market which has been undersold since the depression of 1920. Manufacturers will have an opportunity in 1923 to establish their companies firmly, and should make provision for a falling off in business after the market has been caught up. It is impossible that the industry can continue to make million gains each year, but it will make steady progress always.

The time will never come when the industry will be controlled by half a dozen large producing companies. There will always be a place for the smaller manufacturer who conducts his business sanely and conservatively and who knows his market. Many of the smaller companies are among the leading money makers, dividing profits rather than devoting it to expansion keeping them relatively small.

Smaller production companies will have their best success in appealing to the individualistic car buyer. They cannot be expected to compete with the large producers on a price basis but they can get the business of the buyer who likes specially appointed cars. By building individuality into their cars, and by keeping their prices as low as possible by the utmost care in the management of their factories, they will find themselves always in position to do a satisfactory business.

The dealer situation to-day is the difficult problem for the smaller manufacturer. Hundreds of dealers are out of business because the depression caught them without sufficient capital. New dealers must be built up and if necessary smaller manufacturers with non-competitive lines should join in developing new dealers. There is too much competition among small manufacturers for available dealers now.

There is a growing tendency on the part of dealers to break away from the requirement of representing one car exclusively, this being especially marked among dealers of factories which make only one type of car. This situation is mainly a question of the strength of the dealer and of the factory. If the dealer is the stronger he can usually represent as many cars as he desires. Small producing companies will benefit by the opportunity to share sales outlets with other companies.

Everything is set for a great year for the industry in the coming year. General business of the company will be good and when general business is good the automobile business is unusually good. It is true that there are conditions in the United States and abroad which set up a disturbing mental influence of insecurity but this feeling is gradually being broken down and should disappear in the improved conditions of the new year.

Gordon Lee Leaves Government Service

Goes With Yellow Cab Manufacturing Co. as Foreign Sales Director

CHICAGO, Dec. 11—Gordon Lee has resigned as chief of the automotive division of the Bureau of Foreign and Domestic Commerce to become foreign sales director of the Yellow Cab Manufacturing Co. of this city. His resignation takes effect Dec. 15.

Lee has been head of the division since its inception under the Hoover regime two years ago. Installed simultaneously with some ten or twelve other commodity divisions, the automotive division has grown constantly in efficiency and scope under Lee's administration. It is now one of the most active and important of the commodity divisions.

Lee is making a return to active work in the automotive industry through his new connection. Before becoming chief of the automotive division, he traveled extensively in foreign countries as a representative of Gaston, Williams & Wigmore. His active merchandising work in the domestic field includes several years work with Thomas J. Northway in the State of New York, where he gained considerable reputation as a missionary for the Fordson tractor.

He is the third important executive from the industry to go to the John Hertz interests during recent months, J. A. Ritchie and George A. Green having been brought to Chicago from the Fifth Avenue Coach Co. of New York some weeks ago as executives in the corporation which will build and operate taxicabs and motor buses on an extensive scale.

M. H. Hoepli will be acting chief of the division.

Enjoins General Motors in Deppe Patent Action

WILMINGTON, DEL., Dec. 9—The United States District Court has issued a temporary injunction restraining the General Motors Corp. from manufacturing devices alleged to infringe on certain patented super-internal combustion engines and super-heater manifolds held by the Deppe Motor Corp. of New York.

The Deppe corporation owns United States patent No. 1,335,665, issued March 30, 1920, entitled "Internal Combustion Engine." The patent relates chiefly to a method of preparing the combustible mixture, and one of its claims reads as follows:

The method of preparing an explosive mixture for combustion in heat and power units which consists in charging a moving column of highly heated air with liquid fuel spray then contracting the column and increasing the rate of flow of the mixture, then churning the mixture while applying heat to further atomize the fuel particles, then kneading the mixture by alternately sheeting or flattening the column and re-forming it to cylindrical form, heat being applied on both sides of the sheet at each sheeting stage at progressively increasing temperatures, whereby the mixture is converted into a homogeneous dry gas adapted to remain as such during and after delivery to the heat or power unit.

The concern also owns United States patent No. 1,360,098, issued Nov. 23, 1920, and entitled "Super-Heater Manifold for Internal Combustion Engine." This manifold comprises a conduit of alternate round and thinly flattened portions and jackets and pipe connections, whereby the exhaust gases are utilized for heating the flattened portions uniformly on both sides, the flattened portions and jackets and pipe connections being so connected and proportioned that the heating temperatures at succeeding flattened portions are progressively higher toward the intake of the engine.

SURVEY SHOWS LOSS IN USED CAR VALUES

ST. LOUIS, Dec. 11—The National Automobile Dealers Association is now making a survey of the used car situation in Pennsylvania.

Of 3100 dealers addressed, complete replies have been received from 252, who reported 2445 used cars on hand Dec. 1, which were acquired at a cost of $1,014,322. The present actual market value of these cars, the dealers estimate, to be $844,648, or a flat loss of $169,674. It is figured that by the time there are added to this figure the cost of conditioning the cars for resale, the selling cost and the legitimate items of overhead expense, another $160,000 loss will be suffered.

Forty-two dealers reported the actual value of the cars the same as the acquisition cost, 45 reported the acquisition cost lower than the present actual market value, but 165 dealers reported the acquisition cost higher than the present actual market value.

MAY DISCONTINUE JACKSON

DAYTON, OHIO, Dec. 9—The Jackson car, formerly manufactured in Jackson, Mich., will be discontinued, according to the plans of Associated Motor Industries. It is planned to replace the Jackson line with a smaller National. It has not been determined whether the small National will be made in Jackson, or whether the factory there will be used as a body plant. It is expected that both National models will be exhibited at the New York show.

TO DISCUSS BODY FUTURE

DETROIT, Dec. 9—The Detroit section of the Society of Automotive Engineers has selected as the subject for discussion at its meeting Dec. 21 "The Future in Closed Bodies."

War Risk Insurance Return Is Possible

George F. Bauer of N. A. C. C. Sees Chance of Recovery Under German Treaty

NEW YORK, Dec. 11—That millions of dollars paid out by American automobile manufacturers as war risk insurance from 1914 to 1918, inclusive, may be recovered from the German Government is stated by George F. Bauer, head of the foreign relations department of the National Automobile Chamber of Commerce.

During the war period 265,180 motor vehicles, of which 213,164 were passenger cars and 52,016 were motor trucks, were exported and on each of them war risk insurance had to be paid by American automobile manufacturers.

Reimbursement now is possible because of the treaty between Germany and the United States setting up a mixed claims commission, provided the foreign clients were American citizens. Also, because of this treaty, reimbursements may be had on debts owing American citizens by the German Government, or by German nationals.

Letter to N. A. C. C. Members

In a letter to N. A. C. C. members Bauer advises:

In initial steps, at least, the assistance of an attorney is not needed, as claims may be presented to the Department of State and are transmitted to Robert Morris, head of the commission, which maintains offices at 911 Fifteenth Street, Washington, D. C. A petition in typewritten letter form should be presented in duplicate to the Department of State, and contain a full, complete statement of nationality of firm, amounts paid on war risk insurance policies, and that the claim is being made under the terms of the Germany-United States treaty.

The petition, signed by two officers of the company, must be sworn to under oath. Evidence in support of claim is not required in the beginning, although a request may subsequently be made by the mixed claim commission. To be acted upon, the petition must be presented not later than Jan. 1, 1923.

Ver Linden Plans Return With Light Assembled Six

DETROIT, Dec. 12—Edward Ver Linden, former president of Olds Motor Works and for a time president of the Durant Motor Co. of Michigan, is prepared to re-enter the manufacturing field with a light six assembled car which will be priced below $1,000. The car has been fully developed and production on it will be started soon after the first of the year if Ver Linden is successful in buying out the business of a company now established.

In his plans Ver Linden is known to have important financial connections. It is his intention to buy out a going company rather than undertake to build up an entirely new dealer organization.

To Distribute Bodies from Zone Factories

Springfield Body Corp. Formed — Has Bought One Plant as Part of Its Plans

NEW YORK, Dec. 13—The Springfield Body Corp. has been formed to include three or four large body building plants which will build custom bodies on an extensive scale for manufacturers and dealers. It is estimated that the group will have a capacity of 15,000 bodies annually. The corporation has issued 100,000 shares of capital stock, which, it is said, have been sold. Details as to capitalization, officers, etc., will not be available until after a meeting of the promoters on Dec. 22.

The first plant to be taken over is that of the Smith Springfield Body Corp. of Springfield, Mass., which has property valued at $750,000 and quick assets of $200,000. Its capacity is 1000 bodies a year, it is said. Prominent in the formation of the new concern are two of the Smith Springfield officials, President C. S. Dame and General Sales Manager A. H. Wolf.

May Buy Three More Plants

According to present plans, the corporation will purchase at least two and possibly three more plants. One of these, located in the New York district, will have a yearly output of 2500 custom bodies, and will supply the New York and Philadelphia districts as well as meet export requirements, while Springfield will care for New England. Another factory, probably one in the Detroit district, will serve the midwest. A plant in the Indianapolis section also is under consideration.

Under this arrangement it is figured that there will be a considerable saving in freight car space and shipping costs to the automobile manufacturer as a result of such distribution of custom body factories, all operating under one head and producing similar jobs. Car makers can ship chassis to the distributing centers and the bodies will be mounted there or at the body plants. It is also pointed out that there will be a considerable saving due to centralized designing, buying, selling and financing, which will tend to spread the vogue of custom-built bodies.

No Successor Appointed to Col. Smith of Republic

DETROIT, Dec. 12—No action will be taken by the directors of the Republic Motor Truck Co. on the election of a new president to succeed Col. Frank E. Smith, resigned, pending developments of the receivership under which the company is now operating. Only one or two of the former officers are being retained by the receiver, the work of administering the property having reached a point where the retention of the others was no longer required.

In connection with the present status of the company, the receiver said that appraisals have been completed and that other administrative work has reached a point where the property can be managed with only a small organization. It is expected that the property will be either closed out or sold at receiver's sale in less than two months.

Colonel Smith's resignation is considered as indicating that he has definitely given up hope of reorganizing the company on the basis that he had planned.

ANTI-CAR ADS SHOW RIGORS OF WINTER

NEW YORK, Dec. 11—Advertising propaganda tending to discourage the use of the automobile in winter is being broadcast by the American Electric Railway Association, with which most of the trolley lines of the country are affiliated.

This association has prepared a series of advertisements for use in daily papers which has been sent to its members, with advice that these advertisements be used.

In each of the dozen samples submitted great stress is laid pictorially on the rigors of winter motoring, including the troubles of starting, cold garages, cold hands and feet, etc., while on the other hand the comfort to be enjoyed in trolley riding is emphasized, not overlooking the money claimed to be saved by using trolleys instead of automobiles.

Cadillac Not to Close for Inventory Taking

DETROIT, Dec. 9—Because of the large increase in business following its recent price cut, the Cadillac Motor Car Co. will not close for inventory two weeks the first of the year as planned. Instead, H. H. Rice, president, said, the company will continue at full force and will take on additional workmen.

Cadillac's production schedule for December will be one of the two greatest December schedules in its history, according to Rice. January and February also will be big months in Cadillac production.

R. E. OLDS SELLS FLORIDA LAND

LANSING, Dec. 11—R. E. Olds, president of the Reo Motor Car Co., has sold his holdings at Oldsmar, Fla., to the Cornwell Real Estate Co., in exchange for a hotel property in Kansas City. Olds said he had disposed of his Florida property that he might be relieved of the necessity of giving it personal attention, which its development necessitated.

Mengel Body Starts $350,000 Plant Unit

Will Be Ready for Occupancy June 1st—Company Building for Durant Now

LOUISVILLE, KY., Dec. 12—Ground has been broken for the first factory unit of the Mengel Body Co.'s plant here. Contract for its erection has been awarded, the bid for the structural work being approximately $220,000. Machinery and equipment are expected to make the total cost about $350,000.

In association with the Mengel Co., lumber and box concern, of which it is a subsidiary, the body manufacturing company has a $20,000,000 five-year contract to supply bodies for Durant products. Construction of these bodies already has been undertaken on a gradually increasing scale in the plant of the parent company here.

The first unit of the new plant will be ready for occupancy by June 1, according to plans. Actual construction will be nearly completed about April 1, when the installation of machinery will begin.

One of Most Modern in South

This building will be one of the most modern factories in the South. It will be one-story and will have a ground area of 276 x 441 feet. The construction will be reinforced concrete, brick and steel. There will be a basement under a portion of the building. Ample light and ventilation will be provided throughout.

The plant will have switching connections with the Louisville & Nashville and the Southern Railway. It will consist of dry kilns and assembling, painting and finishing departments. When completed it will occupy an area of 200,000 sq. ft. and will be so constructed that additional units can be added. Other units will be erected as rapidly as plans are completed.

Present plans of the company call for the manufacture of 30,000 bodies the first year, giving employment to 500 men. These bodies will be for light trucks, park and station wagons and regular chassis, particularly for delivery purposes.

Insurance Rates Lowered by Campaign of N. A. D. A.

ST. LOUIS, Dec. 11—After six months of the competition to which casualty insurance companies of the United States have been subjected by the Insurance Service Department of the National Automobile Dealers' Association, the insurance companies have revised the "Manual" rates applying to automobile dealers and garages to a point virtually 20 per cent lower than the existing rates at the time the N. A. D. A. began its struggle for lower rates for the industry.

The rates are still 25 to 30 per cent higher than those available for members of the National Association through their organization.

Nash Perfects Plan for Stock Dividend

Shareholders Will Receive New Common and Preferred for Old Common

KENOSHA, Dec. 11—Plans for greatly enlarged financing of the Nash Motors Co. by a stock dividend which would give four shares of new common stock and three shares of new 7 per cent preferred to stockholders for each share of common now held have been announced by Charles W. Nash, president of the company.

The plans are to be submitted to the stockholders for approval at Baltimore, next Saturday.

The stock now outstanding is 54,600 shares of common and $3,500,000 of preferred. The outstanding preferred stock is to be retired on Feb. 1, 1923, at $110 a share plus accrued quarterly dividends and the plans provide for a new issue of $22,500,000 preferred stock.

The common stock would be increased to 300,000 shares of no par value providing for the distribution of 218,400 shares as a stock dividend. The preferred also would be issued as a stock dividend.

Paige-Detroit Will Pay Common Stock Dividend

DETROIT, Dec. 11—Declaration of a common stock dividend of 100 per cent by the Paige-Detroit Motor Car Co. will bring its total capitalization to approximately $6,800,000, made up of $4,000,000 common and $2,800,000 preferred, all of which is outstanding.

The stock dividend is payable on Dec. 29, and a cash dividend of 3 per cent will be paid on common stock Jan. 2. The regular quarterly preferred dividend also is payable at that time.

Ford Will Declare Only Regular Cash Dividends

BOSTON, Dec. 11—Henry Ford asserts the Ford Motor Co. will not declare a stock dividend this year. He added, however, that he believed the present wave of stock dividend declarations by corporations a business necessity.

"We are expanding steadily," said Ford. "We have a $30,000,000 program for improvements to be completed within a year. We won't declare any stock dividend, only the regular cash dividends, and we will spend our funds in the same way we have in the past, that is, in extensions and improvements."

OLDS WANTS BETTER WINDOWS

DETROIT, Dec. 11—Olds Motor Works has offered cash prizes of $50, $30 and $20 for the three best window displays by its dealers and distributors. The contest will close on Jan. 15, when a committee selected by the factory will pass upon photographs of all windows entered.

Window displays have not been attractive enough in the past, and the contest is intended to bring about an improvement. Christmas displays in several localities last year produced such marked results upon sales that the company is seeking to nationalize the effort for better windows.

N. A. C. C. AT DINNER TO HEAR WILL ROGERS

NEW YORK, Dec. 11—Will Rogers is going into the automobile business, for one night.

He will be one of the two speakers at the annual dinner of the National Automobile Chamber of Commerce, to be held in the Hotel Commodore, this city, Jan. 9.

The subject of his talk will be "What I Think About Automobiles."

Columbia Motor Declares Financial Condition Good

DETROIT, Dec. 11—Distributors of the Columbia Motor Car Co. this week signed contracts for all cars produced in the first six months of operation in 1923, a total approximating 13,000. According to W. L. Daley, vice-president in charge of sales, 40 per cent of production in the first three months and 35 per cent in the second quarter will be closed models.

The company declares itself to be in strong financial condition at the closing of the year and, with a greatly increased sales and distributing organization, will be in position to realize strongly on the potential business of the new year.

In strengthening its sales group, the company states that it is now adequately represented in every important center. Distributors say that fall sales in both the light six and Elite models were heavy.

Morse Chain Completes New Factory in Detroit

DETROIT, Dec. 11—Morse Chain Co. has completed its new factory here, in which it will manufacture all sprockets and adjustments used in Morse front end drives and the new Morse silent chain bus transmission. The building provides a total manufacturing space of 60,000 sq. ft., in addition to quarters for the sales and engineering departments.

With its new production facilities the company declares it will be able to handle the present volume of business more expeditiously and is in position to expand the output under pressure of unusual sales conditions.

The present building will be the center one of four when the company's plans for expansion are realized.

May Sell Standard Parts February 20

Stockholders Likely to Organize to Make Purchase—Creditors Hurry Action

CLEVELAND, Dec. 11—Stockholders of the Standard Parts Co. may organize to buy the plants of the company at a sale which will probably be held on Feb. 20. Receiver F. A. Scott has made application to sell and the court will pass on the request on Jan. 6.

Receiver Scott suggests that the Eaton Axle Co. plant, Standard Welding Co. and the Perfection Spring Co. plants be sold as units. He also explains it may be well to sell the Perfection spring plant, the Pontiac spring plant and the Cleveland, New York and Boston service stations.

Creditors met with the receiver recently to consider plans for expediting the payment of claims. Following this meeting, it was stated that Scott would be asked to file with the United States District Court an application to sell the plants at public or private sale.

Under Receivership Since 1920

Standard Parts has been operating under a receiver appointed by the United States District Court of this city since September, 1920, and because of this unusual length of time the creditors want closing up of their claims expedited.

The company at present is operating five plants, but only four are under the direction of the receiver. The fifth, the Bock Bearing Co. of Toledo, is controlled through stock-ownership. The four that are under the direction of the receiver are the Standard Welding Co., the Perfection Spring Co., the Eaton Axle Co. and a spring plant at Pontiac, Mich.

The American Ball Bearing Co., an axle plant in Cincinnati and a spring plant in Canton were never placed in operation by the receiver, but were sold, the Cincinnati plant bringing $59,000 and the Canton plant $203,000.

When the Standard Parts went into the hands of a receiver, the creditors' claims amounted to $11,000,000. Since then they have been reduced to $7,000,000. The interest on the entire amount $1,000,000, has been paid.

Inventory Being Taken at H. J. Walker Factory

CLEVELAND, Dec. 9—Inventory is being taken at the plant of the H. J. Walker Co. manufacturer of automobile engines which is now in the hands of a receiver, Joseph C. Hostetler, who was appointed by United States District Judge Westenhaver.

The White Head Sales Co., the Stevens Davis Co. and Fairbanks Morse Co. are the creditors of the company which applied for the receiver.

N. A. C. C. Asks Views on Value of Shows

Competition, Open to Motorists and Members of Industry, Closes Jan. 3

NEW YORK, Dec. 11—Desiring to feel out the public pulse as to the value of national shows and also to sound the automotive industry along the same lines, the show committee of the National Automobile Chamber of Commerce announces a competition open not only to motorists but also to members of the industry. The questions asked are:

"In what way are the national automobile shows of value to the public?"

"In what way are the national automobile shows of value to my company?"

"In what way are the national automobile shows of value to me?"

The conditions governing the competition are as follows:

(1) Any competitor may answer one or all questions separately or may combine the answers in one article, but no one will be awarded two prizes. Articles must not exceed 1500 words if all three questions are answered; they must not exceed 1000 words if two questions are answered or 5000 if only one question is answered.

(2) The construction or phraseology of the answer will not be a factor in the awards—reasons will be the dominant points upon which awards will be based.

(3) No one connected with the offices of the National Automobile Chamber of Commerce or the show management may compete.

(4) Answers must be received not later than midnight, Wednesday, Jan. 3, 1923. They must be sent to S. A. Miles, manager of the National Automobile Shows, 366 Madison avenue, New York and will be judged by a committee appointed by the president of the N. A. C. C.

The answer adjudged best of all will win a $200 watch, and the contestants whose answers are considered second and third best will each receive a $150 watch.

Would Change London Dates

LONDON, Dec. 5 (*by mail*)—A petition has been presented by several British firms to the Council of the Society of Motor Manufacturers and Traders—the organizers of the annual London show—asking that the show be suspended until 1924, in order to test a theory that the elimination of the annual exhibition November would cut out or at least reduce the extent and severity of the dead car-buying season in the autumn.

As an alternative, it is suggested that the show be held between Aug. 15 and Sept. 15, the contention being that, if the show were held then, orders would be given for immediate delivery which would otherwise be held up until November.

GASOLINE EXPORTS DECLINED

WASHINGTON, Dec. 9—Gasoline exports from the United States during October were 42,757,000 gallons compared with exports of 44,846,000 in September and 47,116,000 gallons in October of last year, according to census reports of the United States Bureau of Foreign and Domestic Commerce.

NEW YORK AND CHICAGO SCHEDULE BUSY WEEKS WHILE SHOWS ARE IN PROGRESS

NEW YORK, Dec. 12.—Events taking place during the national show weeks in New York and Chicago are announced as follows:

NEW YORK

Jan. 6-13—National Automobile Show, Grand Central Palace.
Jan. 8-13—Automobile Body Builders' Association Show, Twelfth Regiment Armory.
Jan. 9-12—Society of Automotive Engineers' Annual Meeting.

Jan. 8

10.00 A.M.—National Automobile Chamber of Commerce Export Manufacturers' Convention.
6.30 P.M.—Rubber Association Dinner, Waldorf-Astoria.

Jan. 9

2.30 P.M.—National Motor Truck Committee Meeting.
6.30 P.M.—N. A. C. C. Annual Dinner, Hotel Commodore.

Jan. 10

10.00 A.M.—N. A. C. C. Directors' Meeting.
10.00 A.M.—Franklin Automobile Co.'s Sales Conference, Commodore. Luncheon 1.00 P.M.
Evening—Eastern Oldsmobile Dealers' Meeting-Dinner, Commodore.
6.30 P.M.—Motor and Accessory Manufacturers' Association Dinner, Commodore.

Jan. 11

6.30 P.M.—S. A. E. Dinner, Pennsylvania Hotel.
Hupmobile Luncheon and Dealers' Meeting, Commodore.
New York State Automobile Merchants' Association.

CHICAGO

Jan. 27-Feb. 3—National Automobile Show, Coliseum and First Regiment Armory.
Jan. 27-Feb. 3—Annual Automobile Salon, Drake Hotel.
Jan. 29-31—Automotive Electrical Association's Annual Meeting, Congress.

Jan. 27

10.00 A.M.—National Automobile Dealers' Association's Directors' Meeting, LaSalle.

Jan. 29

10.00 A.M.—Sixth Annual Convention, N. A. D. A., LaSalle.
8.00 P.M.—Annual Banquet, N. A. D. A., LaSalle.
N. A. C. C. Advertising Managers' Convention (tentative date).

Jan. 30

10.00 A.M.—Concluding Session, N. A. D. A., LaSalle.

Jan. 31

10.00 A.M.—N. A. C. C. Directors' Meeting.
10.00 A.M.—N. A. D. A. Directors' Meeting, LaSalle.
10.00 A.M.—Franklin Automobile Co.'s Sales Conference, Congress; Luncheon, 1.00 P.M.
Evening—Central and Western Oldsmobile Dealers' Meeting-Dinner, LaSalle.
S. A. E. Meeting and Dinner, Congress.

Feb. 1

Hupmobile Luncheon and Dealers' Meeting, Congress.

New York Reduces List of Approved Headlights

ALBANY, Dec. 12—Fifty-eight headlight lenses, which are now officially approved by the New York State Tax Commission as coming within the anti glaring headlight law of the State, have been eliminated from the approved list in the latest revisions to become effective after April 1.

Until the present revision of the list, in which more than 50 per cent of the approved headlights were eliminated, the list on file at the commission's office contained 100 names of headlights which were officially classified as "anti-glaring."

Ford Asks Water Power Permit on Mississippi

WASHINGTON, Dec. 11—Edsel B. Ford, president of the Ford Motor Co., through W. H. Mayo, has filed an application with the Federal Power Commission for a preliminary permit for one year to develop power rights of the Mississippi River dam No. 1 at Minnehaha Falls at the junction of St. Paul and Minneapolis.

The proposal is to install in the power house, which was built in 1917 by the United States Government, hydraulic turbines sufficient to utilize all the power needed in the operation of a large manufacturing plant producing products at the Ford company. The plant is expected to be located in either St. Paul or Minneapolis. In addition, the application cites that co-operation of the University of Minnesota has been invited to establish an experimental station for the study of hydro-electric sciences.

N.A.C.C. Road Plans Follow New Jersey's

Directors Would Have Taxes Applied Only to Maintenance of Highways

NEW YORK, Dec. 13—Realizing that the 43 State legislatures which meet early in 1923 will take up the matter of imposing a tax on gasoline consumption, directors of the National Automobile Chamber of Commerce devoted the greater part of their monthly meeting to-day, postponed a week, to a discussion of the subject.

After all arguments had been considered, the general sentiment of the directors was that they are not opposed to taxation on motor vehicles, either through registration fees, gasoline taxes or both to an amount sufficient to cover the maintenance of roads, but not their construction. It further was felt that as all highways benefit the public the construction cost should be paid by all taxpayers, whether or not they own motor vehicles.

All taxes on motor vehicles, declared the directors, should not only be used for maintenance, but should be under centralized control. In a nutshell, the views of the N. A. C. C. directors follow along the lines of the New Jersey Plan, which declares that the public shall build the roads and the motor vehicles pay for the upkeep.

Output Reports Read

Production reports read to the directors showed the total output for 11 months of 1922 to be approximately 2,345,000, with November contributing 232,000, which is within 5 per cent of October and twice the volume of the same month last year. The prevalence of low-priced models of closed cars was assigned as one of the main reasons for the unusual fall business.

The directors also received reports from 30 trade associations to the effect that December business will be moderate, but that on the first of the year the market will be active again. November sales were reported to be 75 per cent better than for the same month last year, but 25 per cent less than October, 1922.

The November sales of trucks were about the same as October, 1922, and greater than November, 1921. Sales are better in the Middle West and Far West.

The show date question came up for a short discussion, following the suggestion that national shows held late in the fall might be of greater benefit to the industry, especially dealers, than the winter exhibitions. No action was taken, the matter being laid over for a later meeting.

FREIGHT RATES LOWERED

NEW YORK, Dec. 13—The traffic department of the National Automobile Chamber of Commerce announces that freight charges on motor vehicles from Texas border points (El Paso, Laredo, Eagle Pass and Brownsville) to Mexico City have been reduced approximately 40 per cent. This results from action of the national railways of Mexico establishing a more favorable basis of rates on imports from the United States.

Ford Made 106,352 Sales in U. S. During November

DETROIT, Dec. 13—Retail sales of Ford cars and trucks in November totaled 106,352, all of this business being in the United States and representing the largest November retail business the company has ever had. Retail business in November, 1921, approximated 55,000 to 60,000.

In connection with the volume of business at the present season, Ford officials declare that it is unprecedented and that, in spite of the capacity operation of the plant, it is impossible to meet current demands. Dealers have less than half the stock on hand that they had this time last year, despite the major operation of the plant all year, the total production now reaching beyond the 1,300,000 mark.

N. A. C. C. Truck Members to Convene January 11

NEW YORK, Dec. 12—The motor truck committee of the National Automobile Chamber of Commerce at its meeting to-day decided to hold a special meeting for truck members of the Chamber on Thursday, Jan. 11, which is during the New York show. The meeting will be held at N. A. C. C. headquarters and the entire day given over to discussion of questions of vital importance to truck makers.

To-day's session was attended by representatives of the American Electric Railway Association for a joint discussion of a uniform law that will control the operations of motor trucks as common carriers on the public highways. The automotive representatives were in accord with the association delegates in the major portion of the proposed uniform law, but the two committees have not yet settled upon a taxation cause that is satisfactory to both.

The truck committee also discussed a new caution plate that will be used by all truck manufacturers, but there still remain several details to be settled before the plate can be adopted officially.

WILLYS EXPECTS BIG 1923

TOLEDO, Dec. 12—"We hope that next year will be the greatest in the history of the Willys-Overland Co.," declared President John N. Willys before a group of business men here last night. "Our inventory has been taken and we are planning to produce 45,000 automobiles in the first quarter," Willys said. "This means we will have 15,000 or 16,000 men employed before April 1."

Process Gear Makes Plans for Expansion

Include Construction of Factory Building at Estimated Cost of $150,000

SYRACUSE, Dec. 12—Details of a $500,000 expansion program for the New Process Gear Co., Inc., of this city has been announced by T. W. Warner of Toledo, president.

Construction of a large factory building to cost about $150,000 equipped with new machinery to increase the capacity of the plant to about 600,000 gear sets a year, is included in the program. The contract for the building will be awarded within a few weeks. It is expected that the new plant will be available for occupancy March 1.

Warner announced that the expansion of operations includes new lines of production. Although definite particulars are being withheld, the new product will be for automobiles.

The company has contracts calling for the manufacture of 600,000 differential gears for 1923, according to Warner. This program will demand additional employees, and it is expected that by June more than 1200 will be on the payroll. The present plant is working to capacity and has been for some time.

Officers of the new company have been announced as follows: President, T. W. Warner, Toledo; vice-president, C. W. Miniger, Toledo; secretary, Clayton R. Burt, Syracuse; treasurer, E. H. Witker, Toledo; assistant to the president, Anthony Henninger, Muncie, Ind. Witker is expected to move here within a short time, though Burt will continue manager.

John Wanamaker, Pioneer in Sales Work, Is Dead

NEW YORK, Dec. 13—The death of John Wanamaker marked the passing of a man whose vision was so broad that he foresaw the possibilities of the motor vehicle in the earliest days of the automobile industry.

More than 20 years ago, when Henry Ford was struggling for a foothold, Wanamaker reached out a helping hand and placed the Ford agency in his New York store, this being the first eastern representation Ford ever had. It also is said that the late merchant prince assisted Ford financially at a time when the world looked darkest. W. D. Gash conducted the Ford business for Wanamaker until about 1903, when the Ford company took over the representation.

Wanamaker also figured most prominently in the Selden patent suit, being one of three brought into the litigation, the others being the Ford Motor Co. and the O. J. Gude Co. The suit against Wanamaker was filed Jan. 21, 1904, and later on the three suits were merged into one defense.

Men of the Industry and What They Are Doing

Dr. Nibel Visits Detroit

For the purpose of studying conditions in American automobile plants, Dr. Hans M. Nibel, a director of the Benz Co. of Germany, has been in Detroit, following a visit paid to the New York Benz distributor. While in Detroit he visited the Ford, Cadillac and Packard factories. The Benz company, Dr. Nibel said, at present employs 8000 men and is planning on a production of 4000 cars next year. He stated that the high price of automobiles in Germany makes possession of them possible only for the wealthy. Concerning the four-wheel brake, he said that all companies were trying it experimentally and that he expected it to come as a standard development shortly. Dr. Nibel has been identified with the Benz organization for the last 18 years. He returned to Germany on the steamer "America" on Dec. 13.

Gives All Time to Eisemann

William N. Shaw, vice-president of the New York Air Brake Co., has resigned in order to devote all his time to the Eisemann Magneto Corp., of which he has been president for the last four years, and to other interests.

Rickenbacker Appoints Pelletier

E. LeRoy Pelletier has become advertising manager in charge of sales promotion of the Rickenbacker Motor Co. Pelletier will relieve vice-president E. V. Rickenbacker of much detail in connection with sales promotion, which he has directed from the beginning of the organization. It will enable Rickenbacker to devote more of his time to the engineering, manufacturing and general administration of the business and make closer his association with President and General Manager B. F. Everitt in the production of cars. The appointment will not affect the advertising agency of which Pelletier is head. The agency will continue at its present location, with the founder as president and E. Le Roy Pelletier, Jr., as vice-president. Rickenbacker and Pelletier now are visiting dealers in the Northwest.

William T. Bush Resigns

William T. Bush, for several years a sales executive of Studebaker and Packard, has resigned as director of sales of Gray-Dort in Canada. His plans for the future have not been announced.

White to Develop Disk Wheel

The Wire Wheel Corp. of America has assigned to J. W. White the development of the Buffalo type disk wheel with which the corporation is broadening its manufacturing and distributing organization. White, for many years, has specialized in the development of automotive running gear. His connection with the engineering department of the General Electric Co. prepared him for his entrance into the manufacturing field in 1914 as a maker of axles on the Pacific Coast. Four years later he was in Detroit as manager and chief engineer of the Central Axle Co., a General Motors unit. He has been with the Maxwell Motor Corp. for the last two years and has been largely responsible for the development and adoption of disk wheels as standard equipment on Maxwell and Chalmers cars, as well as the new Maxwell axles.

MAYO HEADS DETROIT RAILWAY COMMISSION

DETROIT, Dec. 12—William B. Mayo, chief engineer of the Ford Motor Co., has been placed at the head of the Street Railway Commission which will manage the city trolley system, Henry Ford having told him to take as much time as the street railway may require.

One of the first things the commission will do will be to endeavor to relieve the street car congestion. Co-operation in this is promised by several of the big Detroit factories which have agreed to dismiss their workers in groups instead of all at one time.

Fields Directs Chalmers Sales

J. E. Fields has been named director of sales for Chalmers cars by Arthur E. Barker, vice-president in charge of sales of the Maxwell Motor Corp. He has resigned as sales manager of the Liberty Motor Car Co. with which he has been affiliated after serving as sales executive with the Hupp Motor Car Corp. Fields' earliest connection with the industry was as a Chalmers distributor at Fargo, N. D., taking this contract at the time Hugh Chalmers took over the former Thomas-Detroit.

Jarrard Goes to Lansing

T. Earl Jarrard, assistant sales manager to M. B. Leahy, general sales manager of the Durant Motor Co., is leaving his Long Island City post to become sales manager of the Durant Motor Co. of Michigan, with headquarters at Lansing. J. W. Hawk, whom he succeeds at Lansing, will assume Jarrard's former position at Long Island City headquarters.

Fitch in Charge of Body Plant

Charles M. Fitch, for several years manager of the Falls Motors Corp., Sheboygan Falls, Wis., has been placed in general charge of the body manufacturing plant being built by the Nordyke & Marmon Co.

J. E. Pickens Resigns

J. E. Pickens has resigned as advertising manager of the Selden Truck Corp., to take charge of the sales service division of Sheffield-Fisher, Inc., Rochester, N. Y., to specialize on direct-by-mail campaigns, sales promotion, sales magazines and house organs. Nearly four years ago Pickens organized the advertising department of the Selden corporation. He came from the Federal Motor Truck Co., with which he had been connected for practically five years in the transportation engineering, sales promotion and advertising departments.

Francis W. Davis in Own Business

Francis W. Davis, who has been with the Pierce-Arrow Motor Car Co. of Buffalo, N. Y., for the past 12 years in various capacities and more recently in the truck division as consulting engineer in charge of design, experimental work, testing and quality, has severed his connection and is now in business for himself as a consulting engineer, specializing in problems of design, manufacture and operation of motor cars, trucks and auxiliary equipment. He is located in the Metz Building, Waltham, Mass.

Curtis in Charge of Doss Plant

T. J. Davis, president and general manager of the Doss Rubber & Tube Co. of Atlanta, one of the South's largest manufacturers of tires and tubes, announces the appointment of T. J. Curtis of Trenton, N. J., as production engineer in charge of the Doss factory. For several years Curtis has been associated with the John E. Thorp Sons Co. of Trenton, rubber manufacturers.

Beneke & Kropf Name Gallup

David L. Gallup has been appointed consulting engineer for the Beneke & Kropf Manufacturing Co. on Rayfield carburetors and thermostats. He has been connected with the engineering department of the Nordyke & Marmon Co. as a consultant for a number of years and previously was in charge of the automobile engineering course at Worcester Polytechnic.

Hinkley Promotes Brede

Oscar M. Brede has been promoted to the position of assistant sales manager of Hinkley Motors, Inc. Specializing in the replacement end of the business which the company is now developing, he will also retain general charge of the service department.

Wilson with McManus in New York

Bernard C. Wilson of McManus, Inc., has gone to New York where he will establish and take charge of a New York office of the McManus organization.

General Tire Sees Sales Gain in 1923

Advises Dealers to Prepare to Double $8,000,000 Business Done in 1922

AKRON, Dec. 9—So optimistic are officials of the General Tire & Rubber Co. regarding the future of the tire industry that they are notifying their salesmen, branch managers and field representatives throughout the country to prepare to double their 1922 tire business in 1923.

At sectional sales conferences conducted by the company, all salesmen are being given instruction in new salesmanship methods. These district conferences supplant one national conference at Akron. The first was held at Atlanta for salesmen in the southern territory; the second at Atlantic City for eastern representatives and the third was held this week at Akron for salesmen from Ohio, Kentucky, Indiana, Michigan, West Virginia and Western Pennsylvania.

The next district conference will be held this week in Chicago for middle western salesmen, and this will be followed by similar conferences as far west as the Pacific Coast.

Vice-president and General Manager William O'Neil, at the Akron conference announced the company's sales for 1922 would approximate over $8,000,000 as compared to $6,500,000 in 1921, an increase not only in units sold but in volume of sales revenues to the extent of $1,500,000.

Unable to Meet Demand

O'Neil also announced that the company estimated it had lost fully $1,000,000 worth of business this year through inability to produce enough tires to fill all orders received. General now is averaging 2500 tires daily. The company is rushing to completion three large factory additions in Akron and has machinery on the ground ready for immediate installation. It is expected that these new plants will be in operation shortly after Jan. 1, practically doubling the company's capacity for daily tire output.

"Go back home and prepare to double your record breaking 1922 business in 1923. The door is swinging open upon the greatest era of prosperity and expansion the tire industry has ever known," O'Neil is telling the salesmen at the district conferences.

O'Neil also claims the company's policy of selecting and restricting its dealers instead of permitting its tires to be sold promiscuously has more than vindicated itself and that the plan is being patterned by many other companies.

OLIVER SENTENCED TO PRISON

ATLANTA, Dec. 13—Elmer Oliver, formerly head of the Oliver Rim Co. of Atlanta, operating a large plant here for the manufacture of automobile rims, has been convicted of a charge of embezzling several thousand dollars of the company's funds, and sentenced to serve 4 to 7 years.

It is announced that other officers of the company also are to be tried on a similar charge. More than 60 witnesses, all stockholders and many of them automobile dealers in this section, were heard during the Oliver trial.

PERSONAL NOTES

Arthur L. Collins Joins Potts

Arthur L. Collins, for the past six months associated with Standard Steel & Bearings, Inc., has entered the tool and alloy steel department of Horace T. Potts & Co., Philadelphia, as sales metallurgist. His work will be with the various mills turning out the Potts' brand of steels, and with the users of these steels in advising on applications and heat treatments. Collins is instructor and lecturer in metallurgy and metallography at Temple University, and has been secretary and treasurer of the Philadelphia Chapter of the American Society for Steel Treating since its inception several years ago.

Western Forge Elects Trabold

Frank W. Trabold was elected to the presidency of the Western Drop Forge Co. of Marion, Ind. He has been identified with the forging industry for many years, principally with J. H. Williams & Co., a company he served in various capacities as sales manager, works manager and vice-president and general manager.

Dunlop Is Reorganized and Will Operate Plant

(*Continued from page* 1195)

before maturity date. Proceeds from the sale of bonds will be used to retire substantially all the present indebtedness of the American company and to provide additional working capital, it is declared by the company.

The corporation is a subsidiary of the Dunlop Rubber Co., Ltd., of England, which guarantees principal, interest and sinking fund of the new bond issue which also is secured by $14,600,100 of the Dunlop Rubber Co., Ltd., first mortgage 8 per cent debenture stock and by a first mortgage on the assets of the American company, valued at more than $16,000,000.

The American Dunlop plant at Buffalo was completed in 1920, the machinery and buildings alone being valued at $16,000,000, while there are 500 acres of land which are said to be worth several millions more. Because of the condition of the automobile industry at the time it was decided to postpone tire making until conditions improved the plant was closed and has been idle ever since that time.

Majority of Owners Prefer Closed Cars

Replies to N. A. C. C. Questionnaire Show 40 Per Cent Want Open Models

NEW YORK, Dec. 13—The closed car has won the election by a considerable margin, defeating its "open" rival by 20 per cent, according to the mail ballot sent out by the National Automobile Chamber of Commerce to 20,000 car owners in ten widely separated states, asking: "When you buy your next car, will it be open or closed?" Returns to date show that 60 per cent of those who replied will buy closed cars and 40 per cent open ones.

Analyzing the ballot, it is found that the reasons for closed car preference are closely related, protection from weather being foremost. General comfort is another big factor, and economy on the basis of all-year use is a third. Appearance also plays an important part.

Trouble With Side Curtains

Other owners specifically mentioned that the difficulties experienced with side curtains has converted them to closed cars. A small per cent say the closed car is better for business purposes. A limited number state they are buying closed cars because of their women folk. The preponderance of the weather, comfort and appearance reasons also indicates that the feminine influence is much stronger than specifically stated.

The following table shows the frequency with which the various reasons were given in the total response of those who preferred closed cars: Weather protection, 44 per cent; general comfort, 34; economy through all-year use, 20; appearance, 7; no side curtains, 4; business reasons, 3; women demand it, .8.

Poor Roads Help Open Cars

Advocates of the open car, the 40 per cent, declare poor road conditions are an outstanding reason for continued open car demand. Price, including upkeep, is another factor, while lightness, which is related both to road conditions and upkeep, also is quoted. Safety was mentioned by many who expressed an objection to being inclosed in case of an accident and by those who feared broken glass. Another large element prefer the open models because it permits them to be in the open air. Business use is an important factor, some owners finding the open car more convenient. Some farmers reported that the open car is more of a utility vehicle as it can be readily used for cartage and also can be driven over fields more readily.

Summed up, the "open" preferences are classified as follows: Poor roads, 23 per cent; price, including upkeep, 16; light weight, 15; safety, 14; more air, 13; business, 10; farm use, 5; touring use, 4; better resale value, .8.

Jordan Orders Keep Factory at Capacity

Distributors Contract for 4350 Cars for December and Next Year Delivery

CLEVELAND, Dec. 11—Four hundred distributors of the Jordan Motor Car Co., in convention at the Winton Hotel placed orders for 4350 Jordan cars at a total valuation of $10,800,000 for delivery during December, January, February and March.

Every section of the United States was represented, and from every distributor came reports of increasing business with strong emphasis on the greater demand for closed cars.

The Jordan company will build approximately 9000 cars in 1922. The demand for closed cars has brought the requirements of dealers far beyond the present capacity of the factory.

This means that Jordan production will run for the next four months at the rate of not less than 1000 cars a month, it was said, and, further, that with this production maintained to April 1, with the normal spring demand coming after the first of April, the factory will be operated at capacity through to July.

Industry Preparing for Output in 1923

(*Continued from page* 1194)

new record from the point of show attendance.

New fields are developing for the sale of automobiles, with the South in particular coming back into the market with the best outlook presented in many months. Conditions in practically all of the Southern States have shown remarkable improvement as prices of farm products have steadily advanced. Road building has been given a marked impetus not only there but in other sections of the country and the advance in the number of highways next year will have a stimulating effect on sales.

Parts makers are operating on steady schedules, which will be increased as the vehicle plants swing back into heavy production. Collections are good, October having shown a decrease of 17.93 per cent in past due accounts.

With the tire makers further advance is being made in replenishing depleted stocks and in placing that branch of the industry on a footing to meet the spring demand. Great benefit is forecast from the approaching conference of representatives of the Rubber Growers' Association of London and the Rubber Association of America which will be held in New York shortly after the holidays for the purpose of considering the recent crude rubber restriction act.

TABLE SHOWING MOTOR VEHICLE PRODUCTION AND SHIPMENTS FOR 11 MONTHS

NEW YORK, Dec. 11—Shipping returns received by the National Automobile Chamber of Commerce place November production at 232,000 motor vehicles, a surprising total, considering the time of the year. This is the eighth consecutive month that production has topped 200,000. Total output for the eleven months of the year is estimated at 2,346,120.

The following table shows production and shipments for the 11 months of the year and shipments for December, 1921 and 1920:

	Output		Carloads		Driveaways			Boat		
	1922	1920	1921	1922	1920	1921	1922	1920	1921	1922
January	91,109	20,057	6,485	15,357	29,283	3,185	7,479	..	93	143
February	122,366	25,505	9,986	19,636	43,719	7,507	10,173	..	99	180
March	172,720	29,236	16,287	27,753	57,273	9,939	16,917	....	75	560
April	219,558	17,147	20,187	31,334	64,634	14,197	22,381	....	1,619	2,960
May	256,219	21,977	18,608	33,416	74,286	15,193	28,827	....	2,381	7,406
June	289,011	22,516	20,269	34,230	60,746	18,834	33,857	8,350	3,947	7,737
July	245,414	23,082	19,514	29,116	52,342	15,533	28,100	8,702	3,726	7,030
August	273,425	23,386	20,758	32,814	34,060	15,218	36,754	7,095	3,595	10,096
September	205,784	20,804	19,002	25,950	24,431	13,840	30,055	5,469	2,959	8,002
October	238,514	17,209	17,808	26,980	14,127	12,971	33,320	2,519	2,226	7,040
November	232,000	13,253	14,264	27,232	9,497	10,528	27,376	659	1,402	5,070

Factory shipments for the other months of 1920 and 1921 follow:

	Carloads		Driveaways		Boat	
	1920	1921	1920	1921	1920	1921
December	11,802	12,100	6,469	7,500	89	134

More Complete Details Given of New Auburn

AUBURN, IND., Dec. 8—More complete details of the new Auburn Six have been announced by the Auburn Automobile Co. The Continental 6-Y engine will be used and the clutch will be Borg & Beck. The gearset will be a Warner three-speed type. Remy starting, lighting and ignition will be regular equipment. The side members of the frame will be 6-in. channels of heavy gage metal. There will be four cross members heavily gusseted with tubular members at each end of the frame.

The new car will be produced in two body styles, a 5-passenger phaeton and a 5-passenger two-door sedan type which will be known as a brougham. The phaeton will have a permanent top as optional equipment.

Fageol Gets Reparation on Shipments of Steel

WASHINGTON, Dec. 10—Partial reparation has been awarded the Fageol Motors Co. of Oakland, Cal., against the Director General, as agent of the Chicago, Milwaukee & St. Paul Railroad Co. and other carriers, for unreasonable rates on pressed-steel side and cross members of automobile truck frames, in straight or mixed carloads, from North Milwaukee, Wis,; Elmhurst, Los Angeles and Burbank, Cal. Reasonable basis of rates were prescribed by the commission.

The rate on side members, with spring hanger attached, on automobile truck frames from North Milwaukee to Los Angeles, which was attacked by the Fageol Motors Co., was not found unreasonable.

Short Lines Evolve Rail Car Lease Plan

WASHINGTON, Dec. 11—Operating losses have been converted into substantial profits through replacing steam passenger trains on short line railroads with motor cars. Announcement to this effect has been made by J. W. Cain, manager of purchases of the Consolidated Purchasing Agency of the American Short Line Railroad Association.

Through the activities of Cain, a finance corporation is now being organized under direction of the association so that member lines and others may acquire motor car equipment under a lease purchase plan, making it possible for the equipment to pay for itself through the saving effected.

Cain states that this corporation will be ready to operate by the first of the year.

It was after an investigation covering the greater part of a year, augmented by answers to questionnaires sent to all member lines throughout the United States and Canada, that the purchasing agency made recommendation and placed orders for more than $250,000 worth of gasoline railroad motor car equipment, representing some 20 cars. Cain declares that the cars are showing excellent results.

CHARLES E. BRENNER DIES

PEORIA, ILL., Dec. 11—Charles Emory Brenner, credit manager of the Avery Co., is dead from heart trouble. He joined the Avery company in 1905 in the capacity of assistant sales manager, was promoted to sales manager in 1909, and served as a director of the company from 1907 to 1914. He was made credit manager in January, 1921.

Kalamazoo Advances Lists on Four Models

President Crawford Assigns Increased Cost of Materials as Reason

KALAMAZOO, MICH., Dec. 8—An increase in prices on four truck models is announced by H. A. Crawford, president of the Kalamazoo Motors Corp., builder of the "Kalamazoo" truck. These advances which are effective Jan. 1, 1923, range from $155 to $300.

The revised list of prices is as follows:

	Old Price	New Price
1½—2-ton	$1,800	$2,100
3-ton	3,145	3,350
4-ton	3,845	4,000
5-ton	4,345	4,500

In addition this company makes a 1-ton speed truck and tractor-trailer units in four, eight and 15-ton sizes and an 18-passenger coach.

"Materials have advanced," said Crawford. "To maintain the Kalamazoo quality, we are forced to raise our prices about 5 per cent on the various heavy models. That is not in relative proportion to the increase in the parts we use."

An interesting order now going through the plant is 12 truck-trailer units for the Noble Hoop Co. of Fort Wayne, Ind. Each unit consists of a 3-ton truck and a 5-ton trailer, both being under control by an automatic air brake system, Westinghouse type. The truck has a heavy duty hoist and windlass, while the standard Wisconsin, 4¼ by 6 engine is regular equipment. This develops 50 h.p. at 1600 r.p.m. The truck has a wheelbase of 186 inches.

The order for the Noble company is finished in a rich, brilliant red, with gilt lettering.

Higher Priced Cars Gain in Metropolitan District

NEW YORK, Dec. 13—Registration of new cars in the Metropolitan territory showed a decline in the low and medium priced models in November as compared with the previous month, but an increase in the number of higher priced types, according to the *Automobile Sales Analysis* compiled by Sherlock & Arnold.

Five cars lead the low and medium priced field with four others some distance behind and the rest falling below the 100 mark in point of sales during the month. There are now 10 cars which show sales in excess of 1000 during the 11 months of the year.

In the higher priced field, two lead in November with sales exceeding 100. Two makes have been sold in excess of 1000 during the 11 months, one showing a considerable advance over the others.

The 11 months of 1922, with a total of 62,957 low and medium priced cars and 7013 higher priced, show a considerable advance over the same period in 1921 when the totals respectively were 41,732 and 4359. November more than doubled the sales of the same month a year ago in higher priced lines and showed an increase of 2000 in low and medium priced car sales.

A recapitulation of sales in the metropolitan territory follows:

	Medium and Low Price	High Price
January	2,014	283
February	2,230	273
March	6,352	632
April	8,428	862
May	8,467	961
June	8,203	865
July	7,816	678
August	5,921	516
September	4,592	511
October	4,518	665
November	4,416	767
	62,957	7,013

COLORADO TEACHER GETS SAFETY PRIZE

WASHINGTON, Dec. 11—Mrs. Anne Rogers, a teacher of Sterling, Col., was received at the White House Thursday and presented by President Harding with a diploma of honor for having contributed the best safety lesson in a teachers' contest, conducted as part of the 1921 national safety campaign.

At the same time J. Schuyler Loomis, 14 years old, Limerick, N. Y., winner in a safety essay contest conducted by the National Grange, was presented to the President and received a certificate of merit.

The presentation exercises culminated a week's entertainment in honor of the winners, provided by the National Automobile Chamber of Commerce which gave Mrs. Rogers $500 in cash and the expenses of a trip to Washington, and the New York boy a gold medal and a trip to Washington.

LONDON CARS REDUCED

LONDON, Dec. 5 (*by mail*)—Since the close of the passenger car show on Nov. 11 three or four firms, makers and importers, have again reduced the prices of the cars they offer. The most notable of these are Citroen with a reduction of approximately 15 per cent, and Austin who has brought down the price of its 7-hp. miniature model from £225 to £165.

BUICK WILL NOT REDUCE

FLINT, MICH., Dec. 12—President H. H. Bassett of the Buick Motor Car Co. states that his company will not reduce prices. As a reason for not going below the present level he points to the high prices of leather and lumber and the expected increase in prices of steel in January. Buick produced 16,000 cars in November.

Hudson, Essex Make New Price Reduction

Four Models of Former Quoted Lower—Latter Takes $100 from Coach

DETROIT, Dec. 11—For the third time this year Hudson and Essex prices have been reduced, the latest cut announced to-day taking $200 off the Hudson sedan and $100 off the coach and two phaetons. Only one Essex reduction was made, the coach being quoted $100 lower.

Hudson started the year with the 7-passenger phaeton listing at $1,745; on July 1 this was cut to $1,695, and on Sept. 22 to $1,575. Now it is $1,475. The Essex coach listed at $1,345, $1,295 and $1,245 on these dates, and now is $1,145.

The revised list as of Dec. 11 is as follows:

	Old Price	New Price
HUDSON		
4-pass. Phaeton	$1,525	$1,425
7-pass. Phaeton	1,575	1,475
Coach	1,625	1,525
Sedan	2,295	2,095
ESSEX		
Coach	$1,245	$1,145

The new list makes especially noticeable the small differential between the open and closed models. Hudson and Essex production this year was over 60 per cent closed cars.

Regular Dividend Declared

Announcement of the regular quarterly dividend of 50 cents a share and an additional dividend of 25 cents a share came with the declaration of the Hudson new prices. Both of these are payable Jan. 2.

The first annual meeting of Hudson stockholders since the placing of its stock on the open market will be held Dec. 20, when a report will be made to stockholders. The meeting then will be postponed to Jan. 20 to give an opportunity for a study of the report.

During the fiscal year ended Nov. 30 the company reports the manufacture of 61,110 cars. Production in 1923 has been set at approximately 100,000.

Fisk and Howe Announce Increased Tire Prices

NEW YORK, Dec. 13—Two tire manufacturers have followed Kelly-Springfield in increasing prices, Fisk having announced a new schedule ranging from 10 to 12 per cent, while Howe has increased prices 10 per cent. Higher schedules by other companies are rumored, with announcements expected shortly.

Howe Rubber Co. reports operating to capacity and states it is from 30,000 to 40,000 casings, and as many tubes, behind on spring orders. It also estimates that in 1922 it will do as much business in dollars as in 1921, with about twice as much in sales by units.

Nash Tells Dealers Prices May Advance

Says His Companies Are Unable to Guarantee Lists Between Now and Spring

MILWAUKEE, Dec. 8—The opinion that motor car prices probably will witness an increase before next spring was voiced by Charles W. Nash, president of the Nash Motors Co. and the LaFayette Motors Corp., in an address at the annual sales conference of Nash and LaFayette distributors and dealers in the Wisconsin and Upper Michigan territory in Milwaukee yesterday.

Nash said that frequently in recent weeks he has been asked by dealers and others what he thought of the outlook with reference to prices. In reply, he said, he has been able to say only that so far as his companies are concerned, they are unable to guarantee dealers against a price increase between now and spring.

Raw materials and other elements entering into the manufacture of motor vehicles appear from present indications to warrant an increase in prices, Nash said. Whether or not this course will be found necessary he said he was not prepared to state positively.

Sees Big Leap in 1923

The automotive industries are due for the greatest leap forward in all the history of the business during the first six months of 1923, Nash declared. Conditions in the agricultural communities have improved so much, he said, that already a bigger and broader market has opened which doubtless will be responsive to broad development after the winter season is over. This is business of a better character than city business, for the city buyer as a rule is merely making a replacement, while the farmer generally is a new customer.

While counting largely for the increased sales next year over the remarkable volume of 1922, Nash said that urban business is bound to be good, for a great many people are still holding off buying cars because of insecurity of positions or for any number of other reasons, and talk of the point of saturation being reached is not substantially based.

Loening Tests New Type of Control for Airplanes

NEW YORK, Dec. 12—Grover Loening, airplane inventor and constructor, announces that flying tests made for a week have demonstrated the complete success of a new type of airplane control of his invention. The tests were made over the East River off Thirty-first Street, where the Loening factory is located. For the trials the Loening monoplane flying yacht was used.

The invention, which is called a lateral pressure equalizer, is mounted on the extreme tip of each wing and departs radically in its effect from the fundamental principles of lateral control as used in the Wright and Curtiss types. In the construction of the device a small section of the leading edge of the wing is extended beyond the tip to which is hinged the pressure equalizing flap, which is controlled, through cables and levers, by the pilot.

The new control can be applied to biplanes and other types of machines but is most valuable for monoplanes due to the depth of chord of their wings.

FIRESTONE DENIES INTEREST IN PLANT

AKRON, Dec. 12—Continued reports that he is heavily interested in the establishment of a proposed $10,000,000 automobile plant at Ridgeway, W. Va., are steadfastly denied by Harvey S. Firestone, president of the Firestone Tire & Rubber Co.

When told Virginia papers had published reports to the effect that deeds for land being acquired for the new plant were being made out in his name, Firestone branded the stories as absolutely false.

Firestone was approached by Detroit interests several weeks ago regarding the Ridgeway venture, but says he did not interest himself in the proposition at all. Since then, due to what he terms as false reports circulated regarding his alleged interests in the venture, Firestone says he has been swamped with correspondence much of which has come from persons owning property in the locality of the reported new plant, all seeking to sell it to him.

Kentucky Limiting Load on Basis of Tires Used

LOUISVILLE, KY., Dec. 11—The load limit law, enacted by the 1922 General Assembly, goes into effect Dec. 15 and continues until April 1, limiting vehicles with steel tires less than three inches wide to 5000 pounds, and 6500 pounds if the tires are three to four inches wide; 6800 pounds if the tires are four to five inches wide, and 7000 pounds if the tires are over five inches wide. For rubber tires less than three inches wide the limit is 5500 pounds, up to four inches 6500 pounds, up to five inches, 7500 pounds, and five inches or more 10,000 pounds.

NO HIGHER BAY STATE TAX

BOSTON, Dec. 9—Chairman Williams, confirmed as chief of the Public Works Department to succeed the late John N. Cole, said, as his first public utterance: "There will be no recommendation from this department for increased fees on motor vehicles."

France Evades Duty Issue, Says Belgium

Failure of London Conference Shelves Tariff Question Until Next Year

PARIS, Dec. 2—That France is side stepping the question of automobile import duties is the charge made by Belgian manufacturers. As soon as it became known that the United States was prepared to establish a 25 per cent import duty on automobiles, the Belgian makers, who are at present protected by only a 20 per cent duty, proposed that the question should be discussed at the meeting of International Automobile Manufacturers' Associations, held in London.

Belgian makers pointed out that France had always justified her 45 per cent import duty by the argument that it was necessary to bring the American duty down to a reasonable figure. The United States having decided on a 25 per cent duty, France ought to have been the first to follow suit.

By sending to the London conference only the paid secretary of the French Manufacturers' Association, and withholding from him all authority to act, the French industry deliberately side-stepped the issue, declare Belgian makers.

Delegates Late in Arriving

For some unknown reason the British delegate had no authority, and because of a misunderstanding, Signor Nathan, the Italian delegate, and an official of the Fiat Co., reached London three days too late.

By reason of this the question of European import duties has been shelved until the next meeting of European automobile manufacturers to be held in Brussels in January. The Belgian delegates declare that they refuse to be stifled.

While Belgian automobile manufacturers are protesting against the French attitude in maintaining a 45 per cent import duty, the Belgian government is at work on the revision of the tariff laws, and, in all probability, will propose a rate of 640 francs per 100 kilos, which is four times the Belgian pre-war rate. The rate against German cars would be twice this amount.

The proposed change is far from meeting with complete satisfaction in Belgium. In the case of the lower priced American cars such as the Ford, Chevrolet and Overland, as well as the European big production jobs Citroen and Fiat, it is estimated that it will be equivalent to a 55 per cent ad valorem duty. For the more costly cars such as Renault, Panhard-Levassor, Rolls-Royce, Hispano-Suiza, and Cadillac there will be little change. As Belgium is not building low priced cars, the new law will give her manufacturers no advantage, while it threatens to shut out of America such makes as Minerva, Excelsior and Metallurgique.

State Road Officials Oppose Finance Plan

Say Motor Vehicle Taxes Should Help Pay for Construction of Highways

KANSAS CITY, Dec. 11—The National Association of State Highway Officials, meeting here, passed a resolution dissenting from the proposal that motor vehicle revenues be limited to maintenance requirements. It advocates, instead the payment of a part of the construction cost through motor vehicle taxes.

The resolution suggests that one-third of the total cost of Federal, State and county road programs be met from motor vehicle taxes, and favors a gasoline tax of not less than 2c a gallon.

This action seems to be a result of the general sentiment throughout the country against the addition of general taxes of any kind, and the demand of the public for economy. It appears that the highway officials are desirous of carrying out their road programs as fully as possible, and that in raising money for that purpose they are seeking the lines of least resistance.

The automotive industry was represented at the meeting by A. J. Brosseau, president of Mack Trucks, Inc.; R. D. Chapin, president of the Hudson Motor Car Co., and Pyke Johnson, secretary of the National Automobile Chamber of Commerce Highways Committee. These men attended the meeting of the Motor Truck Regulation Committee, held during the session, and for one afternoon discussed the general problems of highway finance and motor vehicle regulation.

Connecticut Official Will Urge Truck Road

HARTFORD, CONN., Dec. 11—State Highway Commissioner Charles J. Bennett will recommend to the Legislature which convenes Jan. 3 the construction of the special highway for the exclusive use of motor trucks, extending from Bridgeport, Conn., to the New York State line, which has been under discussion for some time.

The proposed truck route is about 30 miles long, and the highway is planned to be 22 feet wide. One of the plans suggested to meet the expense of maintenance is a tax of two cents a ton-mile, which would bring in a revenue of about $280,000 annually, the estimate being that 14,000,000 ton-miles of pay freight annually pass over the Boston Post road to the New York State line.

WHITE WINS TAX FIGHT

CLEVELAND, Dec. 11—The White Motor Co. has won its fight against the payment of a State personal property tax on $3,025,000 set aside by the corporation for the payment of income and excess profit taxes due the Government. The White company, in making its tax return to the State in 1919, exempted this sum, and the county treasurer of Cuyahoga County rejected the return on the ground that the corporation should have included the sum due the Federal Government.

The State Supreme Court held that Federal income and excess profits taxes are legal and bonafide debts and may be set up by the individual or corporation against credits when making personal property returns to the State.

FINANCIAL NOTES

Van Wheel Corp., stockholders, manufacturer of cast metal hollow spoke aluminum and malleable iron automobile wheels, have authorized the sale of $250,000 worth of preferred and common stock, increasing the company's capital from $250,000 common to $500,000 common and preferred. General expansion of the organization and an increased production are planned. T. Goldsborough Meachem is president of the company.

Mack Truck, Inc., has declared an initial dividend of $1 on the common stock and the regular quarterly payments of 1¾ per cent on the first and second preferred stocks. The common dividend is payable Dec. 28 to stock of record Dec. 18, while the preferred disbursements are payable Jan. 2 to stock of record Dec. 20.

Reo Motor Co. has declared an extra dividend of 1 per cent and the regular quarterly dividend of 1½ per cent both payable Jan. 2 to stock of record Dec. 15.

Spicer Manufacturing Co. has declared the regular quarterly dividend of 2 per cent on the preferred stock, payable Jan. 2 to holders of record Dec. 21.

Dunlop Rubber Co., Ltd., of England, in its balance sheet shows a trading profit of more than £1,000,000 for the last 10 months.

Chandler Motor Car Co. has declared the regular quarterly dividend of $1.50 a share, payable Jan. 2 to holders of record Dec. 19.

AC Spark Plug Co., Flint, Mich., has increased its production facilities by adding to one of its factory buildings.

FRENCH RULES ON TRUCK DUTY

PARIS, Dec. 5 (*by mail*)—Motor trucks weighing 2½ tons or more are now subject to the same ad valorem duty of 45 per cent as applied to passenger cars, according to a decree just issued by the French Government. The 45 per cent duty also applies to spare parts for trucks.

ATLANTA MAY GET TIRE PLANT

ATLANTA, Dec. 13—Atlanta may be the site of a large plant for the manufacture of rubber goods and tires, according to Alexander Lerner of Ottawa, Can., and W. T. Inggram of London, Eng., who are here in the interests of a large rubber manufacturing company in England that is planning to establish a branch plant somewhere in the South.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

During last week the tendency in the call money market was toward greater firmness, although the actual rates remained unchanged at 4 per cent to 5½ per cent as in the preceding week. The situation remained unchanged for fixed date maturities. The rate for all periods from 60 days to six months was still quoted at 5 per cent. The prime commercial rate continued at 4½ to 4¾ per cent.

The October net operating income for Class I railroads totaled $85,234,000, which is equivalent to an annual return of 4.05 per cent on the tentative property valuation. This compares with $105,425,600 and a return of 5.01 per cent for October, 1921, and $58,457,000 and 2.88 per cent for September, 1922. For the first ten months of 1922 railroads of the United States showed a total net operating income of $614,627,000, representing an annual return of 3.97 per cent as compared with $499,346,000, and a 3.23 per cent return for the corresponding period last year.

Revenue freight loadings for the week ended Nov. 25 totaled 955,495 cars, a decrease of 13,599 from the preceding week, which was attributable principally to the falling-off in ore shipments because navigation on the Great Lakes has stopped. It was an increase, however, of 282,030 cars over the corresponding week last year. For the four weeks of November, car loadings amounted to 2,873,325 cars, a decline of 2.4 per cent from the preceding four weeks, but a 30 per cent increase over the corresponding four weeks in November, 1921.

The output of pig iron for November was 2,849,703 tons, which is the largest total since November, 1920, and a gain of 11 per cent over October's output. Production is now going on at a yearly rate of 35,500,000 tons, which is more than twice last year's output.

Report Shows Amounts Due Banks by Wagner Electric

ST. LOUIS, Dec. 11—In a return made in the St. Louis Circuit Court in petition for an order to show cause why a receiver should not be appointed and to stop the sale of the Wagner Co.'s assets to the Wagner Electric Corp. of Delaware, amounts due to St. Louis and New York banks by the Wagner company in December, 1920, are shown to have been $5,115,000.

Of this $2,719,000 was due St. Louis banks as follows: First National, $1,115,000; National Bank of Commerce, $800,000; Mercantile Trust Co., $500.000, and Merchants-Laclede National, $300,000. Of the $2,400,000 due to New York banks, $1,300.000 was due Guaranty Trust Co., $650,000 Bank of Manhattan and $450,000 National City. The indebtedness at the beginning of 1921 was $7,139,258, it is said.

Buyers Order Cars as Christmas Gifts

Sales in Chicago Satisfactory—Dealers Specialize in Winter Inclosures

CHICAGO, Dec. 9—Although retail sales of automobiles have fallen off steadily in Chicago and Cook County for the last three months, the rate of decline has been so gradual that business is still maintained at a level which dealers generally consider satisfactory for this season of the year. Public interest in automobiles is high and dealers whose sales have shrunk considerably have no lack of prospective buyers, many of whom are waiting until after the first of the year.

A good many buyers have placed orders for Christmas delivery. This is especially true in the higher price field, with closed models predominating.

Some enterprising dealers are creating a profitable market for new and used open cars by equipping them with winter inclosures. One Chicago distributor of a popular line of cars has patented its own design of winter inclosure, the sides of which are constructed with rattle-proof metal frames and a maximum of glass, with well-fitted doors and windows that open easily for ventilation. This equipment may be installed with the ordinary soft collapsible top or with a special permanent soft top. The company maintains its own shop in which it manufactures between 40 and 50 of these outfits each week.

Outlook Good for January

There are indications that January business will open well. Some dealers report a considerable number of orders placed for January delivery. The distribution of bonuses and dividends by many large business concerns is expected to give considerable stimulation to automobile buying.

The present trend of buying is fairly well indicated by figures furnished by the Central Automobile Financing Association which keeps a record of all time-payment sales for which official documents are recorded. These sales are estimated to represent between 65 and 75 per cent of all retail sales in Chicago and Cook County.

For the four weeks ending Dec. 2 the number of such sales was 2240; for the four weeks ending Nov. 4, 2691; and for the four weeks ending Oct. 7, 3060. This shows the tapering off in demand, although the decline in these figures probably was somewhat greater than the actual decline in sales because of the fact that since the $50 Ford reduction in October a greater proportion of Ford sales have been for cash.

SOUTHERN TRUCK REOPENS

GREENSBORO, N. C., Dec. 13—The plant of the Southern Truck & Car Corp. has resumed operations after a long period of idleness, following the complete reorganization of the business, with Dr. W. P. Knight of Greensboro as president, and C. E. Lowe, secretary, treasurer and general manager. The company manufactures the Southern truck, quite extensively used by manufacturers in the southeastern territory, and also manufactures special truck bodies.

INDUSTRIAL NOTES

Anderson Tractor Co., recently announced formed at Anderson, S. C., with $200,000, is planning the immediate construction at Anderson of a large plant for the manufacture of tractors and sprays especially adapted for use in the southern cotton fields, according to W. S. Anderson, president of the company. Temporarily the plant will assemble tractors only, but later will manufacture many of its own parts.

Greenway Auction Co., of Columbia, Tenn., has acquired an 87 acre tract near Columbia and will start construction shortly of a plant for the manufacture of automobile tires. Total investment, President J. B. Greenway advises, will be around $200,000

Raymond E. Bell has opened offices in the Woolworth Building, New York City, as consulting industrial and management engineer. Associated with him will be O. H. Blackman, until recently president of the Blackman Co., New York.

Receipts Show Georgia Farmers Extend Buying

ATLANTA, Dec. 13—Tangible evidence of the big improvement in automobile sales in Georgia during 1922, as compared with last year, is shown in a report of the State motor vehicle department to the effect that total receipts the first 11 months of this year were about $125,000 larger than the entire total for 1921. This includes only payment for licenses. Gross collections have been $1,827,388 the first 11 months of this year. Total licenses issued were 128,479 for passenger cars and 16,876 for trucks. This is 17,000 more licenses than for all of 1921.

The big increase this year has been in licenses to smaller counties, especially the past few months, indicating that farmers are doing considerably more motor car and truck buying at this time than in the past two years. In 1921 by far the largest number of licenses issued were in the counties where larger cities were located, such as Atlanta, Savannah, Macon, etc. This year rural counties are holding their own, and probably close to 90 or 100 per cent better than last year.

SWEDISH AERIAL EXHIBITION

NEW YORK, Dec. 12—An international aerial exhibition will be held at Gothenburg, Sweden, from July 20 to Aug. 12, 1923, under the auspices of the Royal Swedish Aero Club and in connection with the tercentennial exposition of Gothenburg.

METAL MARKETS

While the steel market as a whole presents the absence of marked developments which is a usual end-of-the-year condition, the sheet market, especially that for automobile sheets continues to attract considerable attention, consumers being actively engaged in negotiations for good-sized tonnages with the various independent producers. It is generally supposed that the American Sheet & Tin Plate Co. is booked to the extent of its capacity for automobile sheets during the first quarter of the coming year. For that reason maintenance of its 4.70c. quotation which, it had been generally expected in the steel market, would be revised upward, is interpreted by the independents as imposing no obstacle to their continuing the 5c. price for first quarter 1923 shipments.

The fact, however, that the Carnegie Steel Co.'s sheet bar price for the first quarter of 1923 is $36.50 serves to impart a certain amount of steadiness to the sheet market, restraining for the time being either a sharp upward or marked downward revision of prices. In other words, the corporation has once more stepped into the market at a time of much uncertainty and by the correct use of its leadership saved it from the possible consequences of this uncertainty. Quite a little buying of strip steel by automotive consumers is reported to have followed on the heels of first quarter contracts placed by several units of the General Motors Corp. Prices are well maintained at 2.90c. for the hot-rolled and 4.50c. for the cold-rolled. Makers of cold-finished steel bars are moderately busy.

The supply of hot-rolled bars at prices within the reach of the makers of cold-finished bars has been exhausted, and at 2c. for hot-rolled the margin on the cold-rolled product is reduced to $10 per ton which was considered unsatisfactory even in pre-war times

Pig Iron.—Three months ago the pig iron market was bent upon demonstrating that the price limits imposed during the war by Mr. Baruch's fiat can be made to look very reasonable in piping times of peace. To-day indications are that the closing transactions of the year will be virtually on the same levels as the 1921 average, $23 @ $24, valley base. A valley furnace interest booked 10,000 tons of foundry at $25, valley furnace. In some of the markets prices have held up more than in others, but adjustment is now in progress. Since Oct. 1, the pig iron market has declined approximately 25 per cent. Automotive foundries are taking advantage of the return to more normal price levels to replenish their depleted supplies.

Aluminum.—Most of the offerings by importers for the first half of next year met with ready acceptance by consumers and representatives of foreign producers assert that practically all of Europe's aluminum producing capacity for the first six months of next year has been committed. There is a wide spread between the quotations of the various foreign interests, the range being from 22 to 22½c. for 98 to 99 per cent pure virgin ingots and from 22½ to 24c. for the 99 per cent pure. Germany is reported out of the market and Norway has only very limited quantities to offer for early shipment.

Copper.—Automotive demand for wrought copper and brass products is reported as excellent. The raw copper market is on the up trend. Most of the metal offered at below 14c. has found its way into consuming channels and 14c. has become an inside figure.

Calendar

SHOWS

Jan. 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8 - 13 — New York, Second National Automobile Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Dec. 15 - Jan. 2 — Paris, Aeronautical Salon, Grand Palace. Chambre Syndicale des Industries Aeronautiques, 9 Rue Anatole de la Forge.

Jan. 13-24 — Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

April - July, 1923 — Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

RACES

May 10 — Berlin - Grunewald, German Grand Prix.

CONVENTIONS

Jan. 15-19—Chicago, Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show.

Jan. 29 - 31 — Chicago, Annual Meeting, Automobile Electric Service Association, Congress Hotel.

S. A. E. MEETINGS

Metropolitan Section

March 15—Speaker, William P. Kennedy, President, Kennedy Engineering Corp.; Subject, Trolley Buses and Flexible Vehicles for Street Railway Service.

April 19—Speaker, Edw. E. La Schum, General Superintendent, Motor Vehicle Equipment, American Railway Express Co.; Subject, Engineering Features of Fleet Operation.

May 17—Speaker, F. P. Gilligan, Secretary, Henry Souther Engineering Co., Subject, Metallic Materials for Automotive Work.

Other Meetings

Jan. 9 - 12 — New York, Annual Meeting.

Jan. 31 — Chicago Meeting and Dinner of the Society at the Congress Hotel.

Tool Makers Oppose Steel Number Plan

WASHINGTON, Dec. 11—Sponsored by the Society of Automotive Engineers and the American Society of Testing Materials, a sectional committee will be appointed to make an investigation looking to the uniform numbering of forging, casting, structural tool and other steels. This action was decided upon at a meeting held under the auspices of the Department of Commerce.

Vigorous opposition was expressed by makers of tool steel to the inclusion of this class of material in the investigation, but the resolution was carried by a vote of 18 to 3 with 7 not voting. The sectional committee will be made up of representatives of all the interested parties, including producers and consumers.

Parker Voices Protest

The recommendation in favor of the investigation at first excluded tool steel after protest had been voiced by J. H. Parker, of the Carpenter Steel Co., Reading, who, as a representative of the tool steel industry, read a statement from Dr. J. A. Mathews, president of the Crucible Steel Co. of America, declaring that numbering of tool steel was impracticable. His attitude was similar to that of other makers of tool steel.

According to R. M. Bird of the Bethlehem Steel Co. the success of this phase of activity in the Society of Automotive Engineers was due to its system being based entirely on chemical composition.

F. P. Gilligan, Hartford, representing the S. A. E., said that the society first decided on the compositions needed by automotive makers and then designated numbers, and that it is satisfied with the numbering system and that it has not reached its limitations. He said the society is ready to co-operate for the extension of the system but that it had been distributed through outside units distorting the numbers, and he declared that if there is an extension of steel grades to fit all numbers the S. A. E. will find itself without a numbering system.

The S. A. E. system was commended by George L. Norris, New York, also representing the society. Morris favored the extension of the system to steels which it does not now cover. Like others he opposed using the brand name with the numbering system and said such a practice would run counter to the by-laws of the S. A. E. and the A. S. T. M.

Fenn Urges Truck Use Before Rivers Congress

WASHINGTON, Dec. 8—F. W. Fenn, secretary of the National Motor Truck Committee of the National Automobile Chamber of Commerce, urged upon the delegates assembled here yesterday for the eighteenth annual convention of the National Rivers and Harbors Congress to give careful study to the co-ordination of waterways and railways in the wholesale phases of transportation and the motor truck in the retail end, as a means of lowering distribution costs.

In emphasis of this need he pointed out that the prediction had been made by a railroad executive that with the next real revival of general business the country in all probability would be confronted with the most severe congestion of railroad traffic and the greatest inadequacy of railroad facilities ever experienced in its history.

CAMPBELL COMPANY IN FRANCE

BUCHANAN, MICH., Dec. 11—Following the return of L. J. Campbell of the Campbell Transmission Co. from a three months trip to France announcement is made of the formation of the Societe Francaise des Changement de Campbell, capitalized at 2,280,000 francs for the manufacture of Campbell transmissions in France. M. Barron, formerly chief engineer of Rochet-Schneider, has been made general manager of the company. A fully equipped factory has been purchased.

Fornaca, Back Home, Talks About Tariff

PARIS, Dec. 5 (*by mail*)—"By objecting to the high import duties existing in several European countries, American automobile manufacturers display an incomplete knowledge of conditions on this side of the Atlantic," declared Engineer Fornaca, Vice-President of the Fiat Co., on his return from a visit to the United States.

Fornaca says:

Personally, I approve the action of the American Automobile Chamber of Commerce in securing a reduction of the American import duty to 25 per cent, and I should like to see Italy reciprocate. The fact must not be lost sight of, however, that we in Europe are bound by treaties which are not always of an equitable nature.

Thus, if we in Italy lowered our duty to the level of the American standard, we should be obliged to admit several other nations to the same benefits without those nations being in any way obliged to reciprocate. While it is reasonable that we should admit American cars into Italy on a 25 per cent basis, it is unjust that by so doing we should be obliged to admit cars on the same basis from nations which maintain a 45 per cent duty against us.

Fornaca passed through Paris on his way to Turin after a six weeks tour in the United States, during which he visited some of the leading American automobile factories, as well as several of the large steel plants in Pittsburgh and vicinity. He was accompanied on his tour by the production engineer of the Fiat Co.

WILLYS CLAIM SETTLED

TOLEDO, Dec. 12—By order of John M. Killits in the Federal Court here, the Willys-Overland Co. will pay to the receivers of the Willys Corp. the sum of $10,000 in full settlement of all book accounts, claim and counter claims not a part of the big settlement made several months ago. This winds up all disputed points between the two companies.

AUTOMOTIVE INDUSTRIES
The AUTOMOBILE

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Market Never Will Be Lacking for Assembled Vehicles

Can be sold successfully on national basis by any company with adequate capital and selling ability. Without ample resources competition will fail except in localized territory. Large profits in small fields.

By James Dalton

WILL the assembled passenger car and truck disappear from the market at some time in the future?

An emphatic negative should be the answer to this question, which has been heard many times of late.

There always will be a market for assembled vehicles. The only debatable point is, who will manufacture them? They may be made by some or all of the following three classes:

The present manufacturers.

New men who may come into the field from the operating or selling end.

Parts manufacturers themselves.

The field won't be monopolized by any one of the three. Some of the assemblers of to-day will go out of business, either voluntarily or otherwise. New companies will spring up here and there constantly. They will be organized by men who have either capital or ideas. So far as the parts makers are concerned, they have a profound belief in the merit of their products, they are convinced there is a field for the assembled vehicle and they must have a market for the goods they manufacture. Most of them prefer to sell to other people but if they find that their market is dwindling steadily because assemblers lack the vision or the strength to meet competition, they are mighty likely to go into the vehicle field themselves. It will be only as a last resort, however.

Assembled cars and trucks are good motor vehicles. There will be a national market for them just as there is to-day. If a company were to be formed with adequate capital, it could compete successfully on a national basis with the strongest of the companies which manufacture practically complete vehicles. But it takes a lot of money to operate on that basis.

THERE are many companies making cars and trucks to-day which lack the capital adequate to justify an attempt at country-wide distribution in a period of keen competition such as that upon which the industry has entered. They were able to get by when productive capacity was not equal to demand but it would have been possible to have turned out even in this record-breaking year approximately 500,000 more cars and trucks than have been sold.

Success for the assembler in future will depend not so much upon the volume of his production as upon his ability to keep down marketing costs and give respectable service. In the truck field, particularly, service is a more vital subject than almost anything else. If a company can't give service it can't continue to make sales.

A company which has the capital to insure quantity production by intensive sales efforts in every section of the country, thus keeping down its costs, while at the same time giving service which will meet the most exacting demands, is justified in trying to sell its products on a national basis. Lacking such resources it would be far wiser to stick to a circumscribed territory.

IT is an economic fact which cannot be controverted, that cost of sales and service multiplies with increasing rapidity every mile efforts in this direction are removed from the factory. Few national distribution companies know accurately what their marketing costs are, but they would be ruinous were it not for manufacturing economies and the genius of the automotive industry for producing in quantities.

There probably is no assembled car in any price class which can be said to have attained really big production in comparison with the largest production companies in the same price class, which make most of their own parts. This is not because the assembled vehicle may not be just as good. In some cases it may be better.

The failure of the assembled vehicle maker to develop a volume of business as large as that of his rivals who are not classed as assemblers has not been because there has been less quality in his product but because he has not had the financial resources to push sales so intensively.

This is not a reflection upon the financial stability of assemblers as a whole. Some of them are just as strong, in proportion to their size, as any companies in the business. A few of them are stronger. There is a considerable number of comparatively small companies in the assembled vehicle field returning larger profits on the capital invested than their larger competitors.

It is just as profitable and a lot less wearing, to make 10 per cent on an investment of $500,000 as it is to make 1 per cent on an investment of $5,000,000. These particular figures have no significance, but the idea has. The smaller company may have been able, by dint of lower marketing costs, to make its profits on sales in two or three States, while the larger one may have been forced to spread out all over the country.

The time may come when there will be some exceptionally strong assembling companies which can compete on a country-wide basis with the biggest producers, but the immediate answer to the question confronting assemblers to-day is not found in an increase in capital and the sale of additional stock. It rests rather in the intensive cultivation of localized markets.

Most of the companies in business today have financial resources adequate for such a concentration of energies but a good many of them cannot survive unless they do exactly that. They can't stand the gaff of competition if they continue to spread their efforts all over the country. This statement applies particularly to trucks.

There are many truck companies which might well be asking themselves, "What must we do to be saved?"

The answer lies within themselves. If they continue to struggle against the inevitable, trying to sell trucks in every corner of the country, vying for business with concerns which have dollars to spend where they have pennies, it will be a question of salvage, with the usual reorganization and probably another attempt to pull through on the old lines. This may be regarded as a brutally frank statement but it is a time for frankness. Nothing is to be gained by beating around the bush when a situation is serious.

Such companies as these, weak financially but usually turning out meritorious products, can save themselves, however, provided they are not too far gone, if they intensify and concentrate their sales efforts in a restricted field.

Nothing is wrong with the assembled vehicle as such. Practically all the difficulties which have arisen have been the result of trying to stretch a limited working capital so far that it threatens to snap under the strain. Profits have been put back into the business but usually in an attempt to expand marketing operations. These observations are made particularly in reference to trucks, but they apply with equal force to a good many passenger car concerns.

There are more companies in the truck field, however, which have circumscribed their markets and are operating successfully on such a basis. There are few which will admit they are doing business in only a single State, but there are quite a few which are proud of the fact that they are actively cultivating the market in from five to ten States. They will concede that when they started they sought sales within a few miles of the factories. Their territory was extended very gradually.

So far as actual operating methods are concerned, these successful small concerns have developed nothing revolutionary. All of them have distributors and dealers and some of them have branches. They all have traveling representatives who in some instances are called district managers. Their dealer discounts are no larger than those of bigger companies.

THEY have been content with a moderate volume of business. They did not multiply their productive capacity at a time when a large fraction of the industry was frantically erecting plant additions with the idea that there was no bottom to the market and never would be. They have no marble-front offices, no mahogany furniture and no Persian rugs on the office floors. They care little for display but they have a keen eye on profits.

Their output is limited strictly to demand. They are not dependent on mass production to keep down overhead. Their organizations are small. The president knows every one in the shop by his first name. They have few labor troubles. The sales manager knows the family history of almost every dealer.

An air of intimacy seems to permeate these plants. The presidents aren't too big to concern themselves about

MANY companies making cars and trucks to-day lack the capital to justify an attempt at country-wide distribution, but they can make substantial profits by intensive cultivation of a circumscribed territory.

This article discusses frankly the future of the assembled vehicle. The fact that there always will be a national market for cars and trucks of this character cannot be controverted. The only question at issue is, "Who will make them?"

The successful assemblers of the future unquestionably will be the men who carve out a market to suit their capital and do not stretch their resources to the breaking point by trying to reach every corner of the country when their finances do not justify such an increase in marketing costs.

overdue notes for small sums. They know the importance of service and specialize in it. We heard the other day of a factory mechanic who was sent 225 miles to adjust a carburetor. The president remarked:

"It cost quite a few dollars but it was the best kind of advertising."

Here is something really extraordinary. There is one company in New York State, operating west to Pittsburgh, south to Baltimore and back up the coast to Portland, Me., which handles the prime retail paper of its dealers, properly secured, with an interest charge of only 6 per cent. If a comparatively small concern has cash enough to give such practical dealer aid as this, doesn't it bespeak prosperity?

Real Help Given Dealers

Every distributor and dealer in the service of this company is visited at least every two weeks by a factory representative and the calls usually are made every week. These travelers aren't merely order takers. They take their coats off and sell trucks when the dealer himself is unable to close with a prospect. They give advice on credit risks, credit terms and the probable sales value of used trucks offered in trades. The factory has no set plan for dealer education. It just helps them in every way it can. When the traveler runs up against a problem too knotty for him to solve, he calls on the boss for help and gets it.

This company operates a few branches, just to give better service. The branches not only sell parts but give service. The repair shops are conducted by factory-trained mechanics. All distributors and dealers also give service. Branches and distributors carry stocks of parts. When a dealer needs some special part he gets it from the nearest supply depot. In some cases this is the factory.

It's a big part of the traveler's job to keep the dealer organization functioning efficiently. When he finds a town which ought to be productive of sales and in which his company's dealer is not doing business, he gets a new dealer. There is no compunction about cancelling the contracts of dealers who don't deliver the goods. The factory helps those who help themselves. All the advertising is on this basis. It is done only in the best local papers and it always has a local appeal, telling what some operator in that particular town has done with that particular truck.

"A good product and the liberal use of shoe leather," was the answer given by the president of that company when he was asked to what he attributed the success of his operations. He will take on dealers in any part of the country when they ask for franchises, but dealers are sought only in the territory which is intensively cultivated. Most of the orders now are on a repeat basis. It is a remarkable fact that the business of this company fell off only about 20 per cent in the period of depression which began in the fall of 1920. It makes trucks in capacities ranging from one ton to five.

Another company which operates in an even smaller territory boasts that half of the sales credited to dealers are closed by factory representatives. All its dealers are directly under factory supervision. They, too, are given every possible factory help. They seek the advice of travelers, or district managers as they are called, on trades. The advice most often given is never to allow for a used vehicle more than the commission on the new one and never to do that unless the old truck is in such condition they know they can sell it at a satisfactory profit.

These are merely typical examples but they could be multiplied. The success of such companies is not the result of any special genius of the management. The men who are directing them are no more able than those in almost any truck plant in the country. The only difference is that they have gone to work with a very clear and definite idea of the territorial limits in which sales will be attempted and they have stuck to that territory in the face of temptations to expand their operations. With this determination in mind it hasn't been difficult to keep down both manufacturing and marketing costs to a minimum.

What they have done other companies can do. If the plants they have are too big and expensive they can seek smaller quarters. They can weed out their travelers and keep the best of them to cover a limited territory. They can cut down their office staffs and retain only the most efficient. They can brace up their service and see that every user of their trucks gets what he wants when he wants it without having to lay up for repairs the vehicle on which his livelihood depends.

They can reduce their overhead and marketing costs to such an extent that they can compete successfully on a price basis, in their own particular territory, with the big companies which are operating on a national basis. They also can give equally good service. They can make their proposition attractive enough so they can get real merchandisers as dealers provided their product is good.

The result will be larger profits per unit, the stopping up of countless leaks and, ultimately, dividends for stockholders. Later, when they are firmly established in the territory they have decided to cover, they can expand gradually if they put profits back into the business and can't be happy unless they are growing.

These are some of the ideas which the leading unit parts makers are attempting to sell to the assemblers of motor vehicles. They think they are making progress. There may be a selfish motive back of these attempts but if there is it is perfectly legitimate. They want a market for their products which is exactly what the producers of those products want for the cars and trucks they assemble.

Must Sell on Sound Basis

If assembled cars and trucks are not sold on a sane basis there will be no market for either. But there is no occasion for alarm. There is a genuine demand for such vehicles. The men who are making them to-day are the logical ones to supply the market but if they can't or won't do it along the lines which will insure success, other men will come into the field who will do it in that way. It scarcely can be considered selfish, therefore, for the parts maker to assist his old customers, so far as he can, by good counsel.

MOTOR bus companies have been formed in the cities of Madrid, Barcelona and Valencia which are backed by British capital and are using the motor buses of Tillings-Stevens Motors (Ltd.). These companies are selling bonds in the various cities of Spain and will extend their services to cover the total area of each city through municipal concessions. It is to be regretted, says the Automotive Division of the Department of Commerce, that American motor-car manufacturers do not develop foreign markets for their products in a like manner, with the assistance of American bankers.

The motor bus company in Madrid has contracted to put 107 buses in regular operation within the next 14 months, and plans are being laid to extend the total to 160, including reserve buses.

The company organized in Barcelona, with a capital of 10,000,000 pesetas subscribed in part by British interests, will extend its services to 150 buses.

New Rickenbacker Fitted With Air Cleaner and Plate Clutch

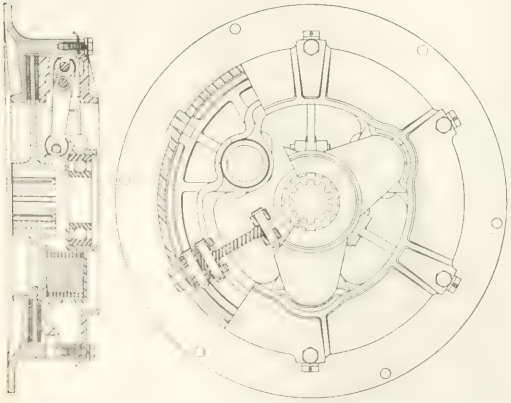
Other changes include a differential gear type brake equalizer, anti-rattlers on brakes and Bosch electrical equipment. Tops of the permanent type will be fitted on all phaetons and all closed bodies will have Perfection heaters as standard equipment.

By J. Edward Schipper

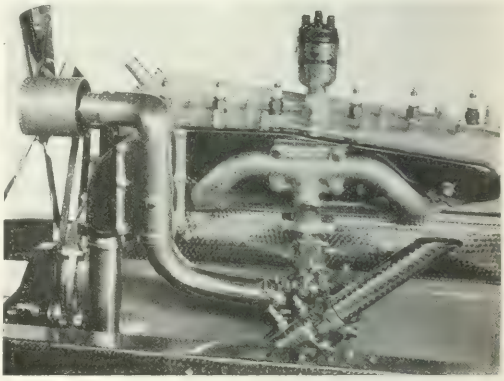
AN entirely new clutch is the most important change in the second series of Rickenbacker cars which has just been put into production. Other changes include a new type hot air stove and an air cleaner attached to the carbureter, the installation of Bosch electrical equipment, minor chassis improvements and a permanent top as a part of standard phaeton equipment.

The clutch is a single plate type which is designed along more or less conventional lines except that the pressure plate forms one abutment for the springs and a movable part forms the second abutment. The movable part is connected to the pressure plate by links which provide a 4 to 1 leverage between the springs and the pressure plate. Inasmuch as the springs act directly on the pressure plate and at the same time through the 4 to 1 levers, a pressure of five times the actual spring tension is available. In other words, with three 110 lb. springs as now used a pressure on the friction rings of 1650 lb. is secured.

From a maintenance standpoint, the friction rings are interchangeable with those of conventional disk clutches so that new disks are available in practically any city. This is one of the advantages claimed over the cone type, which has been displaced because, in the case of the latter, new facings had to be purchased from the factory and could not readily be secured except through Rickenbacker service stations.



Sectional views of the new Rickenbacker single-plate clutch



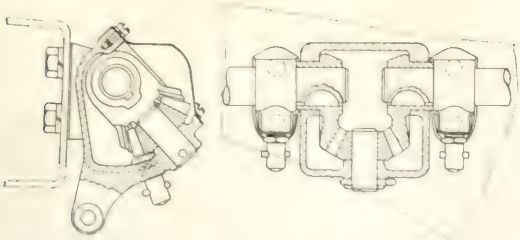
Rickenbacker engine as it appears in the polished show chassis. Note arrangement of the new air cleaner and air heater and the Bosch timer

It should be noted that the pressure plate is positively disengaged from the friction rings instead of being allowed to float as in the case of many single-plate clutches. The driven plate is of light weight in order to facilitate gear changing. This is also an advantage over the clutch which has been displaced, as considerable drag was formerly experienced in gear shifting.

In the servicing of this clutch after the faces are worn about half away and the slippage becomes noticeable, adjustment is made by removing six shims to allow the cover plate to be screwed in another 1/16 in. This permits the facings to be used until they are practically worn away.

Hot Air Stove and Air Cleaner

The only change in the powerplant is in connection with the carbureter, which has been equipped with a new type hot air stove and an air cleaner as standard equipment. The air cleaner, which will now be fitted as standard equipment, is a type in which the air is required to turn a sharp corner and thus throw out dirt particles by centrifugal action. This is the second instance in which announcement is made of the adoption on an American car of an air cleaner as standard equipment. Analysis of the so-called "carbon" deposit in engine cylinders has shown that as high as 90 per cent of the deposit is silicon. The



New Rickenbacker differential gear type foot brake equalizer

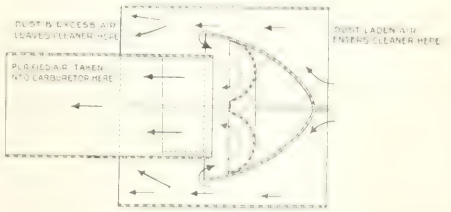
air cleaner is expected to minimize this deposit and also to greatly reduce piston, ring and cylinder wear.

American Bosch electrical equipment has replaced the units formerly employed. The automatic advance feature is incorporated in the distributor head and is so constructed that the weights employed are heavy enough to break loose a gummed bearing should this result from the use of heavy oil. The Bosch units are of standard Bosch construction and are familiar to the industry.

A number of detail improvements have been made in the chassis. The rear axle, for instance, has been equipped with brake anti-rattlers in the form of flat springs added to the top and bottom of the brake bands with supporting members riveted to the brake dust cover. These springs also hold the bands away from the drum, helping to eliminate brake drag, particularly when the bands have been damaged and are out of true. A differential type of brake equalizer with small differential gears in place of the usual balanced lever has been added. This is said to simplify the process of brake adjustment and to make it unnecessary to get behind the disk wheels to perform this operation.

In the body construction, trim and equipment, a number of improvements are incorporated in the series B cars. The phaetons are now equipped with permanent tops, which are lighter and stronger. With the new top it is claimed that it is possible to secure a better appearance and to eliminate rattles and squeaks due to wind pressure. The side curtains can also be made a neater and better fit. Although the tops cannot be lowered as heretofore, the Rickenbacker Company takes the view that since 99 per cent of users never use the drop feature, there is not much use in depriving this percentage of the advantages of a permanent top in order to accommodate the 1 per cent who will occasionally desire to lower the top.

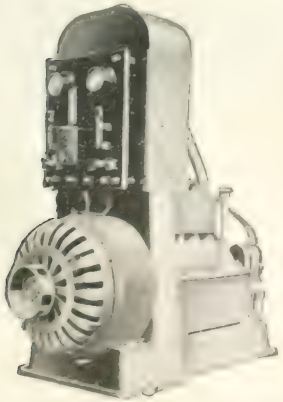
Changes in the wiring have been made so as to secure a Class A rating as regards fire hazard from the Underwriters' Laboratory. An approved transmission lock has also been built into the gearset pedestal which will materially reduce the insurance rates. All nuts, bolts, screws and other parts which have heretofore been touched up after assembly are now rust-proofed, giving them a finish which does not require touching up with consequent danger of daubing other parts. The toe-boards on all of the models have been changed to aluminum to improve appearance. To protect the front compartment from heat coming from below an asbestos insulation has been incorporated in the toe-board. All the molding used on the phaetons is of cold drawn metal stamped to shape and enameled in mahogany finish. Rear view mirrors have been added to all the cars as regular equipment and all of the closed models are now fitted with Perfection heaters as standard equipment. The radiator shell on the phaeton has been changed to nickel plate for the sake of appearance.



Sectional view of the Detroit Perfection air cleaner used on Rickenbacker engine

The original specifications of the car remain unchanged, the entire unit being as previously manufactured with the exception of the alterations here noted.

New Four Cylinder Lighting Set



Unimoto four-cylinder generating set

A 2-KW. electric generating set has been brought out by the Universal Motor Co. and will be marketed as the Unimoto. It comprises a four-cylinder, four-cycle engine direct connected to a six-pole, direct current generator. Ignition is by a high tension magneto. The gasoline tank is in the base, and the radiator is mounted between the engine and generator. The switchboard is on the front of the radiator, making the outfit completely self-contained. It is furnished wound for either 32 or 110 volts and either with or without a storage battery.

When the set is furnished with batteries the generator is shunt wound and the engine is fitted with an electrical governor which automatically regulates the charging rate, giving what is known as a tapering charge. The switchboard is then equipped with a battery tester, so that by merely pressing a switch the condition of the battery is indicated on the dial. When the Unimoto is to be used without battery its generator is compound wound and a mechanical governor is fitted. It is claimed that these features, together with the uniform torque of the four-cylinder engine, maintain a substantially constant voltage on the line even under the most severe conditions.

Intelligent Appeal Is Essential in Car Advertising

Superlative claims of value, extravagant statements, and catch phrases without meaning featured show-time copy last year. Thorough analysis shows faults in detail. Copy writer needs intimate knowledge of product and performance.

By LeRoy P. Wight

THE manufacturers of forty-seven out of the fifty makes of automobiles advertised in connection with the three big shows last year were guilty of such extravagant claims and superficial, unsupported statements that their show advertising was robbed of most of its selling value.

Lest you think this statement is exaggerated let us first point out that this finding is based on an analysis conducted without favor or prejudice by the advertising department of one of the leading automobile manufacturers in America. If it is true, and you'll hardly question it after reading the report of this investigation, it is about time that the subject of automobile consumer advertising, particularly at show time, be handled without gloves.

The demand for the automobile, because it was the keynote of unit transportation, antedated its arrival and at no time has this demand even approached the saturation point. Nowhere in industrial history is there any evidence of a near approach to the great strides made by this industry in the matter of production. If the same could be said of its advertising, the automotive industry, presenting as it does the greatest field of money-making possibilities, would be looked upon much more favorably by the average business man outside of it, especially by the banker.

What effect the character of practically all automobile advertising has in the banking field is problematical but it is easy to believe, in the face of the evidence submitted in this article, that the extravagant claims and superficial, unsupported statements that appear so frequently in this advertising are at least a contributing cause of the banker's unfavorable view of the industry.

Imagine yourself in his place or in the place of the prospective car buyer. Picture the automobile section of any metropolitan newspaper at show time, the paper to which you, as a car manufacturer, pay out your good money to the tune of 40c. to 60c. per agate line. What do you see? Page after page filled with publicity "bunk" and paid advertising which is no better.

What are the claims for this car, beautifully rendered in line or wash by an artist of national reputation? It doesn't make much difference what car we are considering, because, except for the picture of the car, the copyrighted slogan and the nicely lettered name slug the advertisement reads much the same way. A typical example is shown in Fig. 1. What does it say?

Can you imagine the effect on Mr. Prospect after he has read forty-seven just such meaningless messages for which forty-seven manufacturers have paid all the way from $150 to $1500 per insertion?

Do you suppose he has any preference for any one of the forty-seven cars advertised? Will it be any easier for your dealer

Never Before Have Sennett Values Been So Outstanding As In This New Series 77

SENNETT values have long been accepted by discriminating people as the standard by which to judge motor car offerings.

The new Series 77 is in keeping with this enviable tradition—indeed, it raises the standard to new high levels, thus still further widening the gap between Sennett and other vehicles in its price class.

To those who prize power range and flexibility above other factors of motor car performance the new 77 Sennett brings the fullest expression of exhaustless energy, eager alertness and unconquerable vitality—leaping ahead at the traffic officer's "Go!"—throttling down to a walk with never a hint of laboring, making level stretches of the toughest hills, keenly responsive to the driver's slightest wish.

In riding comfort, roadability and ease of control, Sennett is, as always, supreme. Its appointments include the many little touches that add so much to the pleasure and convenience of driving.

The deep and enduring esteem in which Sennett has so long been held has been well repaid in the new Series 77; and its enthusiastic reception, while expected and deserved, has been a source of keen gratification to its builders.

Fig. 1

to sell your car should this prospect happen to wander into your sales rooms?

It would hardly seem necessary to point out that good advertising is nothing more or less than good salesmanship in print.

That it is the cheapest, quickest and most profitable form of salesmanship is obvious. Its efficacy has been proved time and again.

Why, then, should the advertising of the automobile, which is rich in selling points, be so hopelessly inadequate?

Read the foregoing sample advertisement, then ask yourself this question: What would you think of a salesman should he attempt to sell you an automobile by the same method of approach and lack of selling information?

IF you think we have exaggerated the case in the dummy ad just look over the accompanying tabulation. First in the list are 118 extravagant and elaborately superficial statements published over the signatures of forty-seven leading American car manufacturers. Without question some of these statements are true and all are made in good faith, but is any one going to believe them? Is any one going to be influenced by what they say?

Consider this carefully. There is hardly a sentence in this entire list that a good car salesman would dare to use in his selling. On this basis then there is not a selling argument in the whole list.

In addition to the "extravagant claims" list is a compilation of 230 "catch phrases" used by forty-seven different car advertisers.

If the copywriters who grabbed these out of the old familiar "blue sky" left any uncorralled we haven't discovered them.

What they were expected to do for the advertiser in the way of making sales we know not.

Why they were tolerated by the man who O. K'd the space bill is a still greater mystery.

Now we come to an even greater form of advertising misdemeanor, the value claims. Whether or not the claim of "greatest value" is true, will it be believed by the intelligent man when he reads in practically every automobile advertisement in one form or another that the car offered is the greatest value in America?

To present what to many will seem to be such a tirade against automobile advertising without some sort of constructive criticism would hardly be justified, although to point out an existing evil is at least a start in the right direction.

Can this be remedied and by whom?

It can, and the remedy lies in the hands of the executive whose O. K. sends the advertising message on its mission.

The first step lies in the direction of the individual who now uses the blue sky as his source of inspiration. In him lies the way to sales building advertising copy.

LET us interject right here a fundamental truth of advertising practice which supplies good evidence that the much maligned advertising writer is an offender through circumstances rather than because of any desire to go on navigating the sea of superlatives.

To write convincingly about anything one must know it intimately. How many advertising writers know intimately the automobiles they are supposed to sell on paper?

There are, of course, many individuals in the advertising profession who have no right to be known as copywriters. Every profession has its misfits. But most of the men to whom is assigned the task (and it is no easy one) of preparing automobile advertising are sound business men, capable writers and hold no brief for their own work or that of others which is of the same calibre.

What they seemingly lack is definite, first hand information regarding the car which they are selling (advertising should be considered selling in every sense), an intimate knowledge that can be gained only by living with the car during its production, studying it from every angle so that instead of speaking of a car's roadability he can tell an interesting, convincing story of the car's performance in relation to the road (we are assuming that "roadability" has some such meaning) by an intimate knowledge of its details of construction and their bearing on road performance.

To you to whom this message is directed let us offer this constructive suggestion.

First of all know the man to whom you intrust your advertising message. He is more important to you than your best salesman because he is talking to all your prospects all the time.

Know him and believe in him. If he is the right kind, you will.

See that he knows every last detail of your product, your policy and your problems. If he doesn't know them intimately give him as many months as he needs to learn them before he attempts to describe your product.

And last, but not least, be sure that he is fitted by experience with things automotive so that he can appreciate what the prospective buyer wants.

In the meantime let your advertising improve. Make it say something. Make it as individual in word as well as in picture as your product is.

THERE never was a product that did not have some thing or things about it that made it sought after by the prospective buyer. Your car has such selling points and when the writer of your advertising learns what they are and writes them into your advertising message your salesmen will have the support that your advertising, by virtue of its cost to you, should give them.

With the idea of adding what constructive criticism it is possible to add we show a few examples of what the writer considers good selling in automobile advertising. These examples were taken from recent consumer advertising of leading American manufacturers.

ILLUSTRATIONS of the most common faults of automobile advertising are shown on the following pages. These examples were taken from actual copy which appeared at the time of the New York show last year.

We also present samples of what may be considered good automobile advertising copy.

Good Selling in Advertising

The same qualities which recommend the car to business men recommend it with equal force to everyone.

Its name has suggested, rather than limited, its many sided usefulness.

Business requires a car of exceptional hardihood; one that offers weather protection and comfort the year round; a car dignified in appearance and economical to run.

Business absolutely *demands* such a car, but practically everyone *needs* such a car.

The —— meets this universal requirement in a unique and specific way.

Its construction has made closed car history.

The steel body was known before on —— open cars, but its recognized advantages have never before been applied to the construction of a closed car.

The same thing is true of the baked enamel finish, which cannot be applied except where the body is built of steel.

In one new feature, the —— goes even further than open cars have ever gone in the breadth and scope of its usefulness.

The rear seat furnishings are removable, converting the entire section back of the front seat into a steel-walled compartment, with 64 cubic feet of loading space.

—— peculiar achievement, in other words, has been to make the sedan a practical car, so that everyone may enjoy its protection and usefulness at little more than the cost of an open car.

While this piece of copy may merit some criticism it has selling value. The next to the last paragraph covers a particularly strong selling point. Where is the car owner who hasn't at some time felt the need for those 64 cubic inches of loading space? Such points as this are remembered and a campaign which covers one or more in each piece of copy builds up a selling argument that must result in sales.

Here we have an exceptionally good example of real selling copy. No high-sounding phrases, no attempt at cleverness, nothing but a conservative, convincing sales argument such as a good salesman would use right in the salesroom. Note the way the writer has described the ease with which this car can be steered. "Operates as easy as a bicycle" was a real inspiration.

Chassis Quality and Reliability or Body Fittings—Which Do You Want at the Same Cost?

You are offered two types of closed cars at around ——. One makes its appeal to the eye. Its makers call attention to the body fittings. Such luxuries are nice to have.

> But clocks, dome lights, cigar lighters and vanity cases are not essential to comfort and they have nothing to do with car performance. However, you must pay for them. To know how much they cost consider what the open model of such a car sells for.

The —— sells at ——. The body is simple and sturdy, built for utility and comfort. Non-essentials are omitted. What they would cost is invested in motor, clutch, transmission, axles and frame. The ——, one of the world's leading four-cylinder cars, never disappoints.

It is positively reliable. Carefree, untroubled transportation, at the lowest cost for fuel, oil, tires and maintenance, is assured.

> We believe you will find the highest satisfaction in a steering mechanism that operates as easily as a bicycle, in clutch, and brake pedals that respond to the slightest pressure, in freedom from squeaks, rattles, body noises and in performance that matches the costliest cars.

In no car can you get more than you pay for. It is for you to decide which type of closed car will give the most lasting satisfaction.

Extravagant Claims and "Circus" Statements Made in 1922 Show Ads.

(Result of investigation made by advertising department of a leading passenger car company)

OF the 50 makes of automobiles advertised in connection with the New York, Detroit and Chicago shows, 47 of them made their plea for public consideration on the basis of extravagant claims and elaborately superficial statements, set forth without proof and in a manner that leaves the public mind in doubt and confusion.

Here are 119 of those claims published over the signatures of reputable manufacturers.

1.

"Relatively this car should sell far beyond its price."

"Even the engineering perfections * * * are fairly overshadowed by the excellence of ——— coach work."

"Judge this car by what you think the price should be."

2.

"This proves its stability and endurance."

3.

"Throughout 22 years ——— cars have been well built and ———'s prestige has grown steadily."

"———'s business policy has always been conducted on the solid platform of 'keeping both feet on the ground.'"

"To-day ——— holds a unique position in the auto industry."

"———'s strength and stability are reflected in the permanence of its dealer conections."

"The business you build on ——— is a permanent one for yourself."

4.

"Superior quality in every detail."

"Every unit developed by America's greatest automotive engineers."

"We acknowledge no superiors in easy operation, smooth riding qualities, quality of materials, beauty of design, performance and endurance."

5.

"Make every ——— owner a ——— enthusiast."

"Places ——— dealer in every locality in a position to be envied."

"Every car which leaves ——— factory must first, last and all the time give," etc.

6.

"Possesses that precious and priceless thing—public confidence."

"Has, for the time being, attained the very utmost in motor car achievement."

"Motorists everywhere responded instantly and with eager enthusiasm."

"Universally regarded as the standard of the world."

"No ——— has ever had such a reception as this."

7.

"Words cannot convey an adequate idea of the sterling quality," etc.

"One car that fulfills your every desire."

8.

"No matter what car you can afford to own, the ——— will appeal to you from every essential point of view."

9.

"Beyond anything ever offered within a thousand dollars of the ——— price."

"Completely satisfying in every phase of its performance."

"Acknowledged everywhere as an amazing car."

"One of the few great cars in the world."

10.

"The lowest-priced six-cylinder car on the market to-day composed of the following units," etc.

11.

"Response to an overwhelming national demand."

12.

"Outside the reach of mere money alone."

"Has a striking blend of European craftsmanship and American experience."

"The aristocrat of American motor cars."

13.

"Without a parallel."

14.

"Ever foremost."

"——— has led in automobile engineering since 1905."

15.

"Approved and certified as no cars have ever been."

"Proved their supremacy."

"Bear the approval of the most authoritative ingenuity of Europe's best designers and coach makers are reflected in the ———."

"The car of a thousand advances in engineering and production economies."

"The motor car you will want to own and drive."

"All the lessons learned by the engineers of a great industry in war and peace are summed up in the ———."

"New standards in motor car performance."

16.

"The biggest seller in years."

"See the crowds that fill ——— showrooms."

"A wanted closed car people can afford."

"The car people want at a price the thousands can pay."

17.

"Undoubtedly the cleanest motor car ever displayed."

"The most conveniently arranged powerplant you have ever seen."

"Most remarkable motoring development in 1922."

18.

"The perfect development of the six-cylinder motor."

19.

"The decade's greatest advance in automobile construction."

"Hurdles a decade of motor progress."

"Establishes an entirely new standard."

"Unique and unparalleled in the history of motordom."

20.

"Built to meet a nation-wide demand."

"A car which safely secures the owner's investment."

21.

"Proven by trial."

22.

"The sensation of the auto shows."

23.

"The pinnacle of achievement of the automotive industry to-day."

"The vast advantage of actual experience which ——— engineers alone possess."

"A full year ahead of all other cars in quality as well as price."

24.

"To-day it is unquestionably the standard bearer."

"The highest possible efficiency and the greatest economy."

25.

"A car among cars."

"* * * which you are sure of in the ———, and not sure of somewhere else."

26.

"A motor car * * * making the ideas and ideals of the experienced owner a reality and an accomplished fact."

27.

"Potential buyers will recognize its superiority immediately."

"The aristocrat of the highways."

"The standard by which all other motor cars shall be judged."

28.

"To drive this car is to be free from all concern."

"The most complete car ever put on the market by a manufacturer."

29.

"By every standard the most advanced and most highly developed motor car in the world."

30.

"Has developed and ripened into permanent public favor."

31.

"Born for those who shun the commonplace."

"Has captivated America with its daring and elegance."

32.

"A new standard of riding comfort."

33.

"The prices are much less than in any car of equal quality."

"Its smooth, perfect motor."

"All you could desire in unqualified closed car luxury."

34.

"As a desirable commodity in a class by themselves."

"No finer line of motor cars."

35.

"Developed to their present perfection by ——— more than 20 years of leadership."

"Finest achievement in motor design."

36.

"You will fall in love with the ———."

"The new ——— lines stand alone."

"Has behind it a great record of achievement."

"Your idea of a beautiful car."

37.

"Each a complete master of his special life study."

"Know their subject so superlatively well."

38.

"That sense of security and riding comfort not possible in cars of lesser fineness."

39.

"A feature seldom found in really fine automobiles."

40.

"A great American achievement."

"An experience with automotive requirements which no other man in the world could possibly possess."

"The performance of this car is uncanny."

"Of no other car can this statement be made, regardless of price."

"You have yet to learn what real smooth traveling is."

41.

"The embodiment of all that is best in advanced automotive engineering."

42.

"There is no better car than the ———."

43.

"Rides the bumps as though no bumps were there."

"Holds the road tenaciously."

"Steps over hills without a grunt."

"Can do its 55 miles and better all day long and come home fresh at night."

"Needs so little 'service' you'll never feel it."

44.

"Mile after mile of speedy abuse over bumpy highways brings no plaudits."

"The same stamina day in and day out without a word of commendation."

"Its rough and ready ancestor of yesteryear."

45.

"The amazing story of the new ———."

"Greatest triumph in lubrication ever produced."

"Hailed with the most unanimous approval ever given a new model."

46.

"Featured by instant response, full fuel utilization and surprising ease of control."

"Only the most expensive cars possess such striking beauty of design, quality of finish and staunchness of construction."

"An answer to those who have long hoped that the distinctiveness, beauty, completeness and dependability of the custom built vehicle might one day be brought within buying range of the average American family."

47.

"The year's outstanding triumph in motor car design and construction."

"Proving *** an outward indication of a new and wonderfully exhilarating motoring experience."

Extravagant Claims of Value Used Prodigally

HERE are excerpts from the advertising of forty-five different makes of automobiles in which the bald claim is made either in so many words or by inference that the particular car named, at the price quoted, is the greatest value ever offered to the public.

The list includes practically all of the advertised automobiles. Since the manufacturers' names are signed to the advertisements, the manufacturers must assume responsibility for the statements made therein.

What must be the reaction of the man of average intelligence who reads these statements, one after another, published side by side in his newspaper or his magazine?

1.

"The extra VALUE resulting from five generations of coach builders."

2.

"Never before has there been a sport car *** at so moderate a price."

3.

"Compare ——— VALUES and prices with all others.

4.

"A new standard of motor car VALUE established by ——— prices."

"The ——— sets an entirely new standard of motor car VALUE."

"The greatest motor car VALUE in the world."

"Superior VALUE."

5.

"The price that scraps previous motor car VALUES."

"America's most amazing automobile VALUE."

6.

"Temporary slowing down in sales emphasized real VALUE *** It appears that the careful buyer *** regards the ——— *** as an exceedingly good buy."

7.

"Know these facts and you can judge car VALUES."

8.

"——— leads in automobile VALUE."

9.

"Its astonishing VALUE is immediately evident."

10.

"The very maximum of motor car VALUE—a new standard."

"New and remarkable values."

"Without a parallel on sheer dollar for dollar VALUE."

"Extraordinary quality and VALUE that we have built into it."

11.

"A purchase price never before approached."

"Supreme motor car values."

12.

"The outstanding motor car value of the automobile show."

"A new standard of motor car VALUES."

"Unanimous in agreeing that our claims of VALUE 'way beyond the ordinary are self-evident."

13.

"Such VALUES are not to be found anywhere else."

"The Show will bring nothing, we think, to compare with ——— VALUES."

14.

"Never at any price has a more graceful and beautiful car been built."

15.

"They demand that a car shall not depreciate one-half of its VALUE in the first year of driving."

16.

"Just the car the automobile buying public has been awaiting."

17.

"VALUE is the only consideration."
"A real 100 per cent VALUE product."
"It's VALUE that counts."

18.

"The new standard of VALUE among to-day's motor cars."

19.

"A 100 per cent VALUE for your dollar."

20.

"The superlative of VALUE."

21.

"You must necessarily pay more than the price of this car."
"Obviously ——— guarantees an exceptionally high resale VALUE."

22.

"Most astounding VALUE ——— ever offered."
"Greatest VALUE ——— ever offered."
"And ——— VALUES endure."

23.

"One car among 100 whose VALUE everyone knows."
"Recognized cash VALUE."
"High opinion of its VALUE."
"A VALUE among VALUES."
"The outstanding VALUE of motordom to-day."
"A VALUE so sure and so certain that the buyer who chooses something less sure and less certain at a lesser price or at $500 more—almost deserves what he gets."

24.

"The real VALUE that lies in the ——— car."

25.

"A conspicuous motor car VALUE."

26.

"A motor car VALUE so revolutionary, etc."

27.

"No car ever introduced has established a more definite standard of VALUE."

28.

"The most conspicuous motor car VALUE of to-day."

29.

"There is still no precedent, and no equal, for the great VALUE of the new series of the good ———."
"Unusual VALUE with which the good ——— abounds."
"Unusual VALUE *** abounds in the good ———."

30.

"Most remarkable motor car VALUE in America."
"——— leads the show in motor car VALUE."
"Its unchallenged place as VALUE leader."

31.

"Usually associated with makes in price range of two or three hundred dollars more."

32.

"An increase in VALUE even greater than in former years."
"You cannot get more for what you pay than in an ———."

33.

"No car its equal at its price."

34.

"Astounding d o l l a r - f o r - d o l l a r VALUE."
"A rare investment opportunity."
"The greatest VALUE on the market to-day."
"A measure of VALUE that has hitherto never been approached and cannot now be equalled elsewhere."

35.

"——— utility VALUE — is fortified by dependability of performance and economy of operation."

36.

"One of America's foremost VALUES."

37.

"Without question the foremost VALUE in America."

38.

"Guarantees the building of a superior car at a price."

39.

"The lowest priced quality car."

40.

"——— cars represent an actual VALUE higher than ever before."

41.

"The greatest automobile VALUE on the market to-day."

42.

"A new standard in automobile VALUE."
"No other high class car can equal the VALUE of the ———."
"With all the added VALUE—that the great solidly financed ——— organization can produce."
"The new standard for the first cost of the world's finest car."

43.

"You do not know all the quality that 1922 offers you at low price until you have seen the ———."
"A car complete that you yourself would price hundreds higher."
"The car of permanent VALUES."

44.

"——— ownership now gains added VALUE."
"No car of its quality approaches its price."

45.

"By every standard, America's best in low cost and comfort."

Phrases Which Are "Pretty" but Mean Nothing

WE list here "catch phrases" from the advertising of the manufacturers of 47 advertised makes of automobiles. In this list is run the full gamut of superlatives. It leaves nothing to be desired in the way of descriptive adjectives.

1.

"Engineering perfections."

2.

"Strength and stability reflected."
"America's greatest automotive engineers."

3.

"Reflects convincingly."
"Rigidity maintained for *20* years."
"Thoroughly dependable and trustworthy."
"Dashing in appearance."
"A model cherished."
"Built in response to a *con*sistent demand."

4.

"Reluctantly decided."
"Universally agreed."
"Welcomes the opportunity."
"Substantially reduced."
"Deep and widespread."
"Reveals important betterments."
"Wonderful welcome."
"Fundamental soundness."
"Unquestionably outdone."
"Gratefully conscious."
"Precious and priceless."
"Utmost in achievement."
"Superb mechanism."
"Proven economic usefulness."
"Solid merit."
"Royal welcome."
"Eager enthusiasm."
"Sheer beauty."

5.

"Luxurious riding."
"Sterling quality."
"Unusual roadability."
"Sumptuous appointments."

6.

"Wonderful results."
"Impress themselves instantly."
"Finer possibilities."

7.

"Mechanical refinements unsurpassed."
"Marvelous motor."
"Unrivalled efficiency."
"Superlative riding comfort."
"Superb style."

8.

"Justified pride."
"Registers instantaneously."
"Handsome, big and luxurious."
"Greatest individual attraction."
"Complete surprise."
"Unqualified approval."
"Refreshing style."
"Replete with quality."

9.

"Unique in design."

10.

"Extraordinary quality."

11.

"Superior quality in every detail."
"America's greatest automotive engineers."

12.

"Startling beauty."
"Incomparable finish."
"Unsurpassed engineering."
"Unfailing power."
"Marvelous grace."
"Utmost dependability."
"Satisfying performance."

13.

"Columns might be written."
"Rare beauty."
"This marvelous car."
"Marvel at its ability."

14.

"An unqualified triumph."
"Invitingly comfortable."
"Intensely practical."
"Radiating an air of distinction and competence."
"Supreme values."
"Agreeably accommodating five."

15.

"Velvety springs."
"Faultless proportions."
"Refinements of detail."
"Beyond your expectations."
"Its character but not its charm."
"The sum of a thousand advances in engineering and production economies."
"Dynamic motor."
"Beauty of contour."
"More satisfying."
"Spirited performance."
"Unusual charm and individuality."

16.

"Remarkable economy of operation."
"Maximum of flexibility."

17.

"A veritable sensation."
"Transcends existing standards."
"Consistently securing."
"Unexampled roadability and comfort."
"Unique and unparalleled."
"Well-poised power."
"A mechanical masterpiece."
"Truly beautiful."
"Supremely competent."
"Outstanding economy."
"This amazing car."
"Graceful symmetry."

18.

"Unparalleled economy records."
"Backed by living truths."

19.

"Truly a revelation."

20.

"Durability unequalled."

21.

"Embodying to an exceptional degree."
"A new conception of motor car enjoyment."
"Silent, untiring flow of power."
"Readily appreciated."

22.

"Supremely beautiful."
"Supreme quality."
"Exceedingly comfortable."
"Signally evidenced."
"Instantly impressed."

23.

"Startling and significant."
"Uninterrupted regularity."
"Rendering heroic service."
"Difference between unbroken satisfaction and continuous annoyance."
"Everlasting regularity."
"Above and beyond all else."
"Almost unbelievably low."

24.

"Finality of comfort and performance."
"Reality and an accomplished fact."

25.

"Remarkable in performance and durability."
"This marvelous new car."

26.

"Inherent qualities."
"Most complete car."

27.

"Seemingly limitless power."
"Velvet-like softness."

28.

"Unusual ability."
"Reliable, saving service."
"Goodness which assures power and performance."

29.

"Striking distinction."
"Its unchallenged place."

30.

"Faithfully interpreted."
"A distinctive car."

31.

"Distinctly different."
"Instantly apparent."

32.

"Satisfying excellence."
"Traditional dependability."

33.

"Rare investment opportunity."
"Astonishing value."

34.

"Real smartness."
"Tried and true."

35.

"Superlatively well."
"Most arithmetically certain."
"Something else super-added."
"Individual craftsman submerges the ego of his genuis."
"Transmutation of the lifeless metals."
"Appreciative market."
"Scientific accuracy."
"Peculiar identity."
"Instantly obedient."

36.

"Passing novelty."
"Permanent utility."

37.

"Simply stupendous."
"No limit to its adaptability."

38.

"Distinctively different."
"Convincingly speedy."

39.

"Anxiously awaiting."
"Singular distinction."
"A new creation."
"Sensational values."

40.

"Supremely fitting."
"Surpassing beauty and comfort."

41.

"Discriminating buying."
"Distinctiveness of appearance."
"Intrinsic values."

42.

"Superior features."
"Established its supremacy."

43.

"Unequalled value."
"Long, luxurious springs."
"Its world-conquering forefathers."
"This wonder car."
"Living testimony."
"Utmost comfort."

44.

"High-grade and distinction."

45.

"Marvelous power plant."
"Unanimous approval."
"WEALTH of detail and refinement."
"Surpassing all former ——— creations."
"Distinctive, roomy, restful."
"This amazing story."

46.

"Exceptional power."
"Instant response."
"Surprising ease of control."
"Striking beauty of design."
"Staunchness of construction."
"Full degree of riding comfort."
"Unusually complete."

47.

"Universally acclaimed."
"Outstanding triumph."
"Marvelously smooth."
"Striking beauty."

Body Production System Combines Progressive and Group Methods

Work is passed along a line wherever possible, but efficiency of individual operations is always considered. Novel welding jig employed. Molding fastened over joints by new means. Coupe and roadster bodies made together. Fifteen men trim 25 per day.

By J. Edward Schipper

PROGRESSIVE manufacturing methods are combined with group work in the production of the Oakland 644 roadster and coupe bodies. The system has been laid out so that the work is passed along a line wherever possible, but no attempt has been made to apply this method in blanket fashion. Balance of production schedules and efficiency of particular operations demand group work in certain instances.

Detail features of the Oakland body production system include a special welding jig used in connection with welding the rear deck, a well-operated progressive plan for assembling the body panels, and an ingenious method of fastening a molding over soldered joints. These particular methods, included in a generally well-planned body production system, are worth examination as samples of good practice in body manufacture.

The coupe and roadster bodies are identical in construction, except for the extended pillars necessary in the upper part of the closed job. Most of the stock used is 20 gage steel, although other gages are used for certain special pieces.

The pressed metal work is handled much the same as in other body plants, so only a brief summary of this phase of Oakland body production is necessary to fill in the complete picture.

The stock is put through square shears to correct irregularities in shape. It is then ready for the presses. Presses are used for blanking out the pieces and shaping is done by power hammers. Rotary shears assist in blanking out, when necessary. Much of the heavier press work, such as the back panel, is done on Toledo 94s. The back panel, after being stamped out on such a press (Fig. 1) is shaped on a power hammer (Fig. 2). The stampings are made in four pieces and are then welded together by the acetylene process. Similar methods are employed in making the rear deck, which is also a four-piece part.

The special welding jig, previously mentioned, is used here. It is illustrated in Fig. 3. This jig is so constructed as to hold the weld to very narrow limits along the seam. Side panels, as well as the back panel and rear deck, are welded in this jig. The side pieces of the jig turn up on hinges and hold the panels in place during the welding operation. The fender body bolt reinforcement is riveted in place and drilled through a jig after the welding has been completed. The bodies are hand-finished. Rough spots in the sheet metal are taken off and the welded points are smoothed down with a file (Fig. 4).

The shroud, a one-piece stamping, is handled in the same way. It is first stamped out with a die which not only blanks it out, but also pierces the two windshield bracket holes. It is then passed to another die where the ventilator hole is stamped out and formed. The hinge for the ventilator, as well as the hood hinge and the hood ledge support, are spot welded in place. The shrouds are then mounted on bucks and hand finished (Fig. 5). Grinding wheels are used sometimes, as well as files, in finishing the shrouds and back panels.

The wood-working department is located in the same building as are the power presses. Here the pieces for body framing are cut and shaped. The wood-working machinery is modern and efficient, but has no features novel to those familiar with the current methods. It is capable of forming every piece in the frame without the assistance of hand work. Four-sided stickers are used in this department, which cut rabbets and shape four sides to nearly any form required. Wooden parts with projections, especially those with grain running across in such a way as to encourage splitting, are reinforced by pieces inserted at right angles to the grain. Such parts are protected also by screws which are inserted as an additional safeguard against splitting. The screws are put in by automatic screw-drivers, fed automatically from a hopper.

After being finish formed, the wood pieces are forwarded to the framing department. Here is one instance where group work was found to have advantages over the progressive system. A study of possibilities indicated that use of the group method for framing had these features:

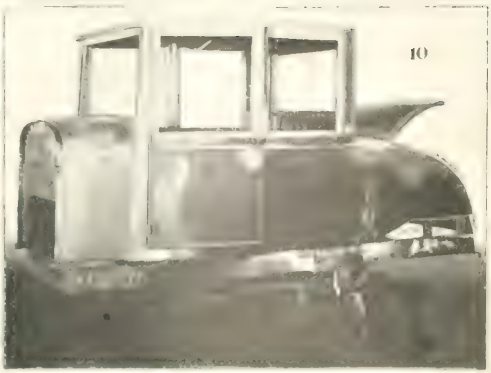
1. Less space necessary than for progressive system.
2. Fewer framing bucks needed than for progressive system.
3. Speed of production is equal in either case.
4. A glue pot can be placed at each end of a buck and tapped in on the steam line so that the glue is always at the proper temperature. Uniform glue temperature cannot be obtained so readily in the progressive system where the bucks are moving.

Two to 4 men work on each buck. The buck acts as the framing jig (Fig. 6). Each man performs the same operations on every body, but does not confine his work to one or two operations as in the progressive system. A



1—Toledo model 94 press which is used for a great part of the pressed steel work used on the Oakland 644 roadster and two-passenger coupe. 2—Forming work is performed on a power hammer. The operator is shown here just starting work on a back panel. 3—Acetylene welding jig used for putting together the top and side panels for the rear deck. 4—After the acetylene welding, the seams are finished off by hand using either file or electric grinding wheels. 5—The shrouds are independently formed, assembled on trucks, and hand finished. 6—Starting the work on the framing buck. 7—Complete body frame is mounted on truck and the paneling is put on by the progressive system, these trucks being passed along a track









8—Panel seams are closed by soldering and filing. 9—A gutter is put in under the deck door so that any moisture leaking through will enter the gutter and pass out at the rear of the body. 10—Completely paneled body ready to go to the paint department. 11—A glimpse along the trim line for the two-passenger coupe.

few sub-assemblies, such as the deck floor, and the front seat back, are put into place on this buck.

The entire wood-working assembly is clamped in and its parts are screwed together. These parts include the battery box, dash, shroud, rail, seat bottom, deck hinge piece, pillows, etc. The screws used for this work are dipped in grease to make them drive easier and to make splitting of the wood less likely.

Body paneling is done on the progressive system. After the wood framing has been completed, the body is removed from the jig. The frame is taken from the buck and placed on a truck (Fig. 7) which is passed from one operator to another along a track. The first operation on either the roadster or coupe is the application of deck panels. Following this the shroud, side panels, etc., are put on. The joints of the door, the end of the cowl, and similar points are soldered to close up the end of the metal paneling (Fig. 8). The soldered joints are filed and cleaned off so thoroughly that it is impossible to detect them.

Fastening Molding

An ingenious method is used to fasten in place the molding which is put over joints wherever necessary. The mold is drilled from the under side. As a result, a burr is thrown up on the top side of the mold. Nails are then drilled into the mold from the top side, securing the mold in place. The burr is hammered back into the hole over the nail. The top of the mold is then filed off, making the surface smooth, rendering the nails invisible and yet securely anchoring the molding.

A wood dash is employed in place of a metal one. The Oakland company believes that the metal dash picks up much vibration from the engine and gives a very noisy front compartment. The wood dash was adopted because it is less resonant.

Doors are assembled as a sub-assembly in a separate department. The door pillars, one-half the hinge, and the deck doors are also sub-assemblies. These are brought together and mounted on the line.

New Type Drain

The drain under the deck door is also mounted on this line. This drain consists of a gutter arranged under the joint in such a way that water draining down toward the deck must flow into the gutter, from which it is lead downward through an opening at the back end, and thence to the ground (Fig. 9).

After paneling, the body is ready for paint work (Fig. 10). It is forwarded to the main plant, which contains the painting, trimming and upholstery departments.

Painting operations follow usual practice for bodies of this price class.

Trimming and upholstery is conducted on the progressive system (Fig. 11). Putting in the head lining is the

first operation. Next the corners are lined, the box lid behind the seat is covered and the posts are trimmed. The operations then follow the usual sequence, the body being passed on a truck from one operator to the next. Upholstery of the seat back is handled as a sub-assembly, since this part is detachable. This method is convenient since the trimming can be done on a bench rather than in cramped quarters within a car.

The trimming line is 120 ft. long. Fifteen men working on it turn out 25 jobs per day.

After completing the trip down the trim line, bodies pass to another finishing line where trim pieces are added, final detail work is completed and glasses are put into the closed cars. They are sent then to the final assembly department where they are mounted on the chassis.

New Chassis Designed Specially for Bus Service

Has low frame with outriggers, wide tread, special springs, Buda engine and double brake on propeller two-piece shaft.

CHASSIS designed particularly for bus service are now being manufactured both by truck builders and by concerns specializing only in buses. A newcomer in the latter field is the Goodwin Car and Mfg. Co., builders of steel railway cars, who have brought out a special bus chassis, called the Goodwin-Guilder Motor Coach, which is assembled largely from standard components but which has several features fitting it especially for the class of work for which it is intended.

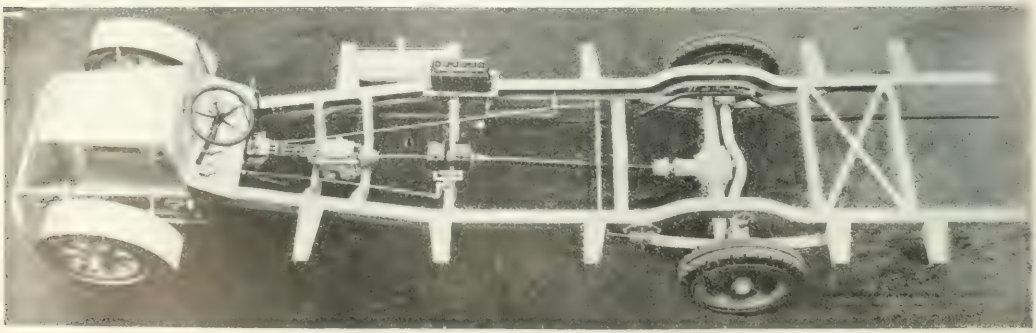
Among the items of particular interest may be mentioned the frame which is narrow (35 in.) at the front to facilitate short turning, but is 51 in. wide at the rear. This feature, together with the use of outriggers flush with the frame, facilitates body mounting and permits the use of a floor laid directly on the frame. The floor is only 26 in. from the ground, so that only a single step is required at the entrance. The frame is kicked up over the rear axle, but is otherwise straight in side elevation. The four-speed Fuller gearset has ground tooth gears and is separately mounted on two frame cross-members. The propeller shaft is a two-piece type, fitted with three Spicer universals. At the middle support S.K.F. bearings are used to carry two 15-in. drums each fitted with brake bands 5 in. wide. These brakes are foot operated. Contracting type hand brakes are fitted on the rear axle.

A Buda $4\frac{1}{4} \times 5\frac{1}{2}$ in. engine is mounted on a three-point support. It is held to a maximum speed of 1500 r.p.m. by a Pharo governor and drives through a Fuller multiple disk clutch arranged to run in oil, and thence through two Merchant & Evans "Griptite" joints to the gearset. The internal gear type Clark "special" rear axle has 71 in. tread, straight bevels, 7 to 1 total reduction, and is arranged for Hotchkiss drive. Rear springs are $3\frac{1}{2}$ in. wide and 60 in. long. They are made from Merrill silico manganese steel and have auxiliary leaves which do not come into action until two-thirds of the load is applied. Front springs measure $2\frac{1}{2}$ x 44 in. and are designed to be flat under full load. A Ross steering gear with 20 in. hand wheel is used. The front axle is a Shuler bus type with 64 in. tread. Smith cushion wheels mounted on Timken bearings are employed. They are fitted either with 36 x 5 in. cushion or 36 x 8 in. pneumatics, as desired. The radiator is of G. and O. manufacture and has a cast aluminum casing.

The chassis measures 25 ft. over all and 80 in. wide over rear link caps. It is supplied either in 196 in. wheelbase, to accommodate 19 ft. 6 in. body, or in 184 in. wheelbase for 18 ft. 6 in. or shorter body, and is intended to carry from 25 to 30 passengers.

Equipment includes a Leece-Neville starting and lighting system with automatic device for increasing generator output when the lamp load is heavy; 12-volt, 180 ampere-hour Willard battery; 30-gal. gasoline tank mounted under outriggers; bumper and Motometer.

A SELF-LOCKING nut which depends upon the shape of the thread, the crest of which is swung around through a few degrees has recently been placed on the market. These nuts are used together with standard bolts, and the result is that they must be forced over the bolts, and the corresponding friction has to be overcome when they are separated. Before the nuts are applied they should be well oiled. The manufacturer claims that these nuts will hold indefintely anywhere on a bolt and they have the additional advantage of occupying less room than a nut with any of the usual locking devices. The nuts are made in all finishes by the Self-Locking Nut & Bolt Co.



Goodwin-Guilder chassis designed especially for bus service

A Critical Study of Modern Steering System Design

Part I

Center point arrangement of knuckle pivots has many European advocates but is little used in this country. Caster angle of about 2 deg. is generally employed. Causes of hard steering analyzed. Reasons for undergather and foregather are considered.

By Herbert Chase

STEERING systems employed on many modern passenger cars and trucks are known to have certain faults but the literature of the automotive industry contains surprisingly little helpful information regarding them. Neither the Transactions of the Society of Automotive Engineers nor those of the (British) Institution of Automobile Engineers contain any papers dealing with the subject except by incidental or casual reference. It has, therefore, seemed highly desirable to collect here certain data pertaining to various parts of the system and to discuss the arguments advanced for the several types of construction employed and their layout or arrangement in reference to other parts. The effect upon the operation and performance of the vehicle will also be considered.

No claim of originality is made for the material here presented. Many of the facts given can be said to be virtually self-evident, yet it is surprising how frequently they are overlooked in actual practice.

In preparing the paper the author has been greatly assisted by several members of the Society. In fact the views expressed are largely formulated by summarizing the opinions of a number of well qualified engineers including several of those most prominent in the automotive industry.

Steering systems as a whole have been little changed for many years. The conventional layout has operated with reasonable satisfaction in most cases, so that it has been given relatively little attention as compared to other parts of the chassis which demanded intensive development. As a result the steering system has lagged behind in the general development of motor vehicles. It has therefore seemed desirable to collect such information as is available in the hope that it will encourage further study of the subject and ultimately result in decided improvement in future steering systems.

THIS article was prepared by one of the Engineering Editors of Automotive Industries at the request of the Meetings Committee of the Society of Automotive Engineers for presentation at the annual meeting of the Society, partly because of the interest in the subject created by discussions of its various phases in these columns and partly on account of the fact that the subject has never been discussed before the Society except in an incidental way.

The author is indebted to others, including several of the most prominent engineers of the industry for a large proportion of the information here summarized.

The paper is printed in advance of the meeting in the hope that S. A. E. members and others qualified to discuss the subject will come to the meeting prepared for such discussion or will submit written criticism for presentation at that time.

Safety

It may seem almost superfluous to discuss here the matter of safety as affecting steering system design, but the fact is that far too little attention has been given to this factor, which should be the primary consideration in the design of most parts of every self-propelled vehicle.

Certain details, such as locking the yokes to the tie rod, are too frequently overlooked. Lost motion which results at this and other points frequently makes the vehicle unsafe. The writer knows of instances where it has been necessary to braze yokes and tie-rod together before the joint would stay tight. Serious accidents are said to have resulted from failure to give attention to details of this character. One manufacturer of steering gear parts advises us that some automotive manufacturers refuse to accept parts in which the limits are held sufficiently close to insure good fit, simply for the reason that such parts cannot be assembled quite so rapidly as others which are given more clearance. A policy of this character is certainly not in the interest of safety and, therefore, cannot be too severely criticized. Other points in the steering system are open to similar criticism. When one stops to realize the importance of safe steering systems, especially under modern conditions of traffic congestion, it is at once evident

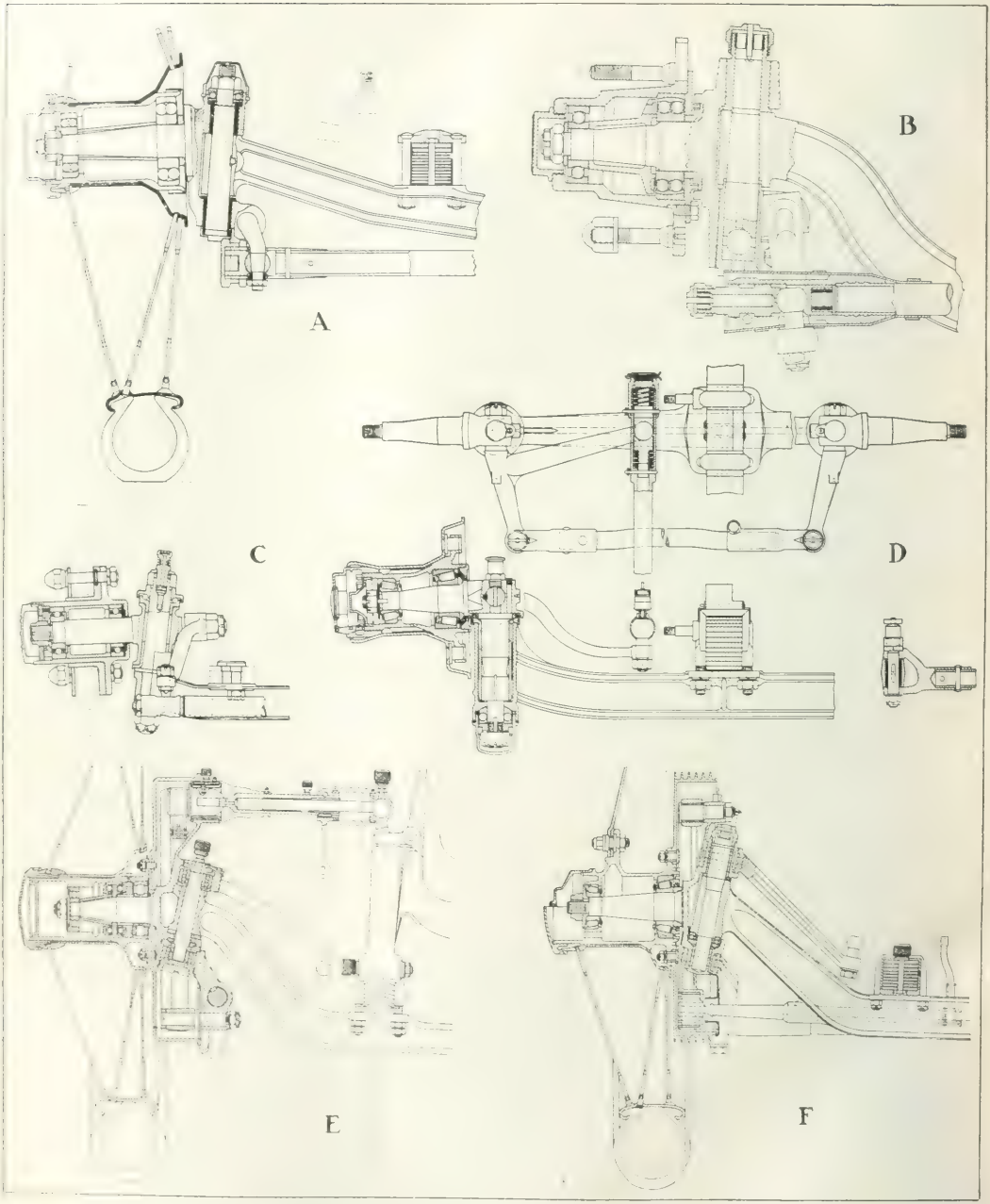


Fig. 1—Several examples of knuckle pivot design used on passenger cars, all but one of which are of British or Continental design: A, Vauxhall; B, Protos; C, A.B.C.; D, Marmon; E, Delage; F, Metallurgique. The last two are good examples of the layout employed when front wheel brakes are employed

that no pains should be spared to make the steering system safe. What user would not gladly pay a few dollars more for a car with a safe system than for one whose system is open to criticism in this respect?

We shall refer here only to the conventional system in which the two front wheels are mounted on spindles attached to the axle by pivoted knuckles, the angular position of which is controlled by a steering gear connected to the knuckles by a draglink and tie-rod.

General Layout of Steering System

It is manifestly desirable to lay out such a system in a manner which will permit all four wheels of the vehicle to turn about a common center without any sliding action when the vehicle turns a corner. To meet this condition it is necessary that the horizontal projection of the axes of all four wheels shall meet at a common point in all positions of the wheels. To fulfill it exactly would require that the locus of the point of intersection be a straight line coinciding with the axis of the rear axle, a condition which cannot be met precisely with the conventional linkage. It is fulfilled approximately when the arrangement is such that the horizontal projection of lines drawn through the centers of the knuckle pivot and the eyes or balls on the arms to which the tie-rod is attached meet in the central vertical plane of the car at or slightly forward of the center of the rear axle.[1]

Unless this rule is followed extensively tire wear and hard steering are apt to result.

Causes of Hard Steering

Among the commonest faults of the steering system is the excessive effort required in its normal operation. The primary causes of hard steering are friction and faulty design of the system, the latter frequently resulting in the former. Friction occurs at many points and for a great variety of reasons, some of which will be enumerated.

a. Inaccurate machine work at joints and bearing surfaces.

b. Careless assembly, often resulting in lack of alignment.

c. Insufficient lubrication.

d. Failure to exclude dirt and moisture.

e. Excessive bearing pressures.

f. Under-inflation, condition, type and construction of tires.

g. Faulty design.

Under *a* can be cited nearly all parts of the steering gear, balls and sockets in the draglink, kingpins and their bushings and tie-rod joints. It is not contended that these units are always subject to faulty machine work, but instances in which each of them has given trouble on this account are quite common.

Numerous examples of careless assembly occur. A common one is the fitting of the steering column in the support at the dash. This is sometimes sprung into place after the lower end of the gear is bolted in position, with obvious results. Another is the forced fitting of king pins and a third the use of excessive spring pressures on draglink and tie-rod bolts.

Insufficient lubrication is so common a fault, especially at the king pins and at draglink and tie-rod joints, that these parts wear rapidly and often rust. The steering gear is usually filled originally with heavy oil which fulfils its purpose well as long as it remains in place, and the same can be said of the knuckle pins on a few cars. Excellent examples of good construction in this respect are the Marmon and Crane designs shown in Figs. 1D and 2. In both of these the bearing surfaces are so arranged as to be submerged in a well of oil. The only place for the oil to escape is at the top of the wells

[1] For articles discussing the geometry of this layout see the *Automobile Engineer*, July, 1910; also Vol. 11, *The Gasoline Automobile*, by P. M. Heldt

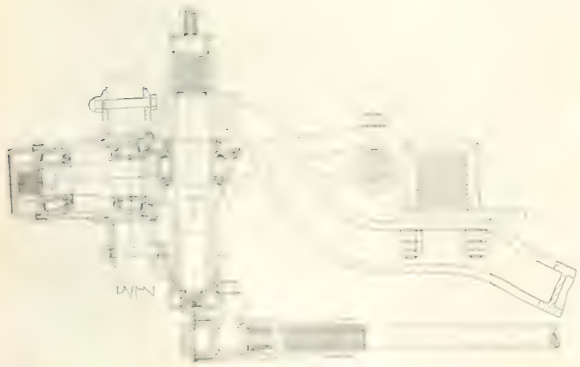


Fig. 2—Latest Crane design of knuckle—an experimental product which incorporates a vertical pivot with roller thrust bearing and a well which permits all bearings to be kept in a bath of oil

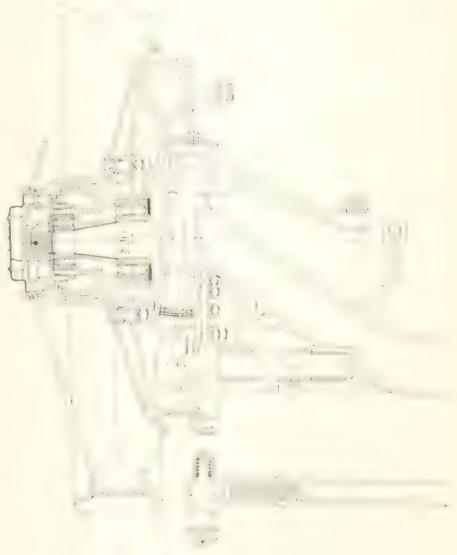


Fig. 10—Excelsior knuckle, approximately center point arrangement, with front wheel brake. Note type of ball socket used on end of tie-rod



Fig. 3—Timken axle end used on Dorris and other cars. A roller thrust bearing is employed

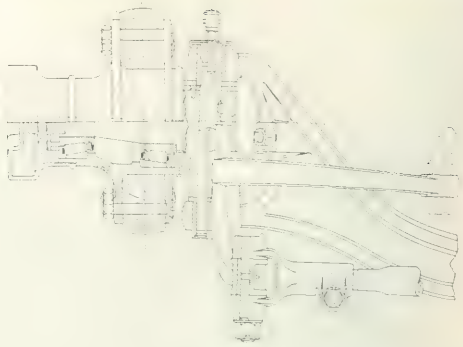


Fig. 6—Packard knuckle pivot with vertical axis and plain bushes

where felt washers are fitted. In the Crane design the aim is to maintain a small head of oil above the bearings. The use of a hair filling in the oil reservoir helps by its capillary action to prevent loss of oil at the top of the well. The arrangement is such that no gun is required for renewing the oil supply. While this Crane design is still in the experimental stage, it appears to have much to commend it.

Several of the designs in Fig. 1 show good examples of the use of ball thrust bearings for supporting the weight of the car, while the Timken design, Fig. 3, used on Dorris and other cars, and the Crane design, Fig. 2, illustrate the use of roller type thrust bearings. Such bearings, if well protected from dirt and water, undoubtedly have much to commend them, and should help greatly in minimizing friction. Another and rather novel form of thrust bearing consisting of single large ball is used in the knuckle of the German Protos car, as shown in Fig. 1B. This arrangement appears to have the advantage of simplicity and moderate cost.

Anti-friction bearings, both of the ball and roller type are frequently used in the steering gear, especially to take thrust, but also for radial loads. The Marmon and Vauxhall gears, shown in Figs. 4 and 5 furnish some examples in this connection. Such bearings certainly help toward minimizing friction, but they have certain disadvantages in respect to higher first cost and in some cases are subject to a hammering action especially when solid tires are employed, which is destructive and may cause corrugating of the bearing surface particularly if the loads are heavy.

Good Design for Lubrication

Lubrication of draglink and tie-rod joints is usually a decidedly hit and miss factor and is seldom given sufficient attention when it depends upon a hand operation. An excellent design is one in which the ball joints are made as nearly oil tight as possible and the tube filled with oil which keeps the ball surfaces well lubricated. A design of this character is said not to require attention oftener than once in six months.

Other points which are quite often the cause of excessive friction are the bearings in the steering column. They are apt to be overlooked when lubrication of other parts is given attention.

Failure to exclude dirt and moisture, especially at draglink, tie-rod and knuckle joints, naturally results in excessive friction and rapid wear. Provision for adequate lubrication at all times by means which tend to force dirt out of rather than into bearings is a kind of antidote, partly because a good lubricant properly applied tends to prevent rust and foreign matter from accumulating on the bearing surfaces, and partly because the constructions which keep the lubricant in place are frequently quite as effective in excluding dirt. A properly inclosed ball and socket joint has certain advantages over the yoke and pin type in respect to the facility with which lubricant can be kept on the surfaces, as well as in freedom from rattle or binding, one of which defects is almost certain to occur with the conventional yoke and pin.

Excessive Bearing Pressure

Excessive bearing pressures are very common in nearly all parts of the steering system. They are, in fact, difficult to avoid within the limits of weight and size usually imposed. It is impossible to consider many details of specific designs here, but it can be said that pins of larger diameter with longer bushings are often easily applied. For example, in the case of one light American car, the 1923 model will have the following changes in this connection, as compared to the 1922 model:

King pin diameter increased from $\frac{5}{8}$ to $\frac{3}{4}$ in. Bushings in axle yoke $\frac{1}{4}$ in. longer. Tie-rod pins increased from $\frac{1}{2}$ to $\frac{5}{8}$ in. and their length doubled.

Ease of steering is affected by tire inflation, condition, character and width of tread and by the type of tire employed. One authority states that the static resistance to turning offered by a tire varies inversely as the square root of the inflation pressure. Cord tires, because of the lower inflation pressures employed and the consequent greater area of tread in contact with the ground, are said to steer harder than the same nominal size of properly inflated fabric tire, but whether this is true when the vehicle is in motion is open to some question. Pneumatic tires are said to render steering harder than solid or cushion tires.

Faulty design often contributes heavily to hard steering, as will be noted from some of the foregoing items. Too small a steering gear with insufficient leverage is one frequent fault, but of course it is poor economy to employ a large reduction giving great leverage simply to overcome friction which is higher than necessary, though this is sometimes done. A much more logical procedure is to minimize friction and then apply a gear with sufficient reduction to accomplish the purpose for which it is intended without requiring undue exertion upon the part of the operator.

Incorrect location of the steering arms and distortion of various parts of the steering system either under the load of the vehicle or under that imposed by the steering operation are other factors which frequently contribute to hard steering. Distortion frequently results in binding which, of course, in turn causes excessive friction. In some cases the pressures imposed are so heavy as to cause the oil film to be squeezed out and the parts to seize or score. This results in a rough surface which offers increased friction and brings about rapid wear.

When a yoke and pin construction is used on the tie rod it is necessary, in order to prevent binding, to make sure that the axes of the pins are precisely parallel to the axes of the knuckle pins and to each other. Careless assembly, or the load imposed upon the axle after assembly, often results in a lack of parallelism of the parts in question, with the inevitable result that excessive friction occurs. This is another reason for favoring the use of a ball and socket on the ends of the tie-rod arms.

The proper finish of bearing surfaces and a provision for adequate clearance at these surfaces would seem to be an obvious necessity, but it is one frequently overlooked. Another item which is sometimes forgotten is the fact that an inclined axis of the steering pivot, other than one which gives true center point steering, raises or tilts the front end of the car when the wheels are deflected from the straight ahead position. This, of course, requires some additional effort in steering.

Other factors which contribute to hard steering are the weight on the front wheels of the vehicle, and the length of the moment arm represented by the distance between the central point of tire contact and the point at which the axis of the knuckle pivot produced strikes the road. Other things being equal it is desirable, in the interest of easy steering, to so proportion the vehicle as a whole as to make the load on the front wheels as small as possible. It is also desirable to keep the moment arm referred to as short as proper clearance (between knuckle and wheel parts) and manufacturing conditions admit. This again may seem to be an almost self-evident fact, but it is one which is sometimes given too little consideration. One manufacturer recently showed the writer how this moment arm could easily have been decreased almost an inch, and without any increase in cost in the case of the axle he was purchasing from a parts maker, had the designer given proper attention to this factor in making the original layout.

Additional factors which create unnecessary friction are introduced if the amount of foregather of the wheels is excessive or if the layout of the draglink, knuckle arms and other parts of the steering system is not correct. The geometry of the system has been treated with reasonable thoroughness in several textbooks and in some engineering papers to which reference is made elsewhere, but is too little considered, especially in the case of some cars that are assembled from units the interrelation of which is not given sufficient study.

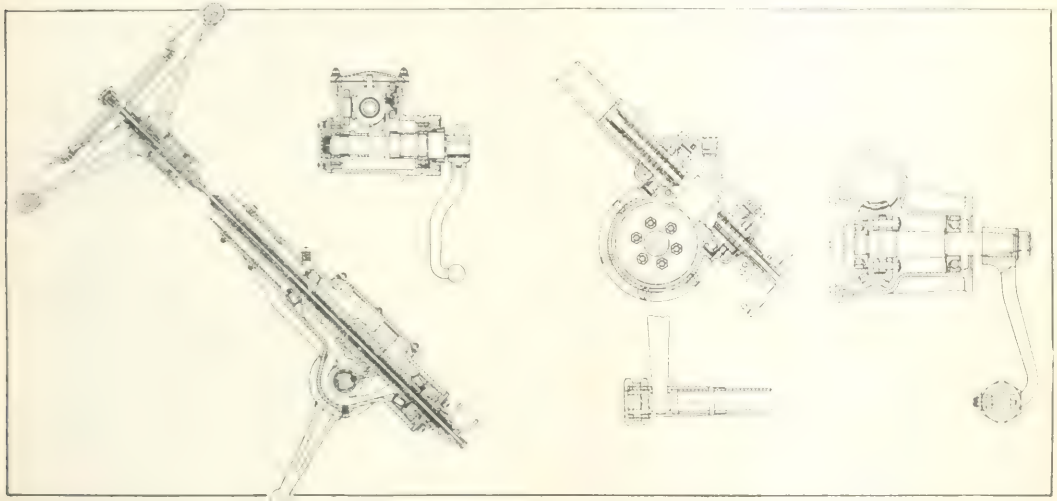


Fig. 4, Marmon, and Fig. 5, Vauxhall showing examples of the use of anti-friction bearings in the steering column and on the steering lever shafts

In a recent article by a steering gear manufacturer[2] it was stated that it had proven practically impossible to build a car in such a way as to have free steering qualities and still have good road-holding qualities at moderately high speeds. We have yet to find any engineer who agrees with this view. It is true that in some cases a free steering car will bring to light faults in the steering system which in a harder steering car of similar general design would not be apparent. This is due to the fact that certain inherent faults, especially the tendency to wheel wobble, are not infrequently damped out by friction, which if it be decreased tends to make these inherent faults apparent, but it does not follow that easy steering and good road-holding qualities are necessarily incompatible. In fact, there is good reason to believe that when the steering system is properly designed and therefore reasonably free acting, the road-holding characteristics of the vehicle will not be impaired.

Angular Position of Knuckle Pivots

Many characteristics of the steering system, especially in respect to performance, are dependent upon the angular position of the knuckle pivots.

Knuckle pivot axes as seen in front elevation are

[2] Hard Steering Result of Inaccurate Manufacture and Assembly, by E. M. Caskey, AUTOMOTIVE INDUSTRIES, Nov. 30, 1922, page 1068.

usually made vertical in the case of American cars and trucks and the same is true with many foreign built vehicles. Examples of the vertical pivot are the Packard, Fig. 6, the Columbia axle, Fig. 7, and the Autocar truck axles, Fig. 8. There are, however, many advocates of the transversely raked pivot and in particular of a pivot whose axis is so inclined as to meet the road in the central point of tire contact. This type of construction employed by Rolls Royce, Fig. 9, and Excelsior, Fig. 10, among others, is usually referred to as "center point steering," and has certain advantages which are worthy of careful consideration. These advantages include:

a—Road shocks in the plane of the wheel have a minimum moment about the knuckle axis and are consequently transmitted in a less degree to other parts of the steering mechanism.

b—Wheels have minimum tendency to toe out because moment of rolling resistance about pivot axis is at a minimum.

c—Possibly easier steering. (There is considerable question as to whether this is actually realized in practice.)

In an article by A. Ludlow Clayden[3], entitled "Wheel Wobble and Other Faults in the Steering System," it is contended that advantage *a* is negligible, a contention which has since been refuted by O. M. Burkhardt[4] and others. Road shocks on the steering mechanism are undoubtedly less by a considerable amount, but of course they are not eliminated.

Some contend that, with center point steering, the front end of the car is raised when the wheels are deflected from their straight ahead position, a contention with which the author is unable to agree.

Since, with center point steering the wheel does not roll when it is cramped with the car standing, as it does with a vertical pivot, it seems doubtful whether a car with transversely raked pivot actually steers more easily than one with vertical pivots.

Transversely Inclined Pivots

With center point steering, the torsional stresses on axle and spring due to road shock are increased, but the design can easily be made such as to care for these. Clayden contends, as pointed out elsewhere, that transversely inclined pivots involve an increased tendency to bring about wheel wobble.

It is undoubtedly more difficult to manufacture axle and knuckle parts when transversely inclined pivots are employed so that there is good reason to doubt whether, all things considered, the use of this construction is worth while except, perhaps, when front wheel brakes are employed. In that case the possible stresses on the steering gear and linkage are so great that inclined pivots are worth while if not actually essential.

[3] See Automotive Industries, Oct. 5, 1922.
[4] See Automotive Industries, Dec. 14, 1922.

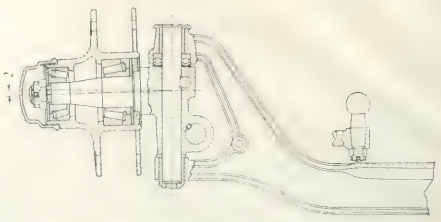


Fig. 7—The Columbia axle end, with vertical knuckle pivot

To put the matter in a somewhat different way it can be said that it is desirable to reduce the moment of forces in the plane of the wheel about the knuckle pivot, but that a construction which does not involve transversely raked pivots, but which still reduces the moment in question a sufficient amount as to be quite satisfactory in practice is possible. Tilting the wheel spindle toward the ground helps reduce the moment, but excessive wheel rake is not good either from the standpoint of appearance or in respect to its adverse effect on tire wear. Angles of 1 to 3 deg. are nearly always employed and greater angles are used in some cases.

Knuckle Pivot Location

It would seem to be a self-evident fact that it is desirable to bring the knuckle pivot as close to the central plane of the wheel as is feasible without involving unnecessary expense, yet surprisingly little attention is given this point in some instances. In one case, that of a well known and much used American axle, it has been found possible to bring the pivot a full half inch closer to the wheel by simply using countersunk hub bolts and slightly altering the machine work on the wheel spindle. Incidentally this simple change greatly improved the steering of the car.

Engineers who have given the matter of knuckle pin location careful study seem to be agreed that an ideal position for it is in the central plane of the wheel. There are certain problems involved in so placing it, but they do not appear insuperable, especially for higher-priced cars and trucks. This arrangement is used to a limited extent, and one advocate contends that the cost is actually less than when conventional practice is followed. However this may be, a design embodying this principle is

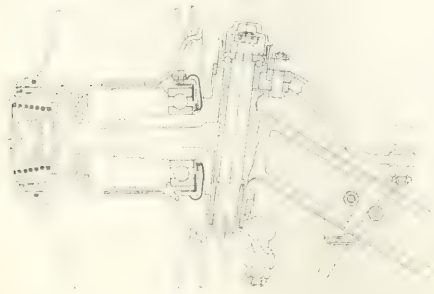


Fig. 9—Rolls-Royce knuckle with pivot inclined to give center point steering

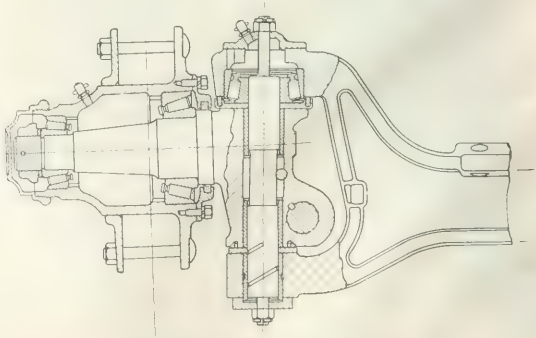


Fig. 8—The Autocar knuckle with vertical pivot, an example of truck construction

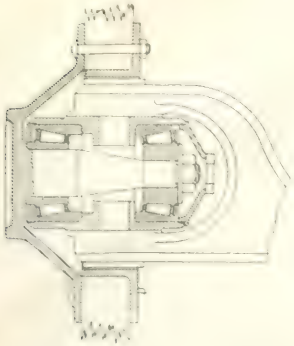
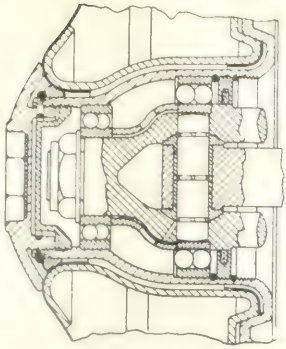


Fig. 11—Type of knuckle with axis in central plane of wheel formerly used on Marmon cars



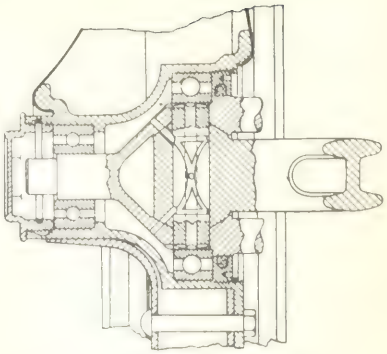


Fig. 12—Two designs of knuckle with axes in central plane of wheel suggested by W. J. P. Moore

worthy of careful consideration and can easily result in better steering qualities.

The primary advantages of such a construction are the fact that center point steering is attained without a tilted pivot and that all tendency toward wheel wobble, except that caused by lack of balance of the wheel, is eliminated.

The chief disadvantage of this construction, or at least that of one form which has been employed, is that unnecessarily large wheel bearings are required. This disadvantage does not apply, however, to all arrangements which embody the principle, as will be evident by reference to Fig. 11, which shows the construction employed for some time in Marmon cars, but not used on later models. It will be seen that the bearings are no larger than normal, but that the wheel spindle is reversed and carried in the forked end of the front axle, the jaws of which must be somewhat deeper than those ordinarily employed.

Two other designs embodying the same principle but employing bearings which appear to be larger than those normally used are shown in Fig. 12. These designs, due to W. J. P. Moore, embody certain advantageous features, among which may be mentioned the fact that the pivot is completely inclosed in such a way that it is well protected from entrance of dirt or moisture and should be quite easy to lubricate. Also the increased size of bearing appears to be offset to some extent by a simpler axle end than is commonly employed.

Foregather or Toe-In of Wheels

When the design is such that the normal rolling resistance of the wheels tends to produce moments about the knuckle pivots or when the wheels have undergather, one or both of which constructions are, we believe, universally employed, the wheels have a tendency to spread or toe out. In fact, if set absolutely straight ahead with the vehicle stationary, they will toe out more or less depending upon the amount of play and spring in the parts stressed, and rapid tire wear will result. To counteract this tendency, the front wheels are always set with a foregather of 3/16 to ½ in. Just how much of this foregather is eliminated, due to the stresses of normal service, we do not know. We have never seen any data in this regard, but believe that, in most cases, the wheels are still foregathered to some extent even at times when considerable resistance to rolling is present. Just why this should be desirable is not entirely clear, but it is supposed to add to tire life to create this condition. It can be said, however, that tilted wheels tend to roll in a circular path instead of in a straight line, and that foregather of the wheels counteracts this tendency. There is certainly one position of the wheels at which resistance to forward motion is at a minimum. Any deviation from this position either inward or outward increases this resistance, so that too much foregather is as bad as having the wheels toe out. So far as we are aware there is no definite rule which establishes the precise amount of foregather which is desirable.

Castering or Trailing Effect

When the knuckle pivot axis is truly vertical the vehicle has little if any sense of direction, that is, it acts only in response to steering forces imposed by the operator who must usually keep feeling the steering wheel in order to hold the vehicle to its course. If, on the other hand, the axis of the pivot be tilted either transversely or with its upper end to the rear, the vehicle has a certain sense of direction or self-righting tendency, that is, a tendency to straighten out when deflected from a straight course, except perhaps under certain extreme conditions.[5] This is due to the fact that the weight supported on the pivot tends, under the influence of gravity, to fall to the lowest point which the mechanism permits, or trail behind the central point of tire and road contact. This is usually termed castering action.

If the pivot be tilted forward, there is still a castering action, but the vertical force due to the weight of the car no longer trails behind the vertical force due to the pressure of the road against the tire. This anti-trailer effect creates a tendency for the wheel to reverse when the vehicle is in forward motion and pull the steering wheel from the hand of the operator—precisely the same effect created by rearward motion of the vehicle when the pivot is tilted backward as in common practice.[6]

Napier points out[6] that there are other forces beside gravity which contribute to castering effect when the car is in motion and the wheels are deflected from a straight course. These are centrifugal or inertia forces which depend upon the velocity of the vehicle and the radius of the curve it is describing.

In respect to castering Napier says further:

"It will inevitably be found that the greater the caster effect, the more pronounced will be the influence of each rut and bump

[5] Clayden takes an opposite view with which we do not agree.
[6] See *Automobile Engineer* issue of July 9, 1914, page 223.

in deflecting the car from a straight line; and a driver relying on caster effect would be ill advised to expect his car without personal intervention to avoid the ditches even on the straightest and widest of rough roads. It is true that, if a bump deflects the steering wheels and the car from one smooth portion of the road to the next, castering action will give the car a tendency to follow a straight course; but it will not be the original straight course. The tendency of castering action is not to preserve a straight course, but to restore the parallelism of the steering and driving wheels after that parallelism has been disturbed by whatever cause. It is, in fact, obvious that, since castering action must take place indifferently on either side of the center line of the car, there can be no castering action while the car is proceeding in the direction of that center line.[7] To my mind, the ideal form of steering gear for a car intended principally for use on rough roads is the original Renouf type, the steering pivots being vertical and in the planes of the wheels. This type has no castering tendency at any steering angle.

"On a smooth and level road, castering action may be relied on. While, on the level, by means of a judicious arrangement of steering details, combined with a skilful manipulation of speed in relation to curvature, a car may become self-steering so far as leaving the curve is concerned, it cannot automatically enter a curve from the straight."

The castering angle or the fore and aft angle which the axis of the knuckle pivot makes with the vertical, is usually from 1 to 3 deg., but angles as high as 6 deg. are employed. One experimenter[8] states that angles of 4 deg. or more have resulted in violent wheel wobble. He recommends making the caster angle equal to the angle of tilt of the wheel spindle and states that 1¾ deg. is about the right value for both.

The castering angle is usually set by placing wedges between the spring and spring seat. It should be remembered that the castering angle sometimes varies with deflection of either or both front and rear springs. The condition of average load should therefore be borne in mind in selecting the angle at which the pivot is set. One writer states[9] that with quarter elliptic springs the pivots tend to tilt forward in rounding a curve, thus giving an anti-castering effect. Items of this kind sometimes have a marked effect upon the steering of the vehicle and should therefore be given close study in laying down the design.

[7] This apparently means no castering effect other than that due to gravity.
[8] Steering System Faults Explained. AUTOMOTIVE INDUSTRIES, Dec. 7, 1922, page 1139.
[9] *Automobile Engineer*, May, 1921.

List of Foreign Dealers Available

BETTER trade lists of foreign dealers and distributers are now available for American automotive manufacturers than ever before. The Automotive Division of the Bureau of Foreign and Domestic Commerce is ready to supply detailed, practical information on foreign dealers. And, what is equally important, special effort is being made to keep the data up to date and get them out quickly.

To facilitate the distribution of this material and to make it available as rapidly as possible, it is being prepared in several forms. Automotive manufacturers can get clearly in mind how they can best utilize this improved service by having an understanding of just what data are available.

At present the automotive commercial intelligence service offered to American automotive manufacturers listed on the Exporters' Index consists of the following:

(a) **Trade Lists**—Containing names, addresses and products handled by automotive dealers in various locations.
These trade lists are now being revised; the new issues besides being brought up to date contain additional data regarding nationality of dealer, selling organization, storage, service, vulcanizing facilities and side lines.

(b) **World Trade Directory Reports**—Containing additional information of a confidential nature of individual firms whose names appear on trade lists. These reports are furnished upon special request and, while they do not give credit information, they state other valuable data including the firm's bank references, capital, managers or partners, reputation, etc.

(c) **Automotive Intelligence Circular as Outlined Above**—These confidential circulars are sent to all automotive exporters listed on Exporters' Index as soon as the reports are received. Their contents are similar to those of the revised trade lists, the latter being, however, distributed merely upon request and only after reports on all important dealers in one territory have been compiled.

(d) **Special Investigations**—Will be undertaken if relations with a foreign dealer necessitate an impartial report. If important information is urgently requested, cables will be dispatched at the expense of the inquirer.

Automotive firms can do much to keep the commercial intelligence file accurate and up to date by reporting whenever letters addressed to firms stated on trade lists do not reach destination. It is also requested that all cases of dishonesty and unfair business practices on the part of foreign dealers be reported in order that other American firms may be warned against establishing connections with foreign concerns of poor reputation.

It is suggested that automotive exporters make the fullest use of the automotive commercial intelligence service by addressing communications either to the Commercial Intelligence Division or to the Automotive Division, Bureau of Foreign and Domestic Commerce.

Ford Assembles Cars at Argentine Show

THE greatest single success of the recent Argentine exposition was the Ford display under the direction of the general manager of the Buenos Aires branch. A large tent was set aside for the company and in it was laid out an assembly line, exactly similar to that in the Buenos Aires factory. Beginning at 9 o'clock every night, a number of cars were assembled, just as they are in the factory. A large corps of employees, dressed in uniform, handled the chassis as they came along and a completed car rolled off the runway once in every ten minutes.

As fast as the engines were put in place and the bodies bolted to the chassis, a sign reading "Sold" (Vendido) was hung up on it, the car then being driven away.

Every night this tent was packed with spectators, among them many who possessed and drove cars of many times the price of the little Ford. The manner in which the public in general visited the Ford booth and the way in which they watched the operations demonstrates that the Argentine motorists are looking under the hood.

They are interested, of course, in the bodies and body lines—that will always be the case—but it is becoming increasingly evident that good bodies will not alone sell cars here. The public here is becoming "motor wise" and it is buying only those cars which are well made and which are as finely constructed from a mechanical as from a body standpoint.

European Conditions More Favorable for Motor Vehicle Sales

Improvement in rates of exchange and anticipated reciprocal import duties needs to open up some markets. Unsold army trucks in France still offer sales resistance. Possibilities of trading with Russia. Wide interest in American products.

EUROPEAN conditions are becoming more favorable for the sale of American automotive equipment, although in some countries the barriers of exchange and customs duties are yet such as to close them automatically to the vehicles manufactured in this country.

This was the impression obtained by D. A. Laing, sales manager of the General Motors Export Co., who has just returned to New York after a trip to Europe, during which he visited and studied automotive conditions in France, England, Belgium, Holland, Switzerland and Italy. In addition, he conferred with G. M. C. representatives and distributors from numerous other sections in order to get a general picture of the present outlook throughout the Continent.

"The possibilities are very good that tariff revisions will be made in several countries as a result of our own action in adopting reciprocal import duties," he said. "Changes are being actively considered and indications are that some results may be expected.

"I found generally that the business outlook is becoming somewhat more favorable, although of course there is much in the way of an immediate recovery. We have believed for some time that Europe was a good place to watch and that it held many possibilities for our lines. Our exhibits at the London and Paris shows were widely attended and drew distributors from many places. We consider these shows to have been very successful from our standpoint and are more than ever convinced of the prospects."

One feature of Laing's trip was a further survey of the left-over war stocks of automotive vehicles in France. Numerous American-made trucks are still unsold in France, and their disposal presents a difficult problem. Passenger cars, however, have been liquidated.

The Russian situation also came in for some attention. Laing authorized the announcement that an effort is being made to ascertain what opportunities exist there for the sale of automobiles through a barter system. This plan has been before the company for some months and it is now believed that some possibilities may exist for making satisfactory trading arrangements.

Conditions and the outlook in the various countries are summed up by Laing as follows:

France—It is generally difficult or impossible for American automotive vehicles to be sold in France when exchange is above thirteen francs to the dollar. For this reason, practically no orders are coming in. When and if the French duty is lowered to correspond to the new American duty, our position will be considerably bettered. Exchange prospects seem to indicate that the dollar will not go below thirteen francs again until February or March. There is a serious problem in France before some manufacturers in regard to war stocks of trucks. Few or no passenger cars remain from these stocks and those unsold are almost worthless. Quite a lot of American trucks, however, which were set aside for sale to Poland have not been liquidated and still remain as a problem confronting the industry.

Belgium—Conditions are good and with exchange at or under fourteen francs to the dollar, we can secure large sales in Belgium.

Holland—This is a very good market but it is a little overstocked. Business is still somewhat stagnant. Exchange and duties, however, are favorable. German cars and trucks which had begun to come into Holland fairly freely are already considerably discredited, particularly trucks.

England—English conditions have been helped materially by the recent rise in sterling exchange. Any activity in England will be of great assistance to the sale of American automotive equipment in the surrounding countries of Europe and also in the British Colonies. I talked with visitors from many parts of the world, while at the London show, and was gratified to learn of their wide knowledge of our products and their enthusiasm for them.

Switzerland—This country was much upset by the impending vote on the capital levy. Fortunately, this proposal has been rejected by an overwhelming majority and more normal conditions will prevail as regards automotive sales. In spite of being in the center of very difficult competition from the manufacturers of other countries, American cars, excluding a certain few, are especially suitable for Swiss conditions.

Italy—My visit to Italy was made at a most important time and soon after their recent anti-Bolshevik revolution, in which the Fascisti party and Premier Mussolini were brought into power. This party is now in control of Italy, having routed the Communists. Premier Mussolini and his party are determined to support the King, the army and navy and law and order in general so that Italy can really resume its proper place in the commerce and affairs of the world. Our friends in Italy look for further improvement in exchange in the near future and for new customs rulings that will permit our products to enter on a fair basis, which they cannot do at present. Furthermore, Premier Mussolini is planning a business-like administration in the general interest of Italy's future and her international trade.

New Courier Line Comprises Nine Body Types

Wheelbase of 116 in. used for all models. Automatic chassis lubricating system is employed. Chassis assembled from standard units with slight modifications. Road test for all completed cars.

By J. Edward Schipper

NINE body styles mounted on a single standard chassis comprise the Courier line. The company is now in moderate production and has been shipping cars to its dealers for some time. The bodies are made in the shops of the company at Sandusky, Ohio. The chassis is assembled in this plant and possesses some features which are of exclusively Courier design.

The 116-in. wheelbase chassis incorporates a Falls model T-8000, six-cylinder valve-in-head engine. This engine is a stock product, with the exception of the fitting of a dry sump oiling system for which some exceptional oil economy claims are made. A bore and stroke of 3⅛ by 4¼ in. give a displacement of 195.6 cu. in. and a horsepower formula rating of 23.44. The engine is claimed to develop 46 hp. on the block at 2600 r.p.m.

The five-passenger car weighs 2825 lb., ready for the road, giving approximately 62½ lb. of car weight for each horsepower. With a standard rear axle ratio of 5 to 1 and an optional ratio of 4.6 to 1, a speed range of from 2 to well over 60 miles per hour is developed. This is with a 32 by 4-in. tire.

The Falls engine is familiar to the trade, having been on the market for some time.

The pressure relief valve, which is carried in an accessible position on the engine, is so arranged that the pressure is taken after the oil has passed through the engine instead of before. The pressure is held at a fairly constant point of 30 lb. to the square inch. To secure the high pressure which could be set to run up as high as 75 lb., a very close-fitting gear pump is employed. The pump drive is the same as on the Falls engine, the additional pump simply being superimposed on the other.



Courier sedan, one of the nine body styles comprising the line

Another deviation from the standard Falls engines is the employment of cast covers for the top and for the valve action. On the standard engines, stampings are employed, but the castings have been substituted for greater rigidity, so that distortion will not take place through unusual tightness on the retaining screws. Gasoline is supplied from a 12-gal. tank in the rear of the chassis through a Stewart vacuum system to a Stromberg carbureter. Ignition is by the Atwater Kent system and the starting and lighting system is a Westinghouse. The battery is a U. S. L. six-volt, 94 amp. type mounted in a steel cradle under the front floor boards.

Hotchkiss Drive Employed

The clutch is a 10-in. Borg & Beck single dry-plate type, delivering the drive through a Muncie three-speed gearset mounted in unit with the powerplant. This gearset is mounted on annular ball bearings throughout. The drive is a Hotchkiss type through two 6½-in. flexible disk universal joints. The rear axle is a Columbia three-quarter floating type mounted on annular ball bearings. The front axle is a Peru, drop-forged, I-beam, with a 2¼ by 1½-in. I-beam section. The steering gear is a Lavine, irreversible worm and wheel type with an 18-in. hard rubber steering wheel designed particularly for this car. It is a thin grip type with the Lavine center control in which the spark and throttle levers are mounted on the steering wheel hub.

The pressed steel, channel section frame is 7 in. deep at the center, with 1½-in. flanges and the stock is 5/32 in. in thickness. The cross-members consist of three pressed steel channel units and two reinforcement tubes, the rear tube being 3 in. and the front 2 in. in diameter. These are mounted in sockets bolted to the frame and as a measure of rigidity, it may be mentioned that a rear corner of the frame can only be lifted a little over ½ in. before picking up the entire frame, this representing the distortion, due to the weight of the frame supported in this manner.

Semi-elliptic spring suspension is employed, the front having an alloy steel main leaf and high carbon steel used for the remaining leaves. The length of the front spring is 36⅜ in. and the width 1¾ in. The rear spring is chrome vanadium steel throughout, 53 in. in length and 2¼ in. in width. The wheels are artillery on all standard models with Stanweld rims. Forsythe disk wheels or wire wheels are standard on the sport model. The tires are 32 by 4-in. non-skid cord, front and rear.

The Kellogg automatic chassis lubrication is installed, this being operated from a central tank located on the front of the dash, with a plunger so constructed that one push after the system has been filled will force lubricant to the various parts of the chassis under pressure. With the use of the flexible disk universals, the usual grease cups have been practically eliminated.

All of the body work is handled in the Courier plant, which is equipped with a complete wood-working and paneling department. The bodies comprising the line are a five-passenger phaeton selling for $1,395; three-passenger roadster selling for $1,295; three-passenger sport roadster, $1,395; three-passenger coupe with extra folding seat, $1,965; five-passenger De Luxe sedan, $2,165; four-passenger sport, $1,495; sport phaeton, $1,475; five-passenger brougham, $1,995, and special sedan $1,850, all prices being f. o. b. Sandusky. The colors supplied are Baltic green, maroon, azure blue, moleskin and dark blue. The upholstery on the open cars is real leather with Spanish finish. On the inclosed cars, imported fabrics are employed. The bodies are practically custom built, as with the limited production, the body manufacture entirely consists of hand work.

From 3 to 5-hour road test is given each car by inspectors before the car is passed and an endeavor is being made to obtain uniformity as regards carbureter and ignition setting. A very thorough rattle inspection is provided. The standard equipment includes spare rim, tool kit, jack, tire rejair kit, starting crank, rim wrench, switch keys, curtain rods, windshield wiper and spot light on the sport models.

The Courier cars for export are supplied with the following optional equipment: Disk or wire wheels, khaki top, right-hand drive and magneto ignition.

Franklin Makes Many Body Changes

NEW Franklin models have lower top lines, increased length and are wider above the body rail. These changes in construction have made it possible to provide roomier bodies. The lines of the higher hood are carried back from the almost vertical grille to the flare of the cowl where they blend smoothly into the body lines. The level of the hood line and the body rail presents an unbroken and continuous sweep from tip to tip, an effect which accentuates the increased length of the car. Seven models comprise the new body line.

The driving compartment is more roomy due to the compactness of the engine and the additional length of the new bodies. More space is obtained in the tonneau also. The position of the seats is lower. The steering post is inclined a little more to suit the lowered seats.

Of the seven new body models, six will be closed, the only open model being the phaeton. The newest type is the sedan with four doors and a straight type windshield. A gain in room in the front seat has been obtained by building it straight across and making it lower, wider and set at an angle which allows ease of driving and comfort for the passenger.

The brougham carries five passengers and has two tilting seats in front and a low rear seat.

The coupe body has been lowered, lengthened and widened.

The demi-sedan is smoother in line and more convenient than before. The roof is lower and wider and on the road the car looks larger from every angle. The glass side panels have been increased in area and the change of windshield design gives clear diagonal vision.

The changes in the phaeton are in the construction of the top which affords rear seat passengers an open view. The front seat is wider and there is more room both in the front and rear compartments. The low top and the merging of the body rail with the horizontal top line of the hood give the phaeton a more rakish appearance.

The touring-limousine has a sliding glass partition which makes it convertible from a chauffeur-driven to an owner-driven car. The weight is little more than 2900 lb.

THE Gramm-Bernstein Motor Truck Co. has announced several changes in the Gramm Pioneer line of trucks for 1923.

The Model 10, speed truck, formerly powered with a Lycoming KB engine, will now use the new Lycoming series C engine, 3½ in. x 5 in. size.

A Continental model J-4 engine, 3¾ in. x 5 in., will be used in place of the Continental Model N, on the Model 65, 1½-2 ton truck. The emergency brake which formerly operated on the rear brake drums will now operate on the front propeller shaft and be of the ventilated shoe type.

The Model 20, 2-2½ ton worm drive truck will be powered with a Continental Red Seal K-4, 4⅛ in. x 5¼ in engine in place of the Continental Red Seal C-2 model of the same size. The same change in braking systems will be made in this model as in Model 65.

The Gramm patent fuel economizer will be made standard equipment on the Model 20.



New Franklin demi-sedan



New Franklin phaeton with lower top

Argentina Offers Biggest Market in Southern Continent

Present annual requirements of 10,000 motor vehicles will increase to 20,000 with normal times. American automotive products favored. Large tire and accessory market. Proper representation at outset will insure getting share of growing trade.

By George S. Brady
U. S. Trade Commissioner at Buenos Aires

ARGENTINA has more automobiles than any South American country, and without question offers greater possibilities for the present development of automobile and truck sales than any other country of that continent. Its population of 8,800,000 is scattered over an area greater than that of the United States east of the Mississippi River, or larger than all of Europe excepting Russia and the Balkans. The most densely populated and highly developed of this vast extent of territory is the great pampa or prairie region, which is rich in agriculture and enjoys a mild climate.

The American manufacturer wishing to sell his cars in Argentina will find it advantageous to obtain a clear understanding of the Argentine people and their social organization, which differs in so many respects from that of most of the other Latin American States.

Nearly one-quarter of the entire population of Argentina lives in the two cities of Buenos Aires and Rosario. The forty-nine cities and towns of more than 12,000 inhabitants have a total of 3,500,000 inhabitants, or 40 per cent of the total population of the country. In addition to these there are 114 towns with populations between 4000 and 12,000. Practically all of the towns of over 5000 inhabitants have paved streets, and all form automobile centers with garages and supply stations.

PREVIOUS to the war Argentina had imported upward of 17,000 automobiles, the annual imports having increased progressively over a period of fifteen years. These automobiles were largely European passenger cars with small motors for use chiefly in the cities of Buenos Aires and Rosario. By 1913, which was the record year in motor car sales, with a total importation of 5115 the imports of American cars had reached 20 per cent of the total. These were mostly low priced light cars and were destined for use in the country districts. Little attempt had been made to advance the sale of the European cars in the rural districts on account of the almost entire lack of roads, and there was no faith in the ability of the American better class car with larger engine to surmount the difficulties of passage over the bad roads and trails. It was the American light car that was the pioneer in the Argentine country districts, but at the beginning of the war in 1914 American motor car popularity was still limited to the sphere of the low priced light car for rough country use.

After 1916, however, the activity of American car agents increased so that by 1919, before the European manufacturers were able to get back into the field, at least half a dozen American makes of medium and high priced cars were well known in Argentina.

THE estancia owners purchase more than one car, usually three, one high-priced closed car for family use, a high or medium-priced five passenger for ranch use, and a light car for rough ranch use. Sometimes the ranch foremen are also provided with light cars. On the Argentine pampa it is possible to drive across the fields easily during the summer, and both the light and heavy cars are used for this purpose. Before the market slump and agricultural depression of 1920 every estancia was being provided with automobiles, and the overseers of these great estates were making their daily rounds in cars instead of by the old method of horseback. With the improvement of business conditions, the Argentina "camp," or country, should become one of our best markets for automobiles of all types.

The above general remarks refer principally to passenger cars, and it can be seen that the requirements of the market will not vary much from the demands of the American car buyer. In the early days of the motor

IN this story, George S. Brady, U. S. Trade Commissioner at Buenos Aires, tells of trade conditions in the Argentine. He shows where the best markets are and suggests methods which the American exporter should use to get his share of the business.

* * *

American motor vehicles and automotive products have won a splendid reputation. They have shown that they have the stuff in them. Reputation will suffer unless backed up by reliable, capable representation, and the author tells how to get it.

car in Argentina the distributers received various requests for special features. In most cases these were whims that were overridden by the manufacturer.

The four-cylinder car is the favorite, but many of six cylinders are in common use. Those of eight and twelve are considered to be in the luxury class and are not among the cars in daily use on the ranches.

Custom Requires Chauffeurs

In Argentina automobiles are not usually driven by their owners, the prevailing social custom of the country making it necessary for the car owner to have a chauffeur. This point has undoubtedly prevented many people in the cities from purchasing cars for their own and family use. On the ranches the passenger cars used for recreation purposes are driven by hired chauffeurs, but the cars for daily ranch use are driven by the owner or by the foremen.

Only a beginning has been made in the sale of motor trucks in Argentina, but the most difficult introductory stage is past. Interest has been aroused recently in this class of transportation, and it is apparent that within a short time the motor truck will come into general use, both in the cities and for hauling on the estancias. Since 1920 light delivery cars have come into use by retail stores, breweries, dairies, and business houses. In fact, the crowded condition of the narrow streets of the business districts of Buenos Aires has made it imperative to adopt motor transportation instead of the two-wheeled carts drawn by horses in tandem.

The War Department, Post Office Department, and some other branches of the Government have acquired heavy trucks for transport work, and a number of private companies have also adopted them for heavy hauling in the city of Buenos Aires. As yet the estancias have not been persuaded to adopt the truck for grain hauling, and the two-wheeled cart carrying five tons and drawn by twelve horses is still the medium of transport from the ranches to the railroad stations.

The gradual improvement of the country roads will bring about a change to the heavy motor truck and trailer for transportation from ports. In the Mendoza wine district some progress has been made, and one of the largest wine factories has adopted American heavy duty trucks for the transport of grapes and wine. Considerable pioneer work has yet to be done, and advertising is necessary.

Truck Educational Work Needed

European truck manufacturers seem to have realized the importance of getting the first foothold in the market, and their efforts have been strong toward getting their makes adopted by the Government Departments. The German Opel Company has an active agency in Buenos Aires, and is advertising its trucks in all the towns of the Republic. The Fiat Company is also active. The possibilities of truck transportation in the grain, wool and livestock regions of Argentina are very promising and the field is yet almost untouched. American manufacturers should join more forcefully in this preliminary educational work and make their trucks known to the Argentine farmer.

The possible consuming market for motor trucks, Buenos Aires, is very large. The city contains 1,800,000 inhabitants, not counting the many suburbs. It is a city of great distances, covering an area more than two and a half times that of Paris. It is situated on the pampas and is perfectly flat. The streets are all paved mostly with smooth stone blocks or with a stone block base. These pavements connect up the suburbs and the cities of Avellaneda and La Plata. It is now only a matter of a short time before it will be connected with Rosario by a hard surfaced road, thus linking up another series of important cities, all of which have pavements suitable for the heaviest trucks.

A conservative estimate based upon the number of factories, and large commercial houses would indicate that a thousand trucks could be used profitably in the city at once, and that this number ought to increase regularly. In addition it is a city well suited in many respects to bus transportation. The municipality granted a concession in 1921 for the operation of bus lines over given routes. By means of a well-conducted campaign of educational advertising the American truck manufacturer should be able to establish an extensive truck market in Buenos Aires and in the Argentine agricultural districts.

Accurate Registration Data Lacking

There is no official data on the total registration of cars in Argentina. Registration is made by municipalities and the combined statistics are lacking. The total of cars in the Republic, however, can be estimated from the official import statistics and the sales records of the cars entering the country knocked down, and which do not figure in the import statistics. Since 1900 the imports have been as follows:

Year	Cars	Year	Cars
1900	9	1911	2,461
1901	16	1912	4,281
1902	28	1913	5,115
1903	62	1914	2,185
1904	129	1915	1,847
1905	377	1916	5,929
1906	712	1917	11,031
1907	610	1918	11,667
1908	495	1919	8,448
1909	831	1920	27,312
1910	1,581	1921	8,952
		Total	94,078

Imports for 1918, 1919, 1920 and 1921 include 5741, 3854, 13,374 and 8,085 cars respectively, imported knocked down and classed as parts. These figures were taken from the sales records of the importer. The Automobile Importers' Association supplied the data for the remaining 867 cars shown for 1921, there being no official statistics for the year available.

Imports of cars for the first six months of 1922 totalled 2290, according to figures of the Automobile Importers' Association taken from ships' manifests. To this should be added not less than 5000 knocked down cars imported as parts during this period, making a total of 7290 cars imported during the first six months of 1922.

Total Number of Cars in Use

It is estimated, therefore, that a total of 77,627 automobiles were in service in Argentina on June 30, 1922. This figure includes trucks, as the Argentine customs statistics included trucks with passenger cars prior to 1920. The number of trucks in Argentina is small and will not reach more than 1 per cent of the total. Official registration in the city of Buenos Aires shows over 1300 "automobiles for cargo," but these are mostly automobile chassis with truck and delivery bodies.

As the larger part of these cars were imported after 1916, and since it is known that cars are not scrapped as quickly in Argentina as in the United States, a very conservative estimate of the total cars now running in that Republic is 75,000, of which more than half are light cars with the small inch clincher tire.

At the present time the annual requirement of the Argentine for automobiles is in excess of 10,000, but there is every reason to believe that when normal times return the requirement of medium and high class cars alone will exceed this figure and that the total annual requirement will be greater than 20,000. The probabilities also are that this amount can be maintained and exceeded for some years to come as immigration, betterment of rural conditions and road improvements are all tending to widen the field for automotive transportation.

Part and Accessory Trade

The automobile part and accessory trade in Argentina has become one of prime importance to American exporters. The wide distribution of American cars has naturally called for parts, but in addition the American accessories have acquired a good reputation. In 1913 out of a total of approximately $2,500,000 worth of parts and accessories imported into Argentina only $110,000 worth came from the United States. Eighty-five per cent came from France, Germany and Great Britain. But in 1920 the United States exported to Argentina $7,266,000 worth of parts and accessories not including engines, engine parts and tires. This figure included parts for about 12,000 knocked down light cars which may be estimated at little over $2,000,000. In the year 1921 the exports of accessories fell to $3,658,000 due to the economic crisis in Argentina, but the potential market is existent there, and the number of American motor vehicles now in Argentina assures a steady demand on a large scale for American accessories.

The demand for automobile accessories has been so general and the trade so lucrative that a large number of small factories have sprung up in Buenos Aires for the manufacture of parts and car equipment. Three or four of these factories are producing accessories of good workmanship, including bumpers, windshields, lamps, radiator ornaments, cutouts and bronze and aluminum cast parts. There are also two factories making electric storage batteries. One of these plants is now producing 40,000 lead plates monthly, of which 25,000 are for automobiles.

At the 1921 automobile show in Buenos Aires there were very complete exhibits of European accessories. These included German magnetos and spark plugs; English generating sets, batteries, spark plugs and lamps; French fire extinguishers and carbureters. Quite extensive advertising is conducted through the newspapers by the agents of European manufacturers.

Methods of Distribution

Unit assemblies and repair parts are handled through the car agents, but accessories, tools and such standard parts as ball bearings, reach the retail trade largely through the motor accessory stores or the larger hardware houses. These houses import through manufacturers' agents, or in some cases directly. There are four or five of the motor accessory stores in Buenos Aires that have a country-wide reputation and carry considerable stocks of all lines. There is hardly anything in the line of motor car accessories that is not salable to the Argentine trade. Almost the only exception to this is the anti-skid tire chains which are not used in Argentina.

The Argentine car owner is, in fact, generally quicker to adopt new equipment than the average American owner. For example, over 80 per cent of the small cars have been equipped with complete sets of shock absorbers. Another low-priced car agent introduced a feature of an electric button to open the door and there was an immediate demand for this feature on the cars.

There is a constant demand for repair parts out of all proportion to the requirements for the same number of operating cars in the United States. The agent for an American shock absorber stated that although he had only about 25,000 sets placed in the country the call for repair parts was greater than the demand over the entire section of the United States east of the Mississippi River. Car agents in Buenos Aires also say that the demand for repair parts is always much greater than the American trade requirement. This is due to the bad conditions of the country roads, lack of mechanical skill on the part of the chauffeurs and to lack of regular oiling of the cars.

Garages and service stations are now to be found in every district of Buenos Aires and in nearly every town of the Republic. American car agents were the first to inaugurate repair service in Argentina, and as a result the service stations there now follow closely the American type of station, even to the feature of free air, "aere libre," to attract autoists. A further reason is that Argentine car owners and agents have been close readers of American automotive journals. Many of the Buenos Aires garages are handsome buildings with ample car storage space and are equipped with the latest tools and appliances for all ordinary mechanical and battery repairs and for vulcanizing. These garages sell fuel, lubricating oils and tires, but do not handle accessories to the extent that the American garages do.

There is a good demand for top covering materials and imitation leather for upholstery. There are no less than fifteen body building establishments of some importance in Buenos Aires. They make most of the closed and special bodies used. These body builders usually purchase the materials through manufacturers' agents in Buenos Aires.

Correct Way to Send Shipments

In shipping parts and accessories to Argentina it is important to pack all parts of one kind together and not put different articles in the same box or crate. The reason for this is that the Argentine customs tariff on automotive parts is based on a valuation by weight, and as this valuation varies with different parts it is essential to pack each class of item separately in order to benefit by the lower rates. Another important point now being ignored by many manufacturers is the labeling in Spanish. Where such articles as horns, spark plugs and repair kits come in separate paste board boxes and are intended for display in the box, the label on the box should give the designation of the goods in Spanish and omit reference to American price in dollars.

The growth of the American tire trade in Argentina since 1913 has been phenomenal, and has more than kept pace with the sale of American automobiles there. In this trade American manufacturers were benefited by the fact that the European companies were obliged to neglect their South American markets during the war years. From a small beginning of $8,153 worth of automobile tires of all kinds exported to Argentina in 1913, the United States exports jumped to a total of $3,126,889 in 1920. Of this amount only $26,938 represented solid tires and $307,143 inner tubes.

The strongest European competition in the Argentine tire trade comes from the three companies, Michelin, Pirelli and Dunlop, all of whom have their own sales organizations in Buenos Aires and advertise extensively throughout the country. As it is very difficult to get any of the established houses in Argentina to finance a strong sales campaign and carry the large stock of tires needed, it is imperative for the American manufacturer to open a branch in Buenos Aires. Several important American companies have already done this.

Buenos Aires is the capital and the center of all big business of the Republic, and is the logical place to center an automobile agency. It also has advantages as a regional headquarters and firms in many lines of business have found it advantageous to give their Buenos Aires office control over the agencies in Uruguay and Paraguay. One of the most important advantages of this is an easier control over shipments and distribution, and it does not interfere with the direct unloading at Montevideo of consignments intended for Uruguay. Shipments to Paraguay have to be transferred to the river boats at Buenos Aires, and the Buenos Aires agency can see to the details of this when the responsibility is placed on it.

Tariff Makes Prices High

On account of the transportation charges and customs duties the selling price of automobiles in Argentina is naturally much higher than in the United States, and this is a factor entering into the possible extent of the market. The difference in retail prices may be judged by comparing the price of a 4-cylinder 5-passenger car which sells for $525 in the United States and retails in Buenos Aires for 2985 pesos, or approximately $1,104 at the exchange of the day. A bid put in to the Sanitary Department on Aug. 2, 1922, for fifteen 5-ton trucks by the Fiat agency in Buenos Aires was for 3,300 gold pesos each, or about $2,740.

Suggestions for Better Merchandising

There are a few vital points to be remembered by the automotive manufacturer desiring to make a success of his car or accessories in the Argentine market. Foremost among these is the selection of the proper firm as representative, the manager of which should be of proven sales and mechanical ability. To introduce any car on the Argentine market requires a costly advertising campaign, and for this reason the representative will demand the sole agency in the entire country for a period of years. The agency in Buenos Aires holds the same relative position to the Argentine car buyer as the factory does to the American purchaser. The representative must therefore be of the type who can offer service and give it. If the manufacturer will give sufficient attention at the outset to the selection of a capable firm to handle his representation he will avoid much lost motion and needless expense and should find himself in a position to take his share of this growing trade.

Road Building Grows in Argentina

THE tangled transportation problem in Argentina is beginning to be unraveled slowly. The persistent efforts of the good roads boosters, headed by members of the Touring Club Argentino, which called the first road congress in the River Plate territory, have succeeded in developing an active interest in the movement.

Road-making machinery is already at work in the provinces of Buenos Aires, Cordoba and Santa Fe and a number of municipal officials have expressed the intention of purchasing equipment as soon as the necessary funds are available. The financial difficulties of some of the municipalities and provincial governments are, of course, a limitation to road operations and many farmers are indifferent to the highway program. Numerous influential land owners, however, are bending every effort to arouse a general interest in the movement. One of these public-spirited men, for instance, recently purchased a grading outfit and at his own expense began to improve a stretch of road eighty kilometers long, which had virtually been impassable. His neighbors finally reached the conclusion that the work was a profitable undertaking and raised funds to distribute the cost among themselves.

Highway Commission Appointed

The recent road congress adopted a program which recommended the appointment of a National Highway Commission to be composed of a chairman and four governors, appointed by the President, each holding office for five years. Opposition to the proposal that the central Government supervise the expenditures for the national highway system was expressed by provincial delegates who maintained that the provinces should be allowed to spend the road funds in their own way. This difficulty was temporarily allayed by the program finally adopted by the road congress, but the same opposition has risen again to hamper passage of the law by the National Congress embodying the highway recommendations. The sequel, however, is an increasing effort by the provinces to put their roads in creditable condition in anticipation of the passage of the highway laws. Thus in some cases it will be possible for the provinces to point out to the National Highway Commission, should it be appointed, that the work already has been done.

Funds for Building Program

It is estimated that the initial funds required under the proposed law will be $25,000,000 (national currency) each year. The program before the Government proposes the expenditure of these funds for national highways, for highways leading from the national highways to the railroad stations, for provincial highways and for municipal and vicinity highways. The problem of raising the money remains for later solution. About the only funds now available to the central Government for road improvements are derived from a small tax on the gross profits of the railroads and there is a very evident official disinclination to augment this tax by any considerable appropriations.

Some of the newspapers and periodicals have shown a disposition to support the movement, and to this end they have devoted much effort to bringing the highway problem before the public. It has also been urged editorially and by the good roads boosters that future highway construction should be supervised by engineers of proven ability.

Some automobile distributors and dealers, who are intensely interested in the betterment of highways, are frankly skeptical of any definite results within the next few years. Others appear confident that there will be a substantial improvement within a comparatively short time. The growing belief in the provinces and the municipalities that good roads are a necessity and not a luxury may force appreciable progress within the next two years. The more general use of the automobile, which is indicated by increased sales in nearly every section, is a chief contributing factor to the road movement. The residents of cities and the rural dwellers are alike being educated to the fact that the good roads movement is not selfish or political but that it has arisen out of an economic problem urgently needing solution.

Pay More Attention to Markets and Less to Competition

Industrial fabric needs better correlation between production and distribution. Struggle for dominance among individuals will not solve problem. General trend of particular industry must be known. Improvement will come with economic knowledge.

By Harry Tipper

IN his book, "The Evolution of Modern Capitalism," John A. Hobson points out the tendency for surplus wealth to go into additional production facilities and the effect which this has upon the method of doing business.

This is recalled to mind by the first statement of the Coal Commission in which they point out that the bituminous coal mining industry is over-developed. They say that there are more mines and larger capacity than is necessary. Consequently, there is less work for the individual miner and a more costly condition in the industry itself.

We are usually inclined to favor the idea that competitive buying itself will prevent a large over-development of production facilities by destroying those who are less efficient in the competition. This is not always the case, however. People come and go in manufacturing business, new capital is attracted from time to time to the possibilities of a business, improvements may be suggested and taken up, and the distribution of the available business may be such as to leave almost the entire number of producers in a position where they can still struggle along, although the profit is very small—if not entirely dissipated.

Under the present system of industry, satisfactory conditions of employment and industrial activity cannot be secured by a large over-capacity any more than by a definite lack of capacity. In the long run industry must charge to the user the entire costs of that industry. Even though the prices at the time of over-development may be favorable, they must be balanced by larger fluctuations on the opposite side or an increased charge to the user which will offset the losses.

A scientific advance in knowledge has enabled us to balance the productive activity of a single factory or a group of factories so that the flow of product is the result of evenly distributed activity in all the departments. It is true that we have not yet solved some of the very important problems in this respect, but much progress has been made in balancing the activities so that they were properly correlated. The industrial fabric itself, of the whole country, very badly needs correlation in order to provide the most economic possibilities of production and distribution.

As it stands to-day, we are long on the capacity to produce one thing and short on the capacity to produce another. Our railroads are attempting to cope with traffic conditions too onerous for their equipment. In some of our cities we are unable to accommodate all the vehicles demanding passage on the streets without lowering the speed because of the congestion. We are short of labor in one direction and there is an excess of labor in another. Throughout the whole industrial fabric, the costs are increased because of the lack of correlation between the various efforts required to bring the products of industry to actual use. Competition—that is the fight of one establishment against another—does not improve this situation. All that competition will do is to balance the difficulty of over-production by another difficulty of under-production; the difficulty of high prices by the difficulty of low prices.

The attention of individual establishments has been turned to competitive endeavor entirely too much. Because of the desire to control a large amount of product, there has been a constant struggle for position between competitors without regard to the necessities or possibilities of the market. We need, for the proper conduct of business, an advance in economic knowledge as definite and decisive as the advance in engineering knowledge in the past 50 years. Calculations upon the future must be coordinated with the general economic trend of the particular industry, more and more carefully, if we are to avoid the difficulties and wastes of over-production or the inefficiencies accompanying the rush of production from a lack of capacity.

Industrial Trend Must Be Known

The individual manufacturer is quite apt to consider his problem successfully solved when he has determined the position of his own business for the next few years within the industry in comparison with the others with whom he is competing. As a matter of fact, this does not, by any means, solve the problems in front of him because his own decisions must be concerned with policies operating considerably into the future and these future considerations cannot be properly worked out without a very definite knowledge of the relative trend of production and consumption. The comparison with competitors does not provide any profitable advantage unless the industry itself is in good condition and this depends upon correlation with the market.

All markets are functions of population and wealth in the last analysis. They grow as the requirements of the populations themselves grow and, consequently, new capacity or greater capacity within the industry can be employed only because of the increase in the popu-

lation and wealth or because of rearrangement between competitors. In other words, the additional capacity provided in the development of any business must be in accordance with the general economic outlook or must be secured by diverting a greater part of the present wealth to the development of that industry.

While this is, of course, important, the most important feature of it is the distribution of human effort. One of the greatest wastes in the modern industrial system is the variation in employment, the amount of unemployment occurring at various times and the irregularity of employment to be found in many lines of industry. This is one of the most difficult problems to be considered in human relations. It prevents continuous efforts and closer organization, it militates against any loyalty of the worker for the organization or any enthusiasm for the job. It emphasizes the incentive of money and weakens the incentive of accomplishment. It increases the solidarity of the worker with members of his group and separates him more completely from his considerations of other groups of the general public.

Intermittent Employment Harmful

In the coal industry we are confronted with the spectacle of the miners complaining that they do not have a living wage and the operators complaining that they cannot afford to pay any more without losing their profit. An engineering writer who has studied the question, reports that the work of the miners is too intermittent to enable them to make a living except at a high hourly rate or per ton rate, while this fluctuation in production makes it impossible for the operators to spread their fixed expenses over a reasonable area of production. The miners have shown from the recent strike the strength of their organization as union men, their willingness to fight and their bitter opposition to any reduction. It is rather significant that some of the strongest unions are concerned with industries where the employment is notoriously intermittent and that unions have made less progress where the employment is continuous or practically continuous as it is in many lines of work.

This better distribution of human effort, however, will not come about through the mere competition of individual establishments in their endeavor to maintain a control of the market. It will improve as our economic knowledge improves and our attention to the market becomes more important than our attention to competitive activity. The possible increase in capacity required to meet the increase in the market—the amount of production demanded in order to provide stability of employment—and a sufficient amount of product to meet the requirements of the population will be studied by groups of employers as the statistics of the market are being studied to-day.

Automotive Requirements Indicated

In the automotive field, the economic curves deduced from a consideration of the law of probability, indicate the future requirements of production. They offer an opportunity for the manufacturer to correlate his production and his marketing activity, his prices and his general policies with the possibilities of the market. Thorough study of these general developments from a national standpoint and from a territorial standpoint should enable the manufacturer in the automotive field to arrive at a better distribution of his human effort and a better consideration of his position from the standpoint of materials and manufactures.

This work of correlation cannot be done, however, by strict attention to the particular part of the field which affects the business of the individual manufacturer. It must be accomplished by an examination of the whole field and in many cases by an examination of a number of fields affecting the production of the particular industry, so that all the important factors are involved and the proper tendencies of these factors indicated in the calculations.

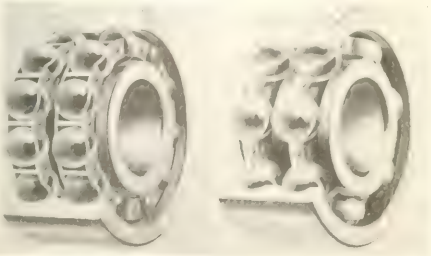
The economists of late years have remarked continually upon the extent to which the speculative judgment of the manufacturer enters into his calculations—that is the extent to which the manufacturer's actions are concerned with and affect the future program. Most of the weighty decisions must be rendered from the standpoint of futures. The only place in which this future can be read is in the past, not in the volume or condition of the past, but in the tendency and trend of the development indicated through past endeavor.

The general development of economic marketing data from this standpoint of future trends is consequently of the greatest importance in permitting a better correlation between production and marketing, a better distribution of the human effort and a better condition of labor, cost and profit in the industrial field. Fortunately for the automotive industry the facts as to its development are available to a degree to make trend study possible, and consequently, this trend study can be pursued much more easily than in some other lines. The analysis of markets from the standpoint of trends, the correlation of the automotive industrial market with the general economic conditions, the correlation of the automotive use with the population growth, and curve of wealth, are the basic factors in the more correct consideration of production and marketing effort. A proper development of these will make it possible to avoid the extremely destructive competition or the extreme fluctuations characterizing some of the industries which are in the minds of the public more basic even than the automotive.

Strom Double Row Ball Bearings

DOUBLE-ROW bearings in two types, standard and maximum, have been added to the line of products of the United States Ball Bearing Co. One of the outstanding features of these bearings is the retainer construction. Two independent riveted retainers are used, one for each row of balls, thereby insuring the same strength in each retainer as obtained in the single-row type of bearings. These bearings are said to be particularly adapted for installations requiring unusual bearing capacity in a limited amount of space.

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Strom double row ball bearings; maximum and standard type

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Aggressive Dealers

AUTOMOBILE manufacturers run a severe risk of raising their selling costs and failing to get maximum merchandising power from their dealers by attempting to control too closely the dealer's action as regards local advertising and publicity. Strong factories may be able to compel the dealer to use only factory advertising copy, but there is no certainty that such a policy will result in maximum effectiveness.

Some sales managers who have been studying the human side of marketing, are beginning to lean strongly toward the belief that a car is just about as strong nationally as the sum of the strength of the individual dealers who are selling it. They are finding it profitable to build up the local reputation and prestige of the dealer, rather than to subordinate the dealer to the car name in his locality.

This general phase of factory-dealer relationships will probably not be fully understood until the results of further experiments are available for analysis. It is interesting to note, however, a statement made the other day by Gordon Lee, former chief of the automotive division, who has recently become associated with the Yellow Taxicab Co. Lee said that "it was the dealers who, in 1921, with their investments at stake, managed to keep their heads above water, and found out that it was their organization rather than a specific car that was the most important selling factor."

The dealer who is willing to have his personality and local business entirely subordinated to the specific car is not likely to be aggressive and dominating in other ways. And aggressiveness is a good point in a dealer.

Efficiency of Air Cleaners

THE necessity for the use of air cleaners on farm tractors has come to be generally recognized, and few are the tractors now offered that do not carry such a device as standard equipment. The centrifugal type of cleaner was the first, and is undoubtedly the one in most extensive use to-day, but two other types have been developed, the so-called air washer and the oil type, in the latter of which the dust is caught on surfaces kept moist with stale lubricating oil. The two liquid types have proven particularly advantageous in certain sections of the country where fine lava dust abounds, which cannot be effectively dealt with on the centrifugal principle.

Air cleaners have been developed in great numbers, and, as is usual in such cases, quite sweeping claims as to their efficiency are made by their manufacturers. That all of the dust held in suspension in the air should be removed is undoubtedly more than can be expected, but the percentage remaining should certainly be very small. However, efficiency in dust removal is not the only important quality of an air cleaner. The incorporation of the device in the induction line of the engine necessarily introduces a slight resistance to the flow of air and thus tends to cut down the power of the engine. With some types, especially those in which the air is drawn through filters which are likely to clog up with the dust, this reduction of engine power may become considerable, which is, of course, highly objectionable, the more so as tractor engines often have none too much power.

Up to the present there has been little data available on the relative efficiency of the different types of air cleaner, and it is therefore gratifying to learn that the College of Agriculture of the University of California has conducted tests on twenty-six cleaners, including all three types mentioned. A bulletin giving the results will be published in the near future. In the meantime it has given out that the oil type proved the most effective dust removers, dropping in no case below 96 per cent efficiency; the water type never fell below 88 per cent, while the centrifugal type removed from a minimum of 42.7 to a maximum of 99.4 per cent, showing that it may be quite effective if of correct construction.

Selling the Idea of Better Highways

YARDS and yards of "editorials" penned by paid propagandists and designed to convince the farmer that he has been made the goat in highway construction have appeared in country weeklies throughout the country in the past year or two. Little of a constructive nature has been done to combat this pernicious literature.

The average country editor is a perfectly honest individual devoted to serving the best interests of his readers. He has been fooled by this propaganda. If he could have been shown that improved rural roads gave the real estate of his readers a greatly enhanced value in addition to making life worth while, he would have been willing to accept that viewpoint.

In the light of what has been printed in many country weeklies and in not a few newspapers, it is refreshing to read an editorial on the subject of rural roads written by Roger S. Whitman and printed in *Country Life* for November. If the automotive industry could get a copy of this honest, unbiased statement into the hands of every farmer in the country it would be doing itself a real service.

In his editorial Whitman says:

"When I first drove over the road that runs past my gate it was of the kind known as dirt, horribly muddy in the spring and fall, a mass of frozen ruts in winter, and unbelievably dusty in summer; just such a road as lay anywhere off the main arteries.

"It ran through a farming section from the town on the railroad to the county seat, and over it passed such traffic as was absolutely necessary—crops on their way to market, the stock of the inadequate general stores, fuel.

"It served its purpose as a link in the network of commerce, but at the cost of much effort.

"Because of a mudhole or two that were ever present, a farmer's team could haul only a half load, although the rest of the road might be firm; there could be no hurrying over that five-mile stretch except at the expense of springs and axles.

"Altogether annoying and exasperating, it was accepted as inevitable, and stood as a monument to our local political system.

"There have been many changes in the twelve years since that day, and more and more those changes have centered in that stretch of road. It has caught up with the times, and has undergone an evolution that I used to think was the result of our general awakening but that I now see as one of the causes of it. It began by being scraped; then it was surfaced; later it was oiled; and finally, after a tedious upheaval, it developed its present broad and smooth concrete surface. And now, when I consider what it is accomplishing, I marvel that we ever were so blind as not to have foreseen the possibilities of even this little stretch of road.

"Road? It is not a road to me; it is a symbol of progress, a means to a vast end.

"Where, in the past, it hindered my trips to the next town, it is now the enchanted entrace to the ends of the earth, the beginning of my dream journeyings, the invitation to rove, to see, to know, to expand.

"It is the foundation of commerce, the bringer of civilization, the means of contact of farm to farm, of State to State, and of all of the grades and shades between.

"It leads to and from all human endeavor; where the children of our lonely neighborhood used to grub over their books in a one-room district school, presided over by a forlorn school-ma'am who taught everything from the A B C's to geometry, now they are gathered by a bus and taken to modern schools in the county seat, to get the most thorough education that can be provided, under the most efficient tutelage.

"And it is our road that makes possible this insurance of progress.

"To the city it brings the country and the sense of the country's freedom and sincerity and rest; to the country it brings the city's culture and resource and improvement.

"A channel for the flow of all that civilizes and develops, it leads our little neighborhood, and so the nation, to unguessed heights of culture and education, of strength and unity and understanding."

Inventory Period Will Be Shorter

Few Plants to Close During Holiday Week

Body Manufacturers, Especially, Will Continue to Operate at High Level

DETROIT, Dec. 20—Inventory taking in a majority of factories in the Detroit district will be limited to a much shorter period than usually given. Few factories will close for the holiday week, the usual inventory period, and instead the stock taking will be done in a great many instances while factories are at least in partial operation, with a complete cessation only in the days at the first of the year.

This condition is particularly true of most of the car factories, all the body manufacturing companies and many of the parts and accessory makers. The body manufacturing end of the industry is the busiest of all in its attempt to keep abreast of the large flood of closed body orders with present inadequate facilities. Car makers are buying closed bodies wherever they can get them and they have been unable to obtain either sufficient or satisfactory deliveries.

Orders Have Piled Up

Some factories have been down for days at a time owing to closed body shortages and this has resulted in a piling up of orders which will take weeks to cut down. One factory will not accept orders on certain of its closed models for delivery in less than a month. Several factories which have gone along uninterruptedly are from two weeks to two months behind on certain closed body models; in fact the closed body type deliveries generally are running behind orders.

Sport type models also have enjoyed a large amount of popularity and these have helped materially to keep buying at a high mark thus far this winter. Manufacturers have been frankly surprised at the volume of business that the special model cars have developed, and instead of just supplying a limited demand that would help to sustain operations in the dull season, the business has assumed important proportions.

Because of the buying in closed models and sport types, both of which take considerably longer in production than the standard models, the car factories have been kept busy, although their production totals have been falling off somewhat from the earlier season. There also has been considerable manufacturing of open standard models, though these in large

(*Continued on page* 1252)

Business in Brief

NEW YORK, Dec. 21—Retail business received a great impetus last week from the combination of cold weather, snow, and distribution of Christmas Club funds. Wholesale and jobbing eased off but report full order-books for the first quarter of 1923. News from abroad influenced the entire character of events last week and there is greater attention focused on foreign affairs.

Iron and steel set a faster pace. Buying by automobile companies and railroads increased in volume. Implement manufacturers are also in the market. Unfilled orders of the United States Steel Corp. showed a decrease which may be due to increased shipments.

The peak of demand for cars seems to have passed and sections which suffered from car shortage are better supplied. Car loadings for the week ending Dec. 2 were 110,276 less than for the previous week. The decrease occurred in a holiday week. Total loadings aggregated 845,219.

Anthracite demand is active and mining is spurred on. Soft coal reached a peak daily output but the holiday decreased the weekly average. Attention is still concentrated on anthracite.

Winter wheat crop is in fair condition. Box car shortage in the grain states has diminished. Grain prices have advanced to the highest point of the season. Estimates place the cotton crop at 9,964,000 bales, the smallest production in 20 years.

Stock market for the week showed a distinct upward trend. Undoubtedly intimations from Washington of a change in foreign policy had its effect. Bonds were strong and steady. Liberty Bonds led the advance in the early part of the week.

Sterling advanced to $4.69, generally regarded as reflecting revival of British trade. Bank clearings fell off 17 per cent and aggregated $6,661,633,000.

December Will Make New Output Record

Total Production of Plants for Year Rapidly Approaching 2,500,000 Mark

NEW YORK, Dec. 18 — Another record in the production history of the automotive industry doubtless will be made in December, notwithstanding the unusually well sustained operations during the previous months of the year. Production is moving along toward the inventory taking period on relatively high programs, with major automobile plants keeping the schedules that are remarkably good for this season.

November proved to be one of the surprises of the year, with 232,000 cars and trucks produced. This was only 6000 less than the October output, but 26,000 more than the total for September, the previous short month. Production for the eleven months approximates 2,345,000 and prospects are that for the full year it will aggregate 2,550,000.

No Stocking of Cars

There are no perceptible signs that dealers are stocking cars. The fact that a general shortage of closed models continues has led to a somewhat stronger demand for open types, fitted to meet the rigors of winter. The popularity of the closed car, however, shows no abatement and is responsible for the increased percentage of this type in practically all production schedules that have been announced for next year. To eliminate much of the trouble that has been experienced in obtaining bodies, a marked expansion of body producing facilities is taking place, the effect of which will be felt in next year's car output.

The transportation situation has shown some improvement, with cars going forward to dealers with more regularity. Winter weather will force a heavier burden on rail equipment in the movement of finished products, although plans formulated for keeping highways cleared of snow will make driveaways feasible and a big factor in getting cars into owners' hands.

Truck demand, especially in the

(*Continued on page* 1253)

Firestone Attacks Restriction Act

Predicts High Mark in Prices of Tires

Relief from British Action Seen in Philippine Plantation Development

AKRON, Dec. 20 — Unless the drastic terms of the Stevenson Act, as ratified by the British Colonial Office and the Federated Malay States, which provide for a graduated tax upon all exportations of crude rubber, either are completely rescinded or materially modified American rubber goods and tire manufacturers will have to bear an increase of nearly $100,000,000 in the cost of the rubber they consume in 1923, according to Harvey S. Firestone, president of the Firestone Tire & Rubber Co.

Firestone sees calamitous conditions ahead for the tire industry unless the Stevenson Act, which he brands as "wholly uncalled-for legislation," is drastically modified at once.

In discussing the increased cost to American rubber consumers as result of the operation of this export tax law, Firestone points to the fact that the limiting of production and exportation of rubber since Oct. 30 already has caused an increase of 100 per cent in the cost of crude rubber.

Must Be Passed to Tire User

There is only one logical outcome he believes, viz.—This increased cost variously estimated at approximately $100,000,000 must be passed on to the tire user which makes perhaps the highest tire prices in the history of the automotive industry practically inevitable.

The only possible avenue of relief, according to Firestone, lies in the development of rubber plantations in the Philippine Islands and in South America. Climatic and soil conditions in the Philippines, according to Firestone and other rubber experts and soil technicians of Akron, are so closely akin to those of the Malay rubber producing belt that it is firmly believed American manufacturers will have no difficulty in making the Philippines the greatest rubber producing area of the world. All that is needed, Firestone believes, is legislation by Congress which will encourage American capital to develop rubber plantations there.

It will also become necessary to negotiate with South American Republicans and to influence them to clear their jungles and virgin territories and transform them into fertile rubber plantations. Rubber for years has been grown in South America, but the methods of refining, as used in other rubber producing districts, have not been so extensively developed upon the South American continent, and although there has been a considerable quantity of crude rubber shipped from there, it has not been of the plantation rubber quality.

Statistics show that America consumes more than 70 per cent annually of the world's supply of crude rubber.

Prior to 1900 practically all crude rubber was imported either from Brazil or Africa.

The world production of rubber jumped from 70,000 tons in 1910 to 201,598 in 1916 and approximately 265,955 tons for the current year up to Sept. 30, of which 249,955 tons were plantation rubber. This gave the British government control of virtually 72 per cent of all the rubber produced in the world.

The British legislation resulted from a report submitted by a special committee headed by Sir James Stevenson, Bart.

Rubber experts say these British restrictions upon crude rubber shipments will force 70 cent rubber.

Goodyear Owns in South America

AKRON, Dec. 20—The Goodyear Tire & Rubber Co., in addition to having a 20,000 acre rubber plantation in Sumatra, owns land in South America where it had intended to build a tire factory. It is barely possible this company may use this land as the nucleus for a new rubber plantation in South America.

Working Out Traffic Problems in Larger Cities Will Prove Beneficial to Truck Industry

By FRED GLOVER,
President of the Timken Detroit Axle Company

Detroit, Dec. 20.

THE year 1923 promises general improvement in all lines of business. Conditions have grown steadily better in the present year despite the temporary setbacks due to the two major strikes and apparently business is set for a prosperous year.

It is vitally important, however, that too much store should not be set upon possible business developments in the coming year, which undoubtedly will be a good one, and that manufacturers should figure further into the future. What will be their positions five years hence should be occupying a good share of their attention. The pressure of competition has brought prices too low in the recent past and increases must be forthcoming. The coming year will probably witness a change in this direction although this may be held over. Prices in most other commodities are showing increases, and the automotive industries will be affected by similar influences.

Raw material prices are advancing steadily and the cost of getting materials from their source to their destination is increasing. The industry cannot hold its prices in the face of this economic pressure.

Inability of the railroads to meet the transportation requirements of the country has held back business seriously in the past year and indications are that this service will not be much improved in the coming year. Throughout the period that railroads have failed to function satisfactorily there has been a growing sentiment for truck transportation and this is due soon to result in large gains in this branch of the industry.

Good general business next year undoubtedly will find a large demand for trucks for short haul work. Working out of traffic problems in large cities will be beneficial for trucks in that it will give them an opportunity to avoid the handicaps of horse drawn and slow moving traffic with which they now have to contend. Motor trucks should not be held to the speed of horses.

Railroads and street railway companies are experimenting with trucks and buses more and more every day as feeders to their lines. Most of the development of new transportation lines is being delegated to gasoline driven vehicles. Although this field is in its infancy, it is growing larger every day and soon will have an important place in the industry.

The labor situation in the coming year seems to be adequately provided for so far as the industry, and the Detroit district particularly, is concerned. There may be some shortage at the peak of the season but there always has been some shortage then. The industry is always in a position to get men when it needs them because of the high scale of wages it pays.

OSHKOSH TRACTOR RECEIVER

MILWAUKEE, Dec. 18—Miss Alma Barry, attorney of this city, has been appointed receiver of the Oshkosh (Wis.) Tractor Co. in a friendly action brought in the Milwaukee County Circuit Court.

Receiver Operating Kelly Truck Factory

Takes Over Affairs Following Granting of Application of New York Bank

SPRINGFIELD, OHIO, Dec. 18—Pearl A. Lewis, assistant to President Charles Willard Young of New York City, has been named receiver for the Kelly-Springfield Motor Truck Co., following the filing of an application by the Bankers Trust Co. of New York, asking for the foreclosure of a mortgage of $1,500,000 and the appointment of a receiver. He gave bond in the sum of $100,000. The receiver was authorized to borrow $250,000 to conduct the business of the company.

Lewis states that the receivership is not occasioned by any fault in the quality of the product, but by other reasons. He says the plant will continue the manufacture of motor trucks without interruption, and adds that he looks for a bigger truck business in 1923 with Kelly-Springfield getting its share of it.

Changes in Personnel

Lewis has taken charge of the plant and will look after things generally, taking over temporarily the duties formerly performed by F. H. Pietsch, acting general manager and sales manager, and W. K. Jamison, superintendent. In addition to Pietsch and Jamison, several persons holding minor office positions have severed their connections with the company.

In the Bankers Trust Co.'s petition, it is stated that the Kelly company has defaulted on its interest on $1,500,000 gold bonds, 8 per cent, dated June 1, 1921, payable in 10 years, that Young, president of Kelly, waived all legalities Dec. 4 at the New York office and declared the principal on all bonds due. The petition also says that unless relief is obtained in this court action, the defendant company's business will be destroyed. It asks that the $1,500,000 mortgage be decreed valid and a lien upon all assets of the Kelly company.

Letter Sent Stockholders

A letter to the stockholders sent out to-day declares that the receiver was appointed so that business can be carried on without interruption and the integrity of the property as a going concern be preserved. It states there is a large amount of unmortgaged property, such as materials, supplies, trucks, manufactured and in process, and parts for the same, etc., in which the court has protected the interest of general creditors by ordering a separate accounting and making any amount appearing to be due on such accounting a charge on the mortgaged property prior to the mortgage.

Continuing, the letter says:

The present situation has been brought about by the fact that, in addition to the general difficulties recently encountered in the truck business, suits have been entered against the company on disputed claims, amounting to more than $600,000, so that the company has been unable to secure the necessary credit to continue its business, and a receivership becomes necessary to avoid the cessation of its business and the consequent disintegration and sacrifice of its assets.

It is believed that the conduct of the receivership will be successful, that the suits on disputed claims above referred to can be wholly defeated, and that, whether the company's affairs can be so shaped as to result in a return of its property to it or whether other disposition must be made of the same, the receivership will prove for the best interests of all stockholders and creditors.

Hare Suit May Have Figured

NEW YORK, Dec. 18—The receivership for the Kelly-Springfield Motor Truck Co. came as somewhat of a surprise to the industry, for reports received here of late told of the company meeting its bills promptly and increasing production at a rate that promised much for the future.

It is thought that one of the reasons for the action is the suit recently instituted by Emlen S. Hare, assigned of Hare's Motors, in a New York court, asking for damages amounting to $675,000 because of the cancellation on Jan. 11, 1922 of the contract which existed between Hare's Motors and the truck company.

The deal with Hare was made Nov. 20, 1920, when the Hare organization was named as selling agent for Kelly-Springfield, following the formation of Hare's Motors, which took over Locomobile and Mercer.

Company Among Oldest

The Kelly-Springfield Motor Truck Co. is one of the oldest of the motor truck builders. It was incorporated Oct. 10, 1912, acquiring the business of the Kelly Motor Truck Co. of Springfield, Ohio, the plant having a capacity of 3000 vehicles a year. Its capital stock was $2,400,000, of which $2,000,000 was common and $400,000 8 per cent cumulative preferred. There was outstanding Jan. 4, 1922, $1,208,400 common and $1,014,000 preferred, the par of the common being $50 and the preferred $100. The funded debt was a $1,500,000 first mortgage bond, pledged as security for $1,404,674. The last general balance sheet showed current assets of $2,286,178 and liabilities of $680,672. The net working capital Jan. 31 was $1,605,000.

The New York banking house back of Kelly Springfield is Emerson McMillin & Co., and Charles W. Young of that firm also is president of the truck company, Marion McMillin is vice-president and P. H. Diehl secretary-treasurer.

ELGIN HALTS PRODUCTION

CHICAGO, Dec. 18—Production has been entirely suspended at the plant of the Elgin Motor Car Corp., at Argo, Ill., which is in the hands of a receiver. Whether or not a movement under way for reorganization will be successful has not yet been determined.

Maxwell Takes Over Chalmers Property

Backing of All Financial Resources of Former Company Is Assured Latter

DETROIT, Dec. 18—With the expiration of the time for filing objections to the sale of the Chalmers company to the Maxwell Motor Corp., the plant and property have passed to the latter company and are now owned 100 per cent by it.

President William R. Wilson states that the Chalmers company will continue operations as in the past, and that the sale of Chalmers cars will be continued under that name. He said further that Chalmers will have the full benefit of the Maxwell organization and that it now has behind it the entire financial resources of the Maxwell interests.

Wilson said that the company is planning largely increased shipping schedules for 1923. In the case of both Maxwell and Chalmers, he stated, the schedules for the new year have been only tentatively fixed and will not be whipped into definite form until just preceding the national shows. Both, however, Wilson said, will show large increases over the present year, which has been one of the best in Maxwell history.

To Continue in Old Plant

The manufacture of Chalmers will be continued in the Jefferson Avenue plant, which will continue to be the six cylinder factory of the company. Other manufacturing operations may be centered there as the company's plans develop.

Sales of the Chalmers will be handled in conjunction with Maxwell by dealers in practically all cities, except those where it is deemed necessary to maintain separate selling organizations. Two separate contract forms will be maintained, and there will be sales directors for each line. Both will work under the direction of A. E. Barker, vice-president in charge of sales of Maxwell.

Stockholders Approve Nash Stock Issue Plan

BALTIMORE, Dec. 18—The recapitalization plan increasing the stock issues of the Nash Motors Co. has been indorsed by the stockholders at a meeting held here. Under this plan the company will have an authorized capitalization of 225,000 shares of 7 per cent preferred stock of $100 par value, and 300,000 shares of common without par value. Provision is made for the retirement of the preferred stock through a sinking fund of 2 per cent.

At present there are outstanding 35,000 shares of 7 per cent cumulative preferred stock, which has been called for redemption at 110 on Feb. 1, 1923, and 54,600 shares of common without par.

Studebaker Rushes Work on New Units

Total Value of Plant Will Be $41,000,000—Will Permit of 600 Cars Daily

SOUTH BEND, IND., Dec. 19—Figuring on a production of 600 cars a day during 1923, 325 a day at South Bend and 275 at Detroit, the Studebaker Corp. is rushing to completion seven additional factory units, of which five are at South Bend and two at Detroit. When completed these buildings will add over 1,000,000 sq. ft. of floor space, bringing the total manufacturing floor space of all plants to 7,100,000 sq. ft. and the cost to $41,000,000. All of these buildings are well under way and will be completed shortly after Jan. 1.

At South Bend the first new unit is a four-story building 518 ft. x 172 ft., an addition to the present Light-Six closed body plant. When completed this plant will consist of one building 769 ft. x 172 ft., four stories high, devoted entirely to the production of closed bodies for the Light-Six model, and will allow for the production of 150 bodies a day.

Assembly Building Enlarged

The final assembly building at South Bend is being enlarged by a four story addition 246 ft. x 72 ft., this space being required for the increased production. To the stamping plant has been added a one-story extension 100 ft. x 96 ft., allowing for additional capacity of steel stampings.

Facilities for storing and shipping completed cars are handled in the new four-story building 624 ft. x 76 ft., which parallels the final assembly building and which is adjoined by an inclosed train shed 624 ft. x 80 ft. The storage building provides storage space for 1000 finished cars and all shipments will be made indoors. The court between the storage building and the final assembly building will be glass covered, affording greater capacity for final inspection of cars.

Addition to Power House

The last new unit at South Bend is an addition to the powerhouse. This building is 116 ft. x 48 ft., two stories high. In it will be installed 16,000 kw. power generating equipment of the latest type, which will supply all of the electric power required by the South Bend plants.

In Detroit there will be two units, one of which will be a five-story building, 441 ft. x 58 ft., for the final assembly and testing departments. The second unit will be a four-story building, 248 ft. x 95 ft., which will be used for various machining operations and stores.

All of the new buildings are of reinforced concrete construction, fire-proof, and with equipment of the latest and most advanced design, much of it especially built to permit of economies in the manufacture of Studebaker cars. An interesting feature in connection with the expansion program is that the new buildings are being constructed and equipped with a minimum interruption to operation.

While concrete is poured on the upper stories, machinery and equipment are installed in the lower floors. When the South Bend factories were first planned six years ago, they were designed with the idea of increasing production without interfering with operation. In laying out machinery, spaces were left alongside machines installed for others that would be required as the output of cars mounted.

The corporation has just completed the erection of a concrete and steel service building three stories high and 148 ft. x 143 ft. in Cleveland. This is a model building in every respect.

Receivership of King Is Dissolved by Court

DETROIT, Dec. 16—Receivership of the King Motor Car Co., ordered in 1920 as a result of a voluntary bankruptcy declaration, was dissolved this week in Circuit Court here. The court allowed $25,000 receiver and $2,000 attorney fees.

The bankruptcy petition, as filed, set up liabilities of $1,385,223. C. A. Finnegan of Buffalo purchased the plant for $500,000 and claims for $1,000,000 shortly after the receivership. Sixty-five of the claims were settled out of court. In 1921 the company paid a dividend of 12½ per cent and in the action for dissolution it was stated that a final dividend of 16.97 per cent will be paid.

United States Radiator to Issue New Preferred

DETROIT, Dec. 18—Under the refinancing plan of United States Radiator Co., the 42 per cent deferred dividends on the preferred stock will be wiped out by the issuance of new preferred stock on a basis of 1.42 shares for each share now held. This plan has been approved by stockholders and will be carried out.

The approval carries with it an increase in the company's capital stock from $8,000,000 to $13,000,000. Of this amount $5,000,000 was classed as 7 per cent preferred stock. About $4,000,000 of this latter stock will be set aside for the retirement of present preferred on the basis named. The additional $1,000,000 preferred will be used by the directors as necessary.

TIRE COMPANY BANKRUPT

IOWA CITY, IOWA, Dec. 17—The Mississippi Valley Rubber Co., making tubes, has filed a voluntary petition in bankruptcy in the United States District Court in Davenport, with liabilities of $134,286. Its assets are listed at $112,263, including $25,000 real estate, $46,080 in tools and machinery and open accounts of $33,063. Secured claims total $13,500 and unsecured claims are $118,587.

New Goodyear Pact Does Not Halt Suits

Efforts Made at Compromise Fail Following Abrogation of Old Agreement

AKRON, Dec. 20—Efforts to compromise the four suits filed in Akron courts last August by Mrs. Laura L. T. Weiss of Cleveland, attacking the legality of the entire $85,000,000 refinancing and reorganization program of the Goodyear Tire & Rubber Co., have failed, according to Mrs. Weiss' attorneys.

When directors of Goodyear on Nov. 24 at a secret meeting abrogated the Goodyear contract with the Leonard Kennedy Co., Inc., of New York and wrote a new and modified contract, attorneys for Goodyear and the banking syndicates involved in the refinancing at once sought withdrawal of the Weiss actions, as these suits were based principally upon the Leonard Kennedy contract. The original contract obligated Goodyear to pay the Leonard Kennedy Co. $250,000 a year plus 5 per cent of profits for the services of the president and treasurer of Goodyear. The new contract eliminates the bonus clause, but continues the payment of $250,000 a year.

Stockholders of Goodyear, who are backing Mrs. Weiss in her litigation, are quoted as saying that the new contract even in its modified form is not satisfactory to them and that they intend to carry the court actions to a final hearing. Another of the Weiss actions attacks the control of the Goodyear company by three trustees of 10,000 shares of management stock.

At conferences held in New York and Cleveland with Goodyear attorneys, counsel for Mrs. Weiss is understood to have refused to consider any withdrawal of the suits unless the new Leonard Kennedy contract was abrogated.

Employment Keeps Up at Exceptional Level

WASHINGTON, Dec. 18—A survey of the employment situation by the Federal Employment Service shows that in the Michigan district the automobile industry is maintaining an unusually high rate of employment in view of the season.

Demand exists for closed body builders, sheet metal workers and toolmakers in the automobile trade in Flint.

Throughout Wisconsin there has been a falling off in automobile and truck factory employment.

It is reported that approximately 8000 workers will be offered employment in Cincinnati upon the completion of two large automobile plants in Norwood.

The employment service says all manifestations point to a steady upward trend in employment. The mounting increases of the past twelve months give substantial evidence of permanency.

Makers Announce New Models of Cars and Engines

Midwest Producing Six-Cylinder Model

Incorporates Most Features Used in Line of Fours, Which It Supplements

INDIANAPOLIS, Dec. 15—The Midwest Engine Co. is now in production on a new six-cylinder model, designed to supplement the line of four-cylinder passenger car engines which have been marketed for some time. The new engine incorporates most of the features used in the fours, but has certain additions, including in particular a special so-called "wave line" connecting rod having a section the flanges of which vary in thickness in such a way as to give a wavy inner surface on these flanges. The idea behind this construction is to prevent certain periodic vibrations in the rod, which are said to occur with conventional construction.

The new model is to be known as No. 610 and will have 3⅜ in. bore and 5 in. stroke, giving a displacement of 268.4 cu. in. It is said to develop 70 hp. at 3000 r.p.m. The crankshaft is 2½ in. in diameter at all bearings and is drilled for pressure lubrication, the pressure being varied in proportion to the load by a spring-loaded valve controlled by vacuum in the inlet manifold. The valves are located in the head and operated by rocker arm and push rod from a chain-driven camshaft in the crankcase.

The engine is provided with a pump for water circulation and with suitable brackets for mounting lighting generator and starting motor.

A more detailed description of the engine will appear in an early issue of AUTOMOTIVE INDUSTRIES.

Three New Body Types in 1923 Columbia Line

DETROIT, Dec. 20—Three new body types, a 2-passenger coupe at $1,235, a special sport at $1,395 and a sport roadster at $995, together with the original light six phaeton and sedan with refinements comprise the Columbia line for 1923. The phaeton has a slightly larger body and the sedan is set lower in the chassis, has a better finish and is roomier. A cowl ventilator and barrel type parking lamps have been added. Prices on the phaeton ($985) and sedan ($1,395) remain unchanged except that steel wheels are now $30 extra.

The coupe is finished in blue with black hood and fenders. It is hung low in the chassis and has genuine leather upholstery with form fitting backs. The doors are extra wide. A large luggage compartment under the rear deck is dirt and water proof. Cowl ventilator, barrel type headlamps, parking lamp, wood wheels and cord tires are standard equipment.

The special sport is finished in maroon or blue and has a style cut khaki top. The upholstery is genuine leather and the equipment includes a touring trunk, Moto Meter, rear view mirror, windshield wiper, sun visor, nickeled radiator, thermostatically controlled shutters, bumpers, transmission lock, barrel type headlamps, parking lamp, steel wheels, scuff plates, trunk bars and cord tires.

The sport roadster is of a racy type finished in red. It has a sloping rear deck in which the spare tires are mounted flush and two side doors give access to a large luggage compartment. Upholstery is real leather and wood wheels are regular equipment.

The Columbia chassis specifications remain unchanged.

Chandler Will Turn Out Chummy Sedan Model

CLEVELAND, Dec. 20—A new chummy sedan, priced at $1,795, is announced by the Chandler Motor Co. This is a 5-passenger model, with two wide doors at the front. The body is made with a hard wood frame and entirely paneled with steel. Either of the high back front seats may be tilted forward, providing easy access through the doors to the rear seat. A polished aluminum truck rack is furnished and aluminum body bars protect the rear of the body.

New Sedan and Phaeton Announced by Crawford

HAGERSTOWN, MD., Dec. 20—Two new body models, a phaeton at $3,000 and a sedan at $4,500, together with the Dagmar sport model will constitute the 1923 line of the Crawford Automobile Co. The Crawford line will be known as the 23-6-60 and is equipped with Continental 6D engines, Brown-Lipe four speed gearset, Timken axles and a permanent top. A domelight is fitted to the top and the radiator and lamps are silver-nickel finished.

Auburn Making Two-Door Brougham for $2,065

AUBURN, IND., Dec. 20—The Auburn two-door brougham is now in production, being fitted to the standard Auburn chassis of 121-in. wheelbase. The trunk which is regularly fitted is 19 in. deep, 11 in. wide and 37 in. long. The general appearance is one of lowness and the windows and doors are quite large, there being 21 sq. ft. of glass. The rear seat is 44 in. wide. The standard colors are brilliant blue, maroon and gray with fenders and flashings of black.

Fuel Consumption Is Low in Waukesha

All Working Parts of Engine Tend to Increase Economy of Operation

WAUKESHA, WIS., Dec. 14—Economy tests of a new engine developed by the Waukesha Motor Co., made here yesterday and to-day, showed it to have a remarkably low fuel consumption. In its outside appearance, the new engine does not differ much from the line which the company has been producing the last two years, but all of the working parts embody improvements tending to increase the economy of operation.

An aluminum piston is used, with an unusual amount of metal in the head, the thickness tapering off from the edge toward the center, and the good heat conductivity of this piston head, together with that of the piston rings used, permits of the use of a rather high compression ratio. Each piston carries two double rings, thus having only two ring grooves. The crank pin bearings are of the radiated type.

Valve Rotators Used

Oil holes are drilled from the crankcase to the valve chamber to cause a projection of oil into the valve chamber and ensure efficient lubrication of the valve stems. Use is also made of valve rotators, which cause the valves to turn completely around on their seats once for every 100 revolutions of the crankshaft. The engine submitted to the tests had a compression ratio of 4.56.

The test was made with low test gasoline (Red Crown of 57 deg. Baumé). It was made partly in the dark during a snow storm, and the conditions were anything but favorable to economy.

A complete technical description of the new engine, together with further particulars of the test, will be printed in AUTOMOTIVE INDUSTRIES of Dec. 28.

Winton Has Sport Sedan as Addition to Body Line

CLEVELAND, Dec. 20—The Winton Co. has added a sport sedan to the line of bodies, this being made entirely in the Winton shops like the other models. The upholstery is tufted. Large area glasses in the rear quarter windows, which are crank operated, make vision easy. All interior fittings are cast bronze, heavily silvered and the door handles are ebony with silver trim. The molding is integral with the body wall, not fastened on afterward, eliminating noise due to weave.

Men of the Industry and What They Are Doing

T. E. Houghton Transferred

T. E. Houghton, formerly assistant manager of the Flint works of the Chevrolet Motors Co., has been transferred to Janesville, Wis., as manager of the new Chevrolet plant established in the former works of the Samson Tractor Co., which is being enlarged and a Fisher body shop added. Production will start about Jan. 15.

Hardin Is Anderson Treasurer

L. L. Hardin, for many years a prominent business man of Columbia, S. C., has been named treasurer of the Anderson Motor Co., moving to Rock Hill and assuming his new duties this month. Hardin was formerly president of the Bank of Columbia.

D. K. Roberts Resigns

D. K. Roberts, director of sales and advertising for the Anderson Motor Co., Rock Hill, S. C., has resigned. He has not yet announced his plans for the future.

Mendelssohn with Underwriters

Paxton C. Mendelssohn, who has been associated with the Fisher Body Corp. for over 12 years, during most of the time in charge of purchases, has resigned, effective Dec. 31. Mendelssohn is one of the best known purchasing agents in the Detroit district and has been active in the affairs of the National Association of Purchasing Agents. It is his intention after the first of the year to devote a considerable part of his time to his interests recently acquired in the Automotive Underwriters, Inc., of which he is secretary and treasurer. His successor with Fisher has not been named.

Matheny Joins Vig-Tor

H. R. Matheny has announced his resignation as factory manager of the Winton Co. to become director of sales with the Vig-Tor Co. Prior to his connection with Winton, Matheny served as production manager of the Central Axle Co., division of the General Motors Corp.

Changes with G. M. Export Co.

Coincident with the return from Europe of D. A. Laing, sales manager of the General Motors Export Co., several organization changes in the export company were announced. These particularly affect territorial division. The former Pan-American division of the company has been split into South American and Caribbean divisions, which will be headed by Alexander Quinn and M. K. Clark, respectively. Quinn had been foreign credit manager for the General Motors Acceptance Corp., but recently joined the export company. Clark was assistant manager of the Pan-American Division. The African division, which formerly was linked with the Australian division, will be headed by E. B. Sullivan. The Australian division will be continued under the direction of P. F. Cooper. W. D. Sullivan, former chief of the Far Eastern Division, has been placed in charge of the European division, his former duties being taken over by W. T. Whalen. The additional announcements are made that William Harvey, Jr., will act in a liaison capacity between the export company and the G. M. C. factories, and that E. S. Zack has become assistant to A. L. Haskell, the vice-president and general manager.

John A. Marshall Retires

John A. Marshall, Kenosha, Wis., who worked beside Henry Ford in the machine shop of the Detroit Dry Dock Engine Works more than forty years ago, has just retired from the service of the Kenosha (Wis.) works of the American Brass Co., at the age of 70 years. Marshall is very proud of the fact that for four years he served his apprenticeship and became an expert machinist side by side with Ford.

Harrington with Star Rubber

Frank P. Harrington has been named director of sales by the Star Rubber Co. During his 21 years in the rubber industry he has been identified in the sales end with Goodrich, Miller and Dayton, his work with the two former organizations covering ten and nine years, respectively.

Paul Rubber Names Hobson

C. H. Hobson, formerly secretary of the Gillette Rubber Co., and the New Jersey Car Spring & Rubber Co., has been appointed assistant to R. B. Tracy, who is sales manager and advertising manager of the Paul Rubber Co., Salisbury, N. C.

Mitchell with Clayton & Lambert

J. W. Mitchell has been appointed purchasing agent of the Clayton & Lambert Manufacturing Co. Mitchell is widely known in the automotive field as a purchasing agent. For three and one-half years he served as purchasing agent for the Monroe Motor Car Co. and was later identified with the Sampson Tractor Co., until its plant was moved. Following this, he acted as purchasing agent for the Frigidaire Corp. for three years.

Lewis Succeeds Mattix

G. A. Lewis has succeeded Paul R. Mattix as purchasing agent for the Steel Products Co. Mattix recently resigned to take a position as sales representative with E. F. Houghton & Co.

McCain Named by Link-Belt

George L. McCain has joined the engineering staff of the Link-Belt Co. Upon his graduation from Iowa State College as a mechanical engineer, in 1909, McCain joined the forces of the Packard Motor Car Co. as motor designer, serving later as experimental engineer and research engineer. In 1917 he was placed in charge of design and production of the Liberty motor, later organizing the design division of the Air Service at McCook Field. In 1918, after the Armistice, he was appointed chassis engineer of the Lincoln Motor Co. In 1919 he rejoined Packard and in the following year became chief engineer of the Saxon Motor Car Co. McCain has also done considerable development work along lines of better spring suspension.

Harold S. Pierce continues as chief engineer of the drive chain department, with headquarters at the Dodge works in Indianapolis. McCain will make his headquarters in Detroit.

Bantam Ball Appoints Ayr

S. L. Ayr has severed his connection as assistant general manager of the central products division of the General Motors Corp., and is now with the Bantam Ball Bearing Co., as manager of its Detroit territory. Ayr at one time was identified with the Packard Motor Car Co. for 12 years, as production manager of its truck division.

Brandt Given New Plant

E. C. Brandt, works manager of the Westinghouse-Krantz Works, has been appointed to serve in a similar capacity at the plant being erected by the Westinghouse Electric & Manufacturing Co. in Homewood, Pittsburgh. Brandt began work for the company as a general mechanic and small tool designer in 1907. Since then he has held a number of important positions, among which were general supervisor of machine tool demonstrations, assistant director of manufacturing operations and supervisor of equipment and methods.

Fred Haskell Promoted

Fred Haskell, former purchasing agent of the Detroit Stamping Co., has been promoted to the office of general manager of this concern.

Loening Sails for Paris

Grover Loening, aeroplane constructor, has sailed for Paris, where he will represent the Aeronautical Chamber of Commerce at the annual airplane salon.

F. Ridger Imhoff Resigns

F. Ridger Imhoff has resigned as sales manager and consulting engineer of the Precision & Thread Grinder Manufacturing Co. of Philadelphia.

Accounting Ordered in Asbestos Action

Decision Returned in New Jersey Court in Brake Lining Patent Suit

NEW YORK, Dec. 18—Vice-Chancellor Buchanan, sitting at Trenton, N. J., has ordered the Thermoid Rubber Co. and the H. W. Johns-Manville Co. to submit an accounting of profits to Milford C. Massie and other stockholders of the Asbestos Brake Co. from patents on asbestos brake lining from 1911. The decision, it is stated by the defendants, will be appealed.

The Asbestos Brake Co. was formed more than ten years ago and was made up of the Thermoid Rubber Co., the H. W. Johns-Manville Co. and several individuals who held brake lining patents. It was in the nature of a holding corporation in which its members pooled their patents, but soon after its formation it is said to have been discovered that it conflicted with the anti-trust law and it ceased to become operative.

Defendants Given Licenses

Despite this, however, the vice chancellor holds that the defendants had been granted licenses by the Asbestos Brake Co. to manufacture and sell brake linings and contracted to pay the Asbestos Brake Co. monthly certain royalties on all such articles sold and to send daily and monthly reports of all such sales. Massie's contention was that no accounting had been rendered, and he asked for such accounting and for a decree of specific performance of the license contracts for the future.

The defense claimed that the contract was binding only upon certain contingencies and that those contingencies never eventuated; that Massie acquiesced for eight years in the non-performance or breach by defendants and complainants are quitably stopped from suing at the present time; that the complainants are in laches and that the license agreements are a combination in restraint of trade in contravention of the Sherman anti-trust act. The vice-chancellor decided against these contentions, however.

Will Have Wide Effect

Should the vice-chanceller's decision be upheld by the higher courts, it is regarded by some that this ruling will greatly affect all manufacturers of brake lining, regardless of whether or not they are affiliated with the Asbestos Brake Co. Others are not so apprehensive, declaring that the Asbestos Brake Co. never functioned and that for all practical purposes it has been dead for years.

Regardless of the outcome, however, the Thermoid Rubber Co. does not fear the result, for it states that some time ago it made an agreement whereby it is thoroughly indemnified and "saved harmless from any amount which in this suit may be determined by any court to be due for it." It claims it will not have to meet any further charges out of its own funds, and that it is not placed in a position where it will have to make for itself any payments. Further, it adds, this suit involves only the Thermoid Rubber Co., none of its officers or affiliated companies being concerned.

TRAINED TRUCK MEN NEEDED, SAYS FENN

SYRACUSE, N. Y., Dec. 19—Speaking before the students of Syracuse University, F. W. Fenn, secretary of the Motor Truck Committee of the National Automobile Chamber of Commerce, pointed out that careful estimates show that 4000 specially trained men will be needed in the next few years for service in the motor transport business, particularly traffic experts to be attached to State, county and municipal organizations.

"The significance of this need will be readily appreciated, when it is realized that over 1,430,000,000 tons of freight, including 134,400,000 tons of farm products, are now carried over our highways every year," Fenn said.

Kentucky Truck Owners Seek Load Law Repeal

LOUISVILLE, Dec. 18—An organization has been formed by the Truck Operators' Association to take legal steps to repeal the load limit law. It is claimed by the association that this law practically puts all trucks of more than 2-ton capacity out of commission for four months of the year and thereby increases the farmer's shipping cost.

The case of Charles W. Nally, Cox's Creek, was cited by the association. Nally runs a dairy at that point and furnishes milk to Louisville dealers. Under the law, now effective, Nally is compelled to use the railroad with increased hauling charges. It is said that the law will force more than 1000 farmers to resort to railroad shipments to deliver their produce to the market, instead of large trucks.

State Road Association to Have National Office

WASHINGTON, Dec. 19—In order to facilitate the campaign for better highways throughout the United States, the American Association of State Highways will maintain a national office in Washington.

The office here will be supported by state finances and will be devoted primarily to needed legislation, co-operation work between the States, will work for standards of bridge work and will maintain a testing laboratory for highway material.

It will be in charge of W. C. Markham.

$7,348,421 Earnings Shown by Firestone

Sales for Fiscal Year, $64,507,301 —Shea Succeeds Robertson as Treasurer

AKRON, Dec. 19—With sales for the fiscal year ending Oct. 31 of $64,507,301, the Firestone Tire & Rubber Co., in its annual statement issued to stockholders on Dec. 15, reported net profits of $7,348,421, after deductions for depreciation, interest, taxes and other charges.

After payment of preferred dividends and miscellaneous charges, the statement shows a net increase of $16 per share in the common stock equity of the company. The company during the year reduced its bank indebtedness by nearly $9,000,000, or down to $12,775,000.

The sales for the fiscal year represented an increase of 23 per cent in units sold over 1920, while the sales in terms of dollars were approximately $2,000,000 less than last year. Sales in 1921 were $66,372,938.

Low Prices Reduced Revenues

The decrease in sales revenues despite the fact that more units were sold is accounted for, according to President Harvey Firestone, by the fact that the company during the past year has faced the lowest prices experienced in the history of tire-making, tire prices having been reduced nearly 40 per cent during the year, as compared to prices charged in 1921.

The company wrote down its inventories from $12,534,369 on Oct. 31, 1921, to $9,890,050 on Oct. 31, 1922.

The ratio of current assets to current liabilities is considerably higher than it was a year ago. This year's statement shows current assets of $25,459,308 and current liabilities of $15,634,600. A year ago current assets were $30,604,048 and current liabilities were $24,438,042.

The statement shows a reserve of $10,326,653 for plant depreciation, which is an increase of $1,284,938 for the year just passed.

Changes with Officers

All officers of the company were reelected at the annual meeting, with the exception of J. G. Robertson, who retires as treasurer to devote his entire time to the Firestone company's many subsidiary investments. He is succeeded by J. J. Shea, former general auditor. H. H. Ollinger becomes general auditor, succeeding Shea.

During the year the Firestone Canadian company financed itself through the sale of $1,500,000 in 7 per cent bonds, the parent company owning the entire outstanding preferred and common stock. The Canadian plant has a present capacity of 1600 tires daily, and is so planned as to make additional production instantly possible.

(*Continued on next page*)

Secretary of Saxon Appointed Receiver

Hearing of Claims Against Company Will Take Place on December 22

DETROIT, Dec. 19—David C. Bayne, secretary of the Saxon Motor Car Corp., has been named receiver of that company, Judge Tuttle directing, in the court order, that he shall take care of the service parts for Saxon owners. The Court also announced that hearings of claims against the company will be held Dec. 22.

The appointment of a receiver has been expected because of the application of three creditors, who claimed that the company had not been in operation for some time, and the failure to complete new financial plans, which included the sale of 200,000 additional shares of stock authorized by the stockholders last August. Market conditions prevented the sale of this stock and also stopped the development of six-cylinder models which were to sell under $1,000 and which were to have been exhibited at the national shows.

Bayne Meets Bankers

Bayne has been in Chicago this week consulting with Saxon banking sources there on matters incident to the bankruptcy proceedings instituted against the company.

Saxon has been in the limelight since its birth in 1913. Hugh Chalmers and Harry W. Ford fathered the proposition at the start, much in the same way that Chalmers started Hudson. At the time Chalmers was president of the Chalmers company and Ford was advertising manager. Sensing the demand for a four-cylinder car built along modern lines that could be put into competition with the Ford, the Saxon Motor Car Co. was organized by a syndicate of ten, headed by Chalmers, each man putting in $10,000.

Advance Was Rapid

The new car was developed in the Chalmers plant and was exhibited at the New York Show in 1914. It listed at $495, the closest anyone has been to Henry Ford's price. It was an instantaneous success, and in two years its production reached such proportions that when the roll was called for the 1916 shows it was found that Saxon had climbed to tenth place in volume of business done in the preceding year. By this time Chalmers had retired from the company, selling out his interests to Harry Ford. The latter, flushed with victory, pushed his expansion plans. He planned a big plant in Detroit, and while it was building he spread into three or four other factories in order to meet production demands.

Pushing his expansion plans, Ford went to New York and reorganized the company, calling it the Saxon Motor Car Corp. It is said that under this refinancing some of the original organizers of the company received as much as fifteen to one for their money. With additional capital, Ford awaited the completion of the new factory, but a serious setback to his hopes came when a fire destroyed the old Saxon plant. Things did not go so well after this, and in 1918 Ford, while in New York City, was fatally stricken with pneumonia. With his passing the company went on the rocks. The new plant, completed by this time, was leased to the United States Government, which in turn sold it to General Motors.

Clarence Pfeffer, who had been treasurer of the Saxon company, was the one to try to put it on its feet. By clever financing, he reorganized the company in 1919 and started to produce the Saxon Duplex, a higher priced car which looked like a winner. But last year, a hard one for everyone, saw the retirement from control of President Pfeffer, and under the guidance of Harry L. Bill the company essayed a fresh start. He was promised financial support which did not materialize and had moved the plant to Ypsilanti, Mich., taking over the old Ace factory.

KETTERING URGES SOUND EDUCATION

NEW YORK, Dec. 18—Addressing the Harvard Medical Society on "An Engineer's Perspective of Modern Science," C. F. Kettering, president of the General Motors Research Corp. and vice-president of Delco, urged that engineering students be trained in the fundamental sciences, including psychology and economics, rather than making specialists out of them.

Kettering declared experimenters often fail because at some stage of their work they overlooked some minor scientific detail.

$7,348,421 Earnings Shown by Firestone

(Continued from preceding page)

Assets listed are as follows:

Cash, $5,715,459; accounts receivable, $9,852,762; inventories, $9,890,050; Coventry Land & Improvement Co., $3,013,708; other accounts, $5,820,215; investments, $4,651,265; treasury stock, $174,028; real estate, plants etc., $21,174,350; deferred charges, $426,793—making a total of $60,718,634.

Liabilities listed are: Notes and acceptances payable, $12,775,000; accounts payable (purchases, payrolls, etc.), $2,639,533; accrued accounts, $320,066; reserve, $300,000; capital stock, $9,500,000 in preferred 6 per cent cumulative, this representing 100,000 shares of authorized ($10,000,000), less $500,000 retired; 400,000 shares of 7 per cent cumulative ($40,000,000), less $20,000,000 unissued, leaving a balance of $10,00,000; common stock, $3,558,000, representing 2,500,000 shares authorized ($25,000,000), less unissued and in treasury ($21,442,000); general surplus, $20,595,491, and insurance account surplus, $1,130,438.

N.A.C.C. Gets Ready for Truck Meeting

Tentative Program Embracing Four Papers on Problems Is Prepared

NEW YORK, Dec. 18—Problems of the truck industry will be thoroughly threshed out at the general meeting of the motor truck members of the National Automobile Chamber of Commerce on Thursday, Jan. 11. The call for the meeting has been sent out by General Manager Alfred Reeves of the N. A. C. C. and it is expected that there will be an attendance truly representative of this branch of the industry.

A tentative program has been prepared and subjects of discussions and papers settled upon, but the list of speakers is not ready for announcement. The meeting is scheduled to start at 10 o'clock in the morning at N. A. C. C. headquarters. There will be two papers discussed in the morning and two or more in the afternoon, Chairman Windsor T. White of the truck committee presiding.

The four leading papers will be on the following subjects:

What is wrong with the motor truck industry?

How can manufacturers and dealers cooperate to make truck paper more attractive to the bankers?

Is there need for a terms committee similar to that in other industries where deferred payments are a factor in sales?

Best methods for finance companies to handle truck sales, including the length of time truck paper should run.

Other subjects include: Parts makers service stations and their relation to local dealers, national users and retail customers and the proper relation of the parts manufacturer with the manufacturer of motor trucks.

New Liberty Car May Come With Finance Completion

DETROIT, Dec. 20—Plans for the refinancing of the Liberty Motor Car Co. will probably be completed this week. It is expected that with the completion of these plans a new manufacturing policy will be announced under which the Liberty line will be extended to include a light six model selling in the $1,000 field.

AIR COOLED CAR SHOWN

DETROIT, Dec. 18—The Detroit Air Cooled Car Co. is displaying a sedan model in its showroom in this city. It will be part of its display at the Hotel Commodore during the national show week. The company is planning to build about 1000 cars in 1923 at the factory recently acquired in Wayne. Contracts for the manufacture of most of the parts have been awarded.

Plants Experiencing Remarkable Demand

December Outclasses Same Month in Previous Years in Milwaukee District

MILWAUKEE, Dec. 18—Astonishment expressed in various ways over the manner in which a large number of passenger car manufacturers are sustaining their output is paralleled by the wonderment with which trade factors in the motor and parts industries here regard the demand for their products which is keeping plants busy at a rate previously unheard of.

There never has been a year when at the middle of December new orders were being booked in such satisfactory volume, and shipping instructions were coming at such a relatively heavy rate as this year. The motor truck trade and makers of farm tractors and power farm operating equipment are contributing something to the interesting and gratifying situation, but passenger car builders remain by far the principal source of demand.

All Predictions Upset

It had been expected that a decline in orders and delivery instructions would suffer a sharp reduction by Dec. 1, but all predictions have gone by the board. Local parts industries, however, look to see a decline this week, which may last until after Jan. 1, but it seems hardly possible that this will be in the nature of a recess or complete interruption. However, many of the industries will practice the usual custom of a temporary suspension between Dec. 20 or 23 and Jan. 2 to 10, so they themselves may make inventories and effect the other usual duties which come at the close of every calendar year.

Passenger car factories in Milwaukee and vicinity are sustaining fair schedules to clean up orders before the holidays and getting their show merchandise into shape. In at least one instance—Nash—production is going forward not much below the remarkably high rate averaged during the year. Mitchell, Case, Kissel and Ogren have reduced forces to a considerable extent, with every prospect for a full resumption early in the new year.

Truck factories in some instances have increased forces, but in the main they are proceeding with the recent averages, indicating that winter transportation difficulties of steam and electric lines are throwing an increasing burden on motor vehicles.

Waiting for Price Cuts

Some disturbance of the public mind in the Milwaukee buying territory has been read from the talk of prospective buyers of passenger cars by the fact that several of the prominent passenger car manufacturers have very recently announced reductions in selling prices. A short time ago, when Studebaker announced that it would have to sell its largest model at a higher price, there was considerable talk about a possible upward movement of passenger car prices all along the line, due to increased production costs. Salesmen were wont to use this as an example of a condition that was developing in this direction and a good many buyers' views coincided.

Now that Cadillac, Hudson, Essex and a few others have come out with broadsides announcing further reductions, a new "lower prices" idea seems to have taken root.

PHILADELPHIA SHIPS TRUCKS TO LIVERPOOL

PHILADELPHIA, Dec. 16—The first consignment of a shipment of 100 motor trucks to Liverpool from the Port of Philadelphia left here this week. It is composed of 20 vehicles and is a trial shipment.

The trucks are manufactured by the Traffic Motor Truck Corp. of St. Louis, and the officers of that organization, together with the Traffic Truck Sales Co., this city, are supervising the transaction.

All of the packing and other arrangements are being taken care of in this city, even to the financing of the order through Philadelphia banks.

Inventory Taking Period in Detroit to Be Shorter

(*Continued from page* 1244)

part have gone in to storage either at dealer establishments or factory warehouses to prepare for early spring business and poor shipping conditions during the winter.

With real winter weather setting in the last few days, automobile factories in this district are finding railroad service falling off as was expected. The wisdom of preparing for bad shipping conditions has been borne out by conditions following the first fall of snow which resulted in several temporary embargoes affecting roads entering Detroit. Driveaways are inadvisable for the present at least and more snow will make them next to impossible.

Bad weather conditions, with the poor condition of railroad equipment following the strike, can easily result in factories here being compelled to operate low schedules for the first month of the new year. Storage facilities at the plants and city are limited and unless it is possible to ship by freight, part time operation must follow.

Companies with well-financed dealer organizations have prepared for this to some extent but the supply of cars in dealers' hands throughout the country is low as compared with other years and much too low to meet a long cessation of shipping.

M. A. M. A. Summarizes Results of Survey

Unquestionably Good Outlook for 1923 Shown in Recapitulation of Views

NEW YORK, Dec. 18—The analytical survey of the automotive industry, which is being made by the Motor and Accessory Manufacturers Association, has reached a stage where a recapitulation of the views of the leading executives paints a picture of the 1923 outlook that is most encouraging.

Classifying these views, General Manager M. L. Heminway summarizes the outlook as follows:

Summary of Outlook

1—That the 1923 outlook in the automotive industry is unquestionably good.

2—That 1923 passenger car production probably will equal that of 1922.

3—That truck production will show an increase in 1923.

4—That renewals during 1923 alone will require 1,800,000 vehicles.

5—That the re-entry of the farmers into the buying market will add substantially to car and truck sales.

6—That there will be a good export business for the automotive industry, particularly in the South American and Far Eastern areas.

7—That the financial situation in the industry during 1923 will be marked by keen competition, strengthening the well established companies and putting the others to the final test.

8—That fundamental credit conditions will be sound and well stabilized.

9—That car manufacturers are giving greater emphasis to closed cars, sport models and light sixes.

10—That more and more accessories and devices, which in the past have been regarded as extras, are being adopted as standard equipment by car manufacturers.

As a result of this survey and his own observations during a year of close contact with the industry, Heminway states that the motor industry is rapidly developing along railroad lines, by which he means that the manufacturers now realize that they are producing and selling transportation rather than vehicles or units.

Statement by Heminway

Heminway says:

To me this development indicates the destiny and opportunity of the automotive industry. More than that, the industry can adjust itself more effectively and more economically to the transportation needs of the nation because it can learn from the blunders as well as the triumphs of the railroads.

From considerable traveling about the trade during the past twelve months, I am convinced that this is the basic doctrine in the minds of the outstanding leaders of the automotive industry.

Profit Small, Asserts Head of Standard Oil

Less Than One Cent a Gallon Goes to Company, Senate Committee Told

WASHINGTON, Dec. 21—The motorist who buys his gasoline from the Standard Oil Co. pays less than one cent a gallon profit to the company, according to the testimony of President Walter C. Teagle, given before the sub-committee of the Senate Manufacturing Committee, which is investigating the gasoline situation.

When gasoline retails at 27 cents a gallon, the Standard Oil Co. of New Jersey, parent company of the Rockefeller group, realizes a profit of about .9 cent a gallon, Teagle said, and out of every dollar the motorist pays for Standard Oil gasoline, the company retains but 3.56 cents.

Teagle denied emphatically that the Standard Oil Co. of New Jersey was a member of a "common ownership trust." He stated that his company had no connection whatever with the Magnolia Petroleum Co., Midwest Refining Co., Sinclair Co. or Union Oil Co.

The witness explained the Standard group's dividends of 400 to 900 per cent, recently declared, as attributable to three reasons: (1) Under-capitalization; (2) desire to effect wider distribution of common stock; and (3) to give the company funds for more financing.

61,000 Buicks Shipped Since First of August

FLINT, MICH., Dec. 18—The Buick Motor Co. reports that more than 61,000 cars were shipped from its Flint, Detroit and Canadian plants since the announcement of the new models on Aug. 1.

During November the company states that it shipped 33 trainloads of cars, which exceeded by 9 train loads the best previous shipping record. One trainload, destined for Sweden, was the largest single shipment that ever left the Buick factory for a foreign consignee.

Dealers Ordering Tires Expecting Higher Prices

AKRON, Dec. 21—That next spring will usher in the greatest era of prosperity and expansion the tire industry has ever known, according to Akron tire manufacturers, is indicated by the fact that practically all tire-producing companies in the Akron district to-day have booked for spring delivery from 25 to 50 per cent more business than they had on their books a year ago at this time.

Every Akron tire plant is increasing production steadily, so as to build up finished goods inventories and have a sufficient reserve supply of tires on hand to meet an expectedly heavy demand in the spring.

It is estimated that tire production soon will be back to 100,000 casings a day in Akron, and some manufacturers would not be surprised to see the gross tire output mount to 125,000 casings a day by early spring.

Talk of tire price increases has greatly stimulated current sales, for many dealers are getting orders in now before the prices are increased.

All Akron companies are "sitting tight" as to price increases, but some admittedly have new price schedules already printed. All that is needed is for some one company to start the movement and the rest will be quick to tumble into line.

HOOVER SEES SAVING FROM ENGINE TESTS

WASHINGTON, Dec. 16—A saving of approximately $100,000,000 a year to the automobile industry is predicted by Secretary Hoover in his annual report as a result of tests now being made by the Bureau of Standards.

This saving, the Secretary states, will be made in the annual gasoline bill of 10,500,000 motorists, being approximately $9 an automobile, and will be secured by increasing the efficiency of the internal-combustion engine. A complete study of automobile engine performances, both in the Bureau of Standard's laboratory and in automobiles on the road, is being carried out with the object of increasing the efficiency, the report states.

December Will Make New Ouput Record

(*Continued from page* 1244)

lighter vehicles, has shown a consistently steady gain. Manufacturers expect a notable improvement to come with the turn of the year and with an increase in buying on the part of the farmer. Rail cars and motor buses are being manufactured in greater volume to meet a steadily improving demand.

While parts business is somewhat lighter than in the earlier months, it continues to be entirely satisfactory. This branch of the industry has experienced a highly successful year, with operations maintained on a high level and collections showing little variation.

VAN KERR SCHEDULE

CHICAGO, Dec. 22—Van Kerr & Co., bankrupt manufacturer of intensifiers for spark plugs, has filed a schedule in the United States District Court giving liabilities as $87,712 and assets as $3,293.

Air Cooled Engines Discussed by S. A. E.

Metropolitan Section Hears Paper Presented by C. P. Grimes of Franklin Company

NEW YORK, Dec. 16—At the monthly meeting of the Metropolitan Section, Society of Automotive Engineers, C. P. Grimes of the H. H. Franklin Manufacturing Co. presented a paper on air-cooled automotive engines nearly all of which was devoted to a description of the Series 10 Franklin engine, its performance and manufacture. This engine, he said, has a 4.22 compression ratio, giving an actual gage pressure of 72 lb. per sq. in. at 400 r.p.m. At 1800 r.p.m. the engine develops 24 hp. and has a cylinder head temperature of 390 deg. Fahr. when the cooling air enters at 85 deg. Fahr. The brake m.e.p. runs from 75 to 77 lb. per sq. in.

Grimes showed that the economy of the Franklin engine based on indicated horsepower is about the same at full load as at part load, but that the friction losses are nearly constant while the pumping losses at part load increase, with the result that the net economy is much less at low loads, as with all conventional automobile engines.

Rapid Development Period Near

J. G. Perrin expressed the view that we are close to a period of rapid development in air cooled engines, but that it is necessary if such an engine is to be successful to design the rest of the chassis with due regard to the characteristics of the engine, as has been done in the case of the Franklin design.

H. M. Crane said that the success of the air-cooled engine constitutes more or less of a challenge to the designer of water cooled engines who have not been forced to look so closely into the matter of cooling. The water used in cooling, he said, does not always go where it is intended. It is possible, said Crane, that it may prove desirable to divide automotive engines into two classes: the smaller class to be air cooled and the larger water cooled. One disadvantage of air cooling is the tendency toward inaccessibility occasioned by the necessary air passages and cowling, and another is the need for an integral head.

Ask Blowers Be Designed

An engineer of the American Blower Co. stated that his concern has been called upon to design blowers for several air cooled engines now under development. It is important, he said, in the interest of efficiency to design the blower especially for the engine. A blower located on the crankshaft has the advantage of requiring no belt or other driving mechanism and no extra bearings, and is consequently much cheaper than an installation in which these parts are required.

Senate Committee to Fix Bus Status

Hearings Will Determine If Vehicles Are to Be Regulated as Public Utilities

WASHINGTON, Dec. 19—The automobile bus, as a means of transportation, for the first time in the history of the industry will receive official "recognition" when a Senate committee begins hearings to determine whether or not it is subject to the same regulations as public utilities.

A long and bitter fight between two traction companies in the District, on one side, and bus lines on the other, had resulted in the whole issue being thrown into the lap of the Senate. As the situation now stands the nation's capital has two railway companies, with service given approximately 40 per cent of the traveling public by nearly a score of private bus companies.

Hearings are expected to last for more than a week, and at their conclusion a report is to be made with recommendations as to statutory law defining for the first time whether or not bus transportation is on a par with street car transportation, insofar as the Federal Government is concerned.

Middle West to Have New Brass Tubing Company

KENOSHA, WIS., Dec. 20—Following the retirement of James R. Anderson as assistant manager of the Kenosha, Wis., works of the American Brass Co. (Anaconda Copper Co.), and the subsequent resignation of five department heads, it is announced that a new corporation to manufacture brass goods and copper products is being organized by this group.

Besides Anderson those who resigned are: George Rahr, leading department foreman; John Henley, mechanical supervisor; Sam Anderson, assistant to Rahr; Arthur Haas, foreman of the casting shop; and Claude Huck, sales manager, Chicago office.

While no definite details of their new enterprise have been divulged, it is said the concern will establish a factory either in Kenosha or near Chicago for manufacturing brass and copper seamless tubing and other products identified with the automotive industries. At present there is no such plant west or south of Detroit, while the main source of supply of raw materials is in northern Wisconsin and upper Michigan.

BEST MOTO-METER YEAR

NEW YORK, Dec. 18—The annual sales conference of the Moto-Meter Co., Inc., was held at the factory in Long Island City, last week. District sales managers and field representatives from all territories were present for the purpose of making plans for the coming year.

It was announced at this meeting that the sales for the first six months of 1922 exceeded the sales for the entire previous year, and that the sales for the full year more than exceeded any previous year in the company's history. From all indications, business for 1923 will show an increase over 1922, the company believes.

Cadillac Sales Increase Following Lower Prices

DETROIT, Dec. 18—Cadillac sales in the first week following recent price cuts showed an increase of 22 per cent and, in the second week, 90 per cent, according to reports received by Lynn McNaughton, general sales manager, from distributors in all parts of the country. Deliveries the first week amounted to 60 per cent and reached 150 per cent in the second.

Production now is running over 50 per cent in closed cars, McNaughton said, but many buyers are coming into the market for open cars in anticipation of waiting lists in the spring.

SENECA REDUCES PRICES

FOSTORIA, OHIO, Dec. 18—The Seneca Motor Car Co. announces that the list price on Models 50 and 51 (1923 models) has been reduced as follows:

Model	Old Price	New Price
50	$1,095	$985
51	1,095	985

TIRE LISTS HIGHER

TRENTON, N. J., Dec. 21—Empire Tire & Rubber Corp. and Murray Rubber Co. have announced a 12½ per cent increase on tire prices and a 15 per cent increase on tubes, effective Jan. 1.

Ohio Road Chief Wants Three-Cent Gasoline Tax

COLUMBUS, Dec. 19—Director of Highways Herrick, addressing the Ohio Tax Association, advocated a gasoline tax of three cents a gallon, which he estimated would yield $6,000,000 a year, for road reconstruction purposes.

Construction must not be stopped and the present maintenance fund is becoming inadequate because of the large mileage of the cheaper types of so-called hard surface roads, Herrick pointed out. Many of the improved roads will have to be reconstructed before long and a fund should be created for that purpose, for which he suggested the gasoline tax.

NEW BERGOUGNAN DIRECTORS

TRENTON, N. J., Dec. 20—The vacancies in the directorate of the Bergougnan Rubber Corp. of Trenton, N. J., caused by the death of Peter D. Thropp and the resignation of John Thropp, due to illness, have been filled by the election of Frank J. Wetzel and Newton K. Bugbee, both of Trenton.

Seeking to Improve License Tag Lights

Bureau of Standards Working with Society of Illuminating Engineers

WASHINGTON, Dec. 18—The Bureau of Standards of the Department of Commerce in co-operation with the Society of Illuminating Engineers is conducting tests in an effort to discover ways of making automobile license tags legible at sight. It is expected that as a result of these tests it will be possible to establish a practical standard of illumination for these tags, so that they will be readable at a reasonable distance at night as well as in the day.

The tests are made by mounting the tag at a known distance, turning on the light, and seeing if the observer can read the number correctly. If he hesitates and corrects himself the tag is taken to be illegible under those conditions, as under normal road conditions there is no time for a close examination. A number of employees of the bureau are used as observers in order to get an approximately average result.

Test Establishes Standard

In the first test the tag is illuminated by lamps so arranged as to give the best possible readability. This establishes a standard. It is then possible to compare the ideal condition with the actual illumination given by any tag illuminator now on the market, to see how much they fall short, and to suggest ways in which they might be improved. The illumination given by many of the types now on the market is purely nominal. A spot of light is thrown on one corner of the sign and that is all.

The apparatus also permits of various angles between the surface of the tag and the light and the eye. The best angle at which to mount the tag can therefore be determined.

A comparison is being made of the relative readability of different color combinations.

Paris Salon Shows More Engines Used in Planes

PARIS, Dec. 18 (*by cable*)—The eighth annual aviation salon, which opened Friday, is attracting marked attention because of its size and the development shown. It is noticeable that commercial planes are popular with the public and that the trend for this type includes the use of several engines in one plane.

One machine carries three engines, while there is another four-engined plane of 1100 hp. with a capacity of 25 passengers. The Pescara helicopter is attracting considerable notice.

Most of the exhibitors are French and American.

Countervailing Duty Meets Canadian Levy

Assessed Under Fordney-McCumber Act But Is Higher Than Law Names

WASHINGTON, Dec. 20—Assistant Secretary Clifford of the Treasury Department has sent notices to collectors of customs informing them of Canadian rates of duties on automobiles and other articles, and advising them that countervailing duties are required by the Fordney-McCumber Act and are to be assessed accordingly. The rates to be assessed are higher than those specifically named in the new law.

The following list showing rates imposed by Canada on American exports is based on advice from the Department of State:

Automobile bodies and automobile chassis, 35 per cent ad valorem (item 438 Canadian tariff).

Automobile bodies of iron and steel, unfinished, which merely represent an assembly of the parts and are not painted or upholstered or otherwise finished, 30 per cent (item 454 Canadian tariff).

Parts of the foregoing, such as iron or steel stampings, 30 per cent (item 454 Canadian tariff).

Two Passenger Runabout Developed by Milburn

TOLEDO, Dec. 20—Milburn Wagon Co. has developed a 2-passenger electric runabout which may be described as a cross between a coupe and a roadster.

The standard model 27-L, 5-passenger brougham, shows many improvements in both workmanship and performance. Additional battery capacity is provided with a heavier duty motor, while equipment includes snubbers, Alemite lubrication and all instruments necessary to insure intelligent and easy operation.

Supplementary to this model, the Milburn is also offering a 4-passenger coupe mounted on the same chassis as the 27-L. This vehicle, which is designated as model 27-F, presents a staggered interior seating arrangement, the driver's seat being set forward in the same manner as in the 3-passenger gasoline car coupe design. An additional auxiliary seat is mounted forward on the right side, directly under the front window, thus permitting a total seating capacity for four passengers.

BIG MONTH AT FORD BRANCH

ATLANTA, Dec. 19—Sales already made and advance orders for cars to be delivered during December give assurance that this will be the biggest month in the history of the factory branch of the Ford Motor Co. here, officials announced yesterday.

This does not mean the largest December, but the largest month the company has ever experienced at this branch. Gross sales of better than 5000 are certain in vehicles shipped, including Ford cars and trucks only. Both October and November were above 4000. It is also certain that the present month will be the biggest in the history of the branch in parts sales.

175 M. P. H., Lowest Speed for Entry in Pulitzer Race

WASHINGTON, Dec. 20—The minimum speed of airplanes entering next year's Pulitzer Cup race has been fixed at 175 m.p.h. by the Contest Committee of the National Aeronautic Association of the United States of America.

A maximum landing limit of 75 m.p.h., the same as in the 1922 races at Detroit, also was decided upon.

A subcommittee has been appointed to act with representatives of the Army and Navy Air Services to select the course for the 1923 meet, over water if possible.

The distance and pylon arrangements of the course have been fixed at a total length of 200 kilometers, with four laps around a 50 kilometer equilateral triangle, using two pylons at the turns, instead of one, to assure a wide turn. A single basis for the minimum factor of safety for monoplanes and biplanes—seven and one-half—also has been determined upon, and the committee has decided that contestants must retain their landing gears after taking the air.

Prize money will not be offered for events in which only military and naval service planes can compete, as in the Pulitzer race, and at least two events will be arranged in which only civilian flyers will enter.

PIERCE-ARROW SALES GAIN

BUFFALO, Dec. 18—In the first 11 months of 1922, its passenger car sales showed an increase of 40 per cent over the corresponding period last year, reports the Pierce-Arrow Motor Car Co. In the last half of the year it is estimated that the gain over the last six months of 1921 will be close to 90 per cent. Truck sales up to Dec. 1 of the current year were 65 per cent more than those of the 1921 period.

WITHDRAWS SHOW SANCTION

NEW YORK, Dec. 18—By mutual agreement the sanction of the Minneapolis show by the Motor and Accessory Association has been withdrawn. This leaves New York, Chicago and Boston as the only shows this winter open to manufacturers of parts and accessories as exhibitors.

NEW STUDEBAKER BRANCH

INDIANAPOLIS, Dec. 15—Studebaker Corp. has opened a factory branch in this city to replace the former distributorship. W. J. Owens is retail sales manager, and George Mander, wholesale representative.

Road Work Expands Under Chilean Law

Chief Activity Centers Around Santiago—Proves Relief to Unemployment

SANTIAGO, CHILE, Nov. 8 (*by mail*)—A compilation of the highway activities in Chile, made by the Automobile Association of Valparaiso and Vina del Mar, shows that 43 kilometers of roads and 120 kilometers of paving, principally in the neighborhood of Santiago, the Chilean capital, have been built or improved as a result of the new Chilean road law.

A total of 13,000,000 pesos (Chilean) also has been expended on road work as a measure to combat the recent unemployment problem, which was so marked some months ago when nitrate production was at a low ebb.

A six kilometer concrete highway was recently opened connecting this city, which is the seaport for the capital and the chief maritime outlet of Chile, with the suburban city of Vina del Mar. This highway was built by a North American paving company and is an excellent piece of work. It is fifteen meters in width and has a double line of electric tramway tracks in the center.

Road from Valparaiso

The same company is also building an experimental road on the route from Valparaiso to Santiago. It is six meters in width, the central four meters being of crushed stone with concrete top and the outer shoulders of one meter width on either side of crushed stone only. The Santiago highway, when completed, will be one of the most important motor routes in all of Latin-America.

The Chilean road law was passed in March, 1920, the special revenues provided by it starting in part from July 1 of that year but not entirely until 1921. Provisions of the law, however, prevent the use of any of these funds until the following year after they are collected and, consequently, it was not until 1922 that these funds became available for road work in any large degree.

The principal work now consists of repairs on the existing roads and for this work Chilean factories have built for the government 72 road rollers, their cost totalling $20,000 gold.

COTTON MILLS TURN TO TIRES

ATLANTA, Dec. 18—Officials of the Thomaston Cotton Mills Co. of Thomaston, Ga., advise they have closed several large contracts lately with northern tire manufacturers for the production of tire fabric, and will at once install additional new machinery at the plant, and hereafter turn attention largely to tire-fabric making. The plant is also to be enlarged. In the past year about half a dozen Georgia cotton mills have turned to the production of tire fabric.

BANK CREDITS
Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

The tendency in the call money market last week was toward greater ease, and the supply was well in excess of the demand. Actual rates ranged from 3¾ per cent to 5 per cent, as compared with 4 per cent to 5½ per cent in the previous week. A slightly easier trend was noted in time money, the rate for all maturities from 60 days to 6 months being 4¾ per cent to 5 per cent, as compared with 5 per cent in the previous week. Although offerings were in freer supply, no real important transactions were effected. The prime commercial rate remained at 4¼ per cent to 4¾ per cent.

The outstanding event of last week was the sensational advance in sterling exchange which carried the demand rate up to $4.69, the highest level since the spring of 1919 and within 17⅝ cents of par. Although there was a swift downward reaction to $4.63, a large part of the gain over the previous week was held.

Unfilled orders on the books of the United States Steel Corp. at the end of November totaled 6,820,242 tons, which was a loss of 62,045 tons from the total reported at the end of October. This decrease followed eight consecutive months in which the forward business showed gains. The last previous decrease was reported for last February at a time when the industry had begun to show signs of recovery from the depression that had begun in the summer of 1920. Although actual new business placed during November is said to have exceeded October's volume, the increased ease in shipping finished products from the mills tended to offset this.

Merchandise exports from the United States during the month of November totaled $383,000,000, which was $12,000,000 greater than the value of October exports, and $19,000,000 more than the value of merchandise exports for November, 1921. As compared with total value of exports in November, 1913, the figures for November of this year show an increase of $138,000,000.

The Federal Reserve statement as of Dec. 13, 1922, showed an increase of $15,431,000 in gold reserves and $11,907,000 in total reserves. Bills on hand decreased $49,442,000 and total earning assets $53,998,000. Deposits also declined $48,994,000, while Federal Reserve notes in circulation increased $17,963,000. The reserve ratio advanced from 74.3 per cent to 75.1 per cent.

FALOR TO INCREASE OUTPUT

AKRON, Dec. 20—The Falor Manufacturing Co. is planning substantial production increases the first of the year. The company, which manufactures tire tubes exclusively, has just moved into its new factory in North Akron. It was organized two years ago by Shelby Falor, former Goodyear official.

While November business was the biggest in the company's history, Falor reports that December production and sales will run 15 per cent higher than those of November. The company now is manufacturing 1600 tubes daily and Jan. 1 will go to a production of 2000 daily.

FINANCIAL NOTES

Belle City Malleable Iron Co. of Racine, Wis., has increased its authorized capitalization from $500,000 to $1,300,000. The new issue is made to finance the entire reconstruction of the plant during a three-year period at a cost of $800,000, doubling the former capacity and providing the most modern buildings, equipments and methods. The first unit of the reconstruction, an annealing building, costing $250,000, is being completed and will be ready for occupancy Jan. 15. A new $25,000 office building will be occupied Jan. 1. Next spring the first unit of a new foundry will be started. All construction work is planned so that there will be no interruption of operations at any time.

Globe Ball Co., Milwaukee, manufacturer of steel balls, ball bearings, etc., has increased its capital stock from $75,000 to $125,000 to finance enlargement of the plant and business. At the same time the corporate name was changed to Globe Bearings Co., to indicate better the character of the industry.

Edmunds & Jones Corp. has declared the regular quarterly dividend of 1¾ per cent on the preferred and 50 cents a share on the common stocks, both payable Jan. 2 to holders of record Dec. 20.

Hupp Motor Car Co. has declared the regular quarterly dividend of 1¾ per cent on the preferred stock, payable Jan. 1 to stock of record Dec. 20.

Continental Motors Corp. for the nine months ended July 31, 1922, shows net profits of $1,281,618 after charges and taxes.

Wills Creditors Advised of Time for Filing Claims

DETROIT, Dec. 20—Creditors of C. H. Wills & Co. are being notified by the Security Trust Co., receiver, to file all claims against the company on or before Feb. 5 next. The appraising of the property is nearing final stages and a report will soon be made by the receiver.

The business of the company is reported to be in satisfactory volume. The receiver is bending every effort to complete its work so that a termination may be reached before the opening of the 1923 heavy manufacturing season.

H. H. HEWITT DIES

BUFFALO, Dec. 20—Herbert H. Hewitt, president of the Hewitt Rubber Co., died Tuesday following an extended illness. Besides his connection with the Hewitt company, Hewitt was manager of the Reading Car Wheel Co. of Reading, manager of the Magnus Metal Co., Buffalo, and had diversified interests in this part of the country.

Engineers Inspect Big Dirigible ZR-1

Visit Hangar at Lakehurst—Frame Work of Machine Nears Completion

LAKEHURST, N. J., Dec. 19—The giant dirigible ZR-1 which is being assembled in the Navy's mammoth hangar here was inspected to-day by members of the Society of Automotive Engineers and other engineers who came here from New York and Philadelphia for that purpose. The framework of the ship, constructed almost entirely of duralumin, is nearing completion, and a part of the covering is already applied, while several of the gas bags are completed and ready for installation.

The process of assembly being followed involves laying out on the floor the subassemblies of the transverse rings, the largest of which are 78 ft. in diameter. These are formed from duralumin latticework girders previously fabricated in the Naval Aircraft Factory. When assembled the rings are hoisted by tackle attached at three points and swung into position, after which the longitudinal girders are riveted in place. In the keel of the ship is incorporated a triangular passageway, which contains the operating controls and affords means for passage between the six cars suspended below the hull, each car containing one six-cylinder 300-hp. Packard engine designed especially for dirigible service.

Hydrogen May Replace Helium

Helium will first be used to inflate the gas bags and support the ship in its initial flights, but this may later give place to hydrogen, which is far cheaper and more plentiful and has considerably greater lifting power.

Every effort is being made to insure the safety of the ship and its crew. A committee of engineers appointed by the National Advisory Committee for Aeronautics has carefully checked the plans and specifications of the ZR-1 and has made inflation tests involving pressures 50 per cent greater than the structure is designed to stand in service without signs of failure. Careful analysis and computation of stresses and aerodynamic forces acting upon the craft when in flight have also been made and the factor of safety found to be greater than that of any similar craft constructed to date.

Will Cost $1,500,000

The ship is 680 ft. long and is divided into 20 compartments or bags containing about 2,290,000 cu. ft. of gas. Its estimated cost is about $1,500,000 or about 15 per cent of the cost of the navy's scout cruisers, many of the functions of which it is intended to fulfill, although possessed of a much greater radius of action. It is expected that the craft will be completed about July 15, 1923.

Cotton Crop Valuable Despite Small Yield

High Prices Have Wide Moral Effect on Business Throughout South

ATLANTA, Dec. 20—While this year's cotton production in the South as estimated by the Government is the smallest in twenty years with the exception of last season's yield in total bales, it is the fourth most valuable crop the South has ever grown, due to the exceptionally high prices now prevailing for cotton, cotton seed and other southern agricultural products. The aggregate value of the total crop, not including linters and seed, is estimated at $1,134,608,356, for a yield of 9,964,000 bales of 500 pounds each.

It is also estimated that the twelve principal southern crops this year are bringing approximately $1,200,000,000 more than the same twelve crops brought the South last year, which means that the buying power of Southern farmers is now at the highest mark in history in spite of excessively large debts they have been liquidating with this year's profits.

All Factories at Capacity

The moral effect of this on Southern business is surprising. Nearly every factory in the South is running at capacity, most of them well sold ahead into 1923; wholesalers report the biggest volume of holiday business the past two months they have experienced in years, on a par with the flush periods of 1919; retailers state business was never in greater volume.

There is a shortage of labor in most of the important industries, and the best of wages are being paid.

The South has fully recovered from its long period of deflation, and is looking toward 1923 as one of the biggest years it has known in a business way.

Construction activity is continuing unabated over the whole district through the winter months, and most cities report new building records in 1922. In Atlanta, the total is better than $20,000,000 for the year, exceeding the previous biggest year in the city's history by more than $5,000,000.

Financial State Good

Bankers state that financially the whole section is in first class shape, and will enter 1923 with fewer debts than it has ever known at the beginning of a new year.

Exclusive, perhaps of the inflation period, the year was the best automotive dealers and distributors have yet experienced, and in some cases, principally with those handling lower priced and medium priced cars, was the biggest year without exception.

Among the smaller dealers in towns and communities dependent mostly on rural trade, business the last six months has been exceptional and is steadily improving from month to month as crop prices and cotton continue to advance.

Most accessory jobbers also report the biggest volume during 1922 they have experienced in many years, with the 1923 outlook for a still larger volume.

The volume of general business in the Atlanta Federal Reserve district during November experienced the largest increase of any other reserve district in the United States, Atlanta's increase being 21.4 per cent as compared with an increase of 13 per cent for the country as a whole. The Atlanta district comprises the group of southeastern States.

INDUSTRIAL NOTES

Vig-Tor Axle Co. has purchased the fully equipped plant of the Forest City Machine & Forge Co. in Cleveland, for the manufacture of internal gear drive rear axles for trucks, and front axles for both commercial and passenger cars. The plant is appraised at $750,000 and embraces two three-story buildings, 40 x 70 feet and 85 x 177 feet; a main machine building, 100 x 296 feet, and three smaller structures.

Bessemer Metal Products Co., formed recently at Bessemer, Ala., plans the immediate establishment of a plant in that city for the manufacture of metal automobile parts, including principally pistons, piston rings, connecting rods, pins, and similar items, according to E. J. Perkins of Bessemer, president of the company.

Gas Tank Recharging Co., Milwaukee, manufacturer and distributor of acetylene gas and by-products, has plans for a complete new plant on a new site in West Allis. Bids closed Dec. 15 on six buildings of fireproof construction, work on which is to be started immediately after Jan. 1 at a cost of $150,000.

Fountain City Lumber & Body Co. was organized and incorporated at Knoxville, Tenn., this month and is planning the establishment of a plant manufacturing automobile bodies and truck bodies. J. R. Brantley, W. J. Statum and others, of Knoxville, are the incorporators.

Hayes Wheel Co. individual stockholders have formed the Morrison Stamping Co. with $100,000 capital, to engage in the general automobile stamping business. The property adjoining the Hayes plant at Detroit has been obtained for a site.

Kings Manufacturing Co., Inc., manufacturer of the Henderson window holder and automobile body hardware, has secured larger quarters at 32 Thirty-third Street, Brooklyn.

E. G. Budd Manufacturing Co. has bought a five-story concrete factory in Philadelphia from Simmons Properties, Inc., for $125,000.

Ingersoll-Rand Co. and the A. S. Cameron Steam Pump works have opened a branch office in the Ellicott Square building, Buffalo.

FORD TRAINING CHINESE

DETROIT, Dec. 18—The first of several hundred young Chinese have entered the employ of the Ford Motor Co. to receive a thorough training in American manufacturing and business methods, so as to be competent to fill positions in the Ford factory at Canton, China.

METAL MARKETS

While there is a seasonable easing off in the demand for most steel products, especially so in sheets, automotive consumers are consistently covering their first quarter 1923 wants. They are doing this in rational fashion and, because of the absence of all excitement in this buying, sellers are meeting them more than half way in the matter of prices. There has been a deal of activity in the alloy steel market in the last few days. The competitive spirit among the northern Ohio alloy steel mills is somewhat more pronounced, and consumers have been offered inducements amounting on an average to $5 per ton as compared with previously prevailing prices. In anticipation of a strong automotive demand most of the alloy steel producers have committed themselves heavily in the ferroalloys market, ferrochrome and ferrosilicon coming in for especially large transactions. Nickel steels, nickel chromium steels, and chrome vanadium bars are quoted about 25 cents per 100 pounds lower.

Reports emanating from conservative Pittsburgh sources tend to show that the steel industry is taking seriously threats of another coal strike on April 1, 1923 and that many of the steel mills are preparing for such a calamity by accumulating heavy reserves of pig iron. The third largest steel interest is mentioned in particular as following such a course. While precautions of this sort would be more than vindicated in the event of another coal strike materializing, it will be readily seen that these preparations are fraught with much risk in so far as concerns the markets in the event that fears of a repetition of this year's coal shortage should after all prove unfounded.

Pig Iron.—As the result of the heavy buying during the first half of the month, the market presents a much firmer appearance. Differentials between the various markets are becoming less glaring in disparity. Furnaces are less disposed to go far afield from their logical territories to get business. For all that, leading pig iron sellers concede that "furnace books are only making a beginning on 1923 business." Producers active in the Detroit territory are perhaps a shade firmer in their price views than those in other consuming centers. While tonnages contracted for by automotive foundries have been heavy in the aggregate, individual orders are of a size which clearly discloses that consumers are anticipating merely their actual wants and not going beyond that boundary line in their commitments.

Aluminum. — Aluminum sheet offerings from other than the leading interests are at a wide range of prices. Out of stock 14 to 16 gage body sheets sell at as high as 49 @ 45 cents base while some importers are offering for delivery within six weeks sheets at 31 cents base for flat and at 35 @ 35½ cents for circles from flat sheets. Imported ingot metal also continues to show a wide range in quotations, 98 to 99 per cent pure virgin metal being quoted in one quarter at as low as 22 cents and in others at as high as 23½ cents. Information from Germany is to the effect that the export duty on aluminum wire has been reduced from 4 to 2 per cent, but nothing is known regarding any action altering the export duty on aluminum sheets.

Copper.—The copper market has turned much firmer and "outside" holders are asking close to producers' prices which range from 14¼ cents up.

Calendar

SHOWS

Jan 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8 - 13 — New York, Second National Automobile Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Dec. 15 - Jan. 2 — Paris, Aeronautical Salon, Grand Palace. Chambre Syndicale des Industries Aeronautiques, 9 Rue Anatole de la Forge.

Jan. 13-24 — Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

April - July, 1923 — Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

RACES

May 10 — Berlin - Grunewald, German Grand Prix.

CONVENTIONS

Jan. 15-19—Chicago, Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show.

Jan. 29 - 31 — Chicago, Annual Meeting, Automobile Electric Service Association, Congress Hotel.

Feb. 15-16—Chicago, City Club, Winter Sectional Meeting of the American Society for Steel Treating; W. H. Eisenman, 4600 Prospect Avenue, Cleveland, national secretary.

S. A. E. MEETINGS

Metropolitan Section

March 15—Speaker, William P. Kennedy, President, Kennedy Engineering Corp.; Subject, Trolley Buses and Flexible Vehicles for Street Railway Service.

April 19—Speaker, Edw. E. La Schum, General Superintendent, Motor Vehicle Equipment, American Railway Express Co.; Subject, Engineering Features of Fleet Operation.

May 17—Speaker, F. P. Gilligan, Secretary, Henry Souther Engineering Co., Subject, Metallic Materials for Automotive Work.

Other Meetings

Jan. 9 - 12 — New York, Annual Meeting.

Jan. 31 — Chicago Meeting and Dinner of the Society at the Congress Hotel.

Co-operative Plan Urged on Farmers

CHICAGO, Dec. 19—The development of an adequate highway transportation system by Federal and State governments, was urged here by the representatives of the American Farm Bureau Federation, just closing its fourth annual convention. The delegates represented 6,000,000 farmers.

A resolution was adopted and sent to members of Congress requesting that the national and State governments take prompt steps to develop a well-rounded transportation system of first grade highways, which would be inter-State in their relation.

Another resolution was adopted condemning the high freight rates.

Co-operative marketing by trucks was urged as a means of solving, to a large extent, the transportation problems of the farmer and as a possible factor in securing better prices for farm produce by the elimination of "excess" middlemen.

Manufacturers Placing Ash Orders Well Ahead

ATLANTA, Dec. 20—Lumber manufacturers with southern headquarters in Atlanta and operating mills in this district producing ash, advise that there has been an unprecedented demand for thicker ash grades from the automobile manufacturers the past two months, and that a majority of the mills are sold ahead into 1923.

The unusual demand, in fact, has caused grades used most commonly by the automotive trades to advance in price the past five or six weeks, with the result that 10/4 ash, firsts and seconds, which is the best grade, has now reached $115 per thousand; common is selling at $77. In the 12/4 ash, firsts and seconds are at $118 per thousand, and common at $80. These are the two dimensions in thick ash most commonly used by the automotive trade.

As a whole, the ash industry in the Southeast, most operators here state, has experienced one of its best years in history, with the outlook for an even better volume during 1923, judging from advance orders now being placed by the automobile manufacturers. The latter are doing their buying much further in advance than they were six or seven months ago, and as a whole thick ash prices are steadily on the upward grade.

Manager of Ford Branch in Houston, Tours Mexico

DETROIT, Dec. 18—R. S. Abbott, manager of the Houston branch of the Ford Motor Co., is now on an extended trip in Mexico, visiting all Ford distribution sources. Particular attention will be paid to sales possibilities to decide what will be necessary to increase business throughout the republic. Endeavor will also be made to educate the people in the use of the Ford products for their special requirements. The trip is practically a duplicate of a similar one taken a year ago.

Abbott will travel south to the Isthmus of Yucatan and west as far as Sangeronimo. Economic conditions will be studied separately and compiled individually by States. A considerable part of the time will be spent by Abbott in Mexico City.

It is the intention of the company to locate an assembly branch in Mexico when economic conditions are considered satisfactory. Abbott's investigation, although designed fundamentally to increase business of the Houston branch, will serve to provide information on economic developments as a link in the company's plan of manufacture.

HEADS MITCHELL COMMITTEE

CHICAGO, Dec. 20—Herman Waldeck, vice-president of the Continental & Commercial National Bank, is chairman of a committee of creditors organized for their interests and for the purpose of advising and co-operating in the plan of reorganization and refinancing of the Mitchell Motors Co. that is under way.

Barnes Uses Radio to Tell Truck Value

WASHINGTON, Dec. 20—The motor truck is the ideal means of American transportation, according to Julius H. Barnes, president of the United States Chamber of Commerce, in a radio message addressed to trade bodies and clubs throughout the United States. The message was broadcast at the annual banquet of the Washington City Club.

The speaker declared that, while the problem of transportation should predominate the minds of all thinking Americans, no definite plans were underway to solve it. He recommended that a survey of the country's needs be made by the government.

Transportation, he declared, was the most outstanding need in "Present Day American Problems," the subject of his address, and urged that business men and manufacturers give more study and support to the nation's requirements for better highway transportation systems throughout the country.

Stewart-Warner Income Estimated at $5,775,000

CHICAGO, Dec. 18—Estimates based on the earnings of the Stewart-Warner Speedometer Corp. for the first three-quarters of the current year indicate that the company's net income for 1922 will be in the neighborhood of $5,775,000. After Federal taxes and dividend requirements of $21,168 on the Stewart Manufacturing Co.'s $264,000 8 per cent preferred stock, this would be equivalent to $10.49 a share on the capital stock of Stewart-Warner.

The management reports that sales and earnings in the current quarter are at the same rate as those of the second and third quarters, which ordinarily are the most active periods. A total of $4 a share in dividends has been paid by the company this year, and its directors virtually have assured stockholders that the annual rate will be increased to $5 next year.

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Chevrolet Copper-Cooled Car Ready for Market

New line, developed at General Motors Research Laboratory, embodies advanced ideas in cooling. Copper radiating fins welded to cylinder barrel. Four cylinders cast separately. Five-passenger model $725. Present Chevrolet line continued.

By J. Edward Schipper

THIS is the first complete technical description of the Chevrolet copper-cooled car to be presented to the industry. The long period of experimental work which preceded the announcement of this new line has made the industry keenly interested in its engineering details.

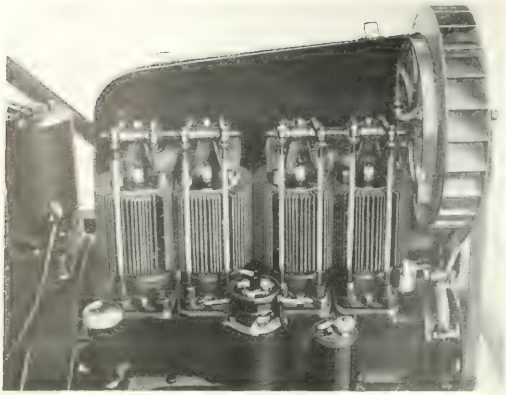
Automotive Industries is able to give the complete story of this new model in time for engineers and executives to study the design carefully before actually seeing the car at the New York Show.

PRODUCTION has started and shipments are being made to distributors on the Chevrolet copper-cooled car. The price of the touring car will be $725. This car, which, for the past two years has aroused the interest of the industry, was developed at the General Motors Research Laboratory at Dayton and turned over to the Chevrolet Motor Car Co. for production. Interest in this car has been keen because it marks the introduction to the American market of a low-priced, air-cooled car. The present Chevrolet line will be continued.

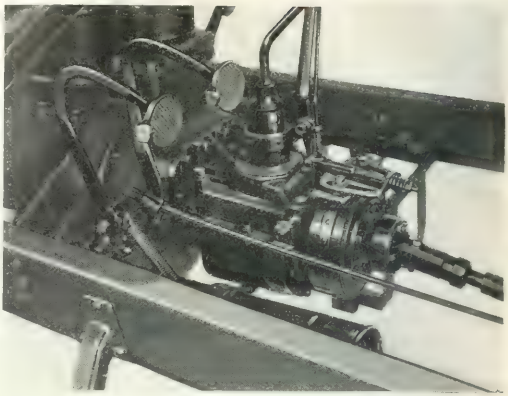
In the development of the air-cooling system, the General Motors Corp. has successfully accomplished, on a production basis, the feat of electrically welding copper to iron. By the use of this process the copper cooling fins are made an integral part of the cast-iron cylinders, and advantage is taken of the excellent heat conducting qualities of copper. Rolled copper has a heat conductivity of more than double that of cast iron. Because of the use of copper cooling fins the term "copper-cooled" is used in designating this new product.

In a water-cooled car, the water simply acts as an agent for transferring the heat from the cylinder to the radiator. In this new engine the water vehicle has been dispensed with and instead, the radiator has been mounted directly on the cylinder barrel.

Because of the increased conductivity of the copper fins as compared with cast iron, the characteristics of the copper-cooled engine are claimed to be very



New Chevrolet copper-cooled engine with part of draft tube removed to show cooling fins and blower inlet. Note vertical position of starting motor



Gearset and propeller shaft brake, showing cam operating mechanism

much closer to those of the water-cooled engine than are those of engines in which cast-iron cooling fins are employed. Because of the more rapid flow of heat through the copper ribbing and because of the method of manufacturing the copper ribs out of copper sheet, not only is the heat conduction and radiation more rapid as compared with that of the cast-iron fin, but it is also possible to utilize an increased area of radiating surface, since the copper is much thinner than any cast rib can be. From a standpoint of performance, the use of the copper fin has resulted in an engine which gives about the same mean effective pressure, using about the same compression ratio, as water-cooled engines of the same size.

How Cylinders Are Manufactured

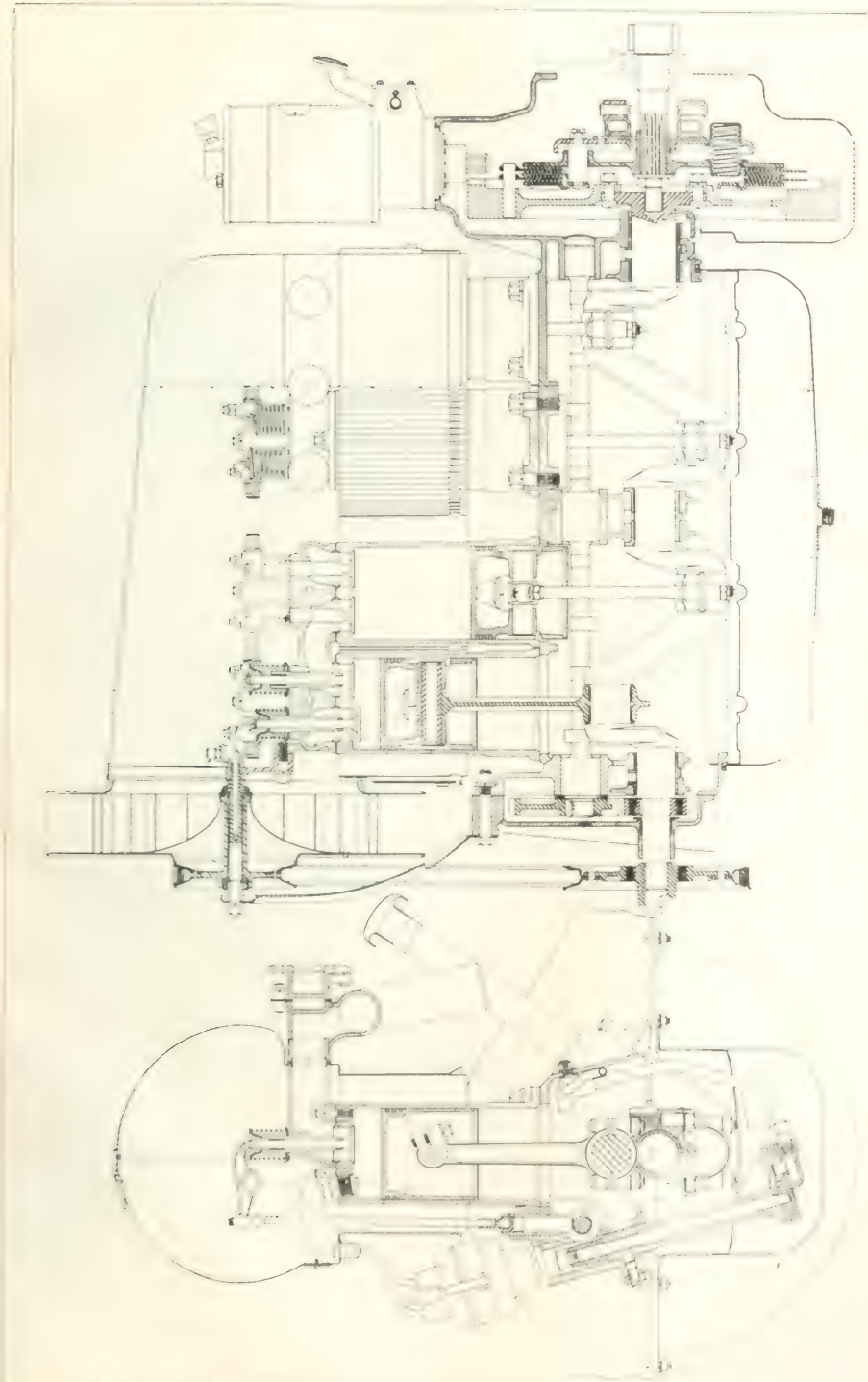
To manufacture satisfactorily the copper-cooled engine, it has been necessary to develop machinery which will form the copper ribs and apparatus which will commercially handle the electric welding of the formed ribs to the cylinders. This manufacturing equipment has been developed at the Dayton laboratory coincidentally with the development of the cylinder itself. The finished cylinders are manufactured at Dayton, the copper fins being made in a special machine which takes the sheet copper and forms it into the proper shape, reducing the depth of the fins or loops at points where clearance for the valve push rods and adjacent cylinders is required. The copper is so formed that the loops are closed at points adjacent to the cylinder barrel and in such a way that a continuous band of copper is in contact with the outer wall of the cylinder, which latter is machined both inside and out.

While the cylinders are necessarily manufactured singly, they are assembled in pairs. There are two detachable heads, each covering two cylinders of the four-cylinder engine. Each pair of cylinders is brought relatively close together, but a full spacing is allowed between the two center cylinders so as to permit of the full length of fin between cylinders No. 2 and No. 3. Between cylinders 1 and 2 and between cylinders 3 and 4, which are closely adjacent to one another, the fins are graduated in size so that there is no interference. Because the fins are shorter at this point, this would produce a warmer part of the cylinder barrel were it not for the fact that the intake valve is on the same side on the cylinder. This construction facilitates preheating of the incoming gases and permits of a Siamese intake layout. The exhaust valves are placed adjacent to the outer side of each cylinder in each pair where the ribs or fins are free from interference and where the maximum cooling effect is obtained. The longer fins and the hot exhaust gases balance against the shorter fins and cool intake gases so that thermo-couples placed at various points about the engine disclose very little difference in temperature at any point.

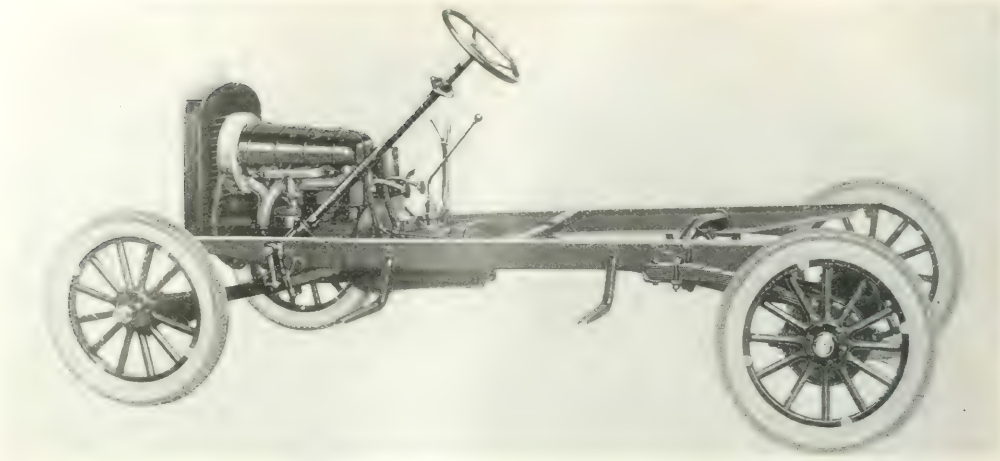
This new engine is the first square one to be placed on the market for some time. The bore and stroke are each $3\frac{1}{2}$ in. With a compression ratio of 4 to 1, which is standard, a maximum b.hp. of 22 is delivered at 1750 r.p.m. A restricted intake manifold is used to

Specifications of Chevrolet Copper-Cooled Car

Bore, $3\frac{1}{2}$ in.
Stroke, $3\frac{1}{2}$ in.
No. of cylinders, 4.
Cylinder head, detachable.
Cylinders cast, individually.
Pistons, Lynite.
Piston weight, 1 lb. 5 oz.
Connecting rod, length, 6 13 16 in.
Connecting rod, weight, 1.11 lb.
Valve material, Silcrome
Camshaft drive, metal gear.
Oiling system, gravity-splash.
Oil pump type, gear.
Carbureter, Carter.
Intake, exhaust heated.
Fuel feed, vacuum.
Electrical system, Remy.
Battery, Willard.
Spark control, automatic.
Clutch, multiple disk.
Number of disks, 4.
Low speed reduction, 3.32 to 1.
Second speed reduction, 1.77 to 1.
Third, direct.
Reverse, 4.27.
Rear axle reduction, 4.44 to 1.
Universal joint, Mechanic.
Rear axle, semi-floating.
Propulsion, through springs.
Torque, through torque arm.
Final drive, spiral bevel.
Front spring, quarter elliptic.
Rear spring, quarter elliptic
Foot brake, external on rear wheels.
Hand brake, external on drive shaft.
Steering gear, Jacox.
Turning diameter, 39 ft.
Tire size, 30 by $3\frac{1}{2}$ in.
Wheelbase, 103 in.
Speedometer, Champion.



Vertical sectional views of the new Chevrolet copper-cooled engine and horizontal section of clutch. Note arrangement and type of construction of blower which draws air from central base of cylinders, through and around the copper cooling fins and over the cylinder heads. The latter are made in two parts. That portion to which the valves seat has a thick section and is integral with the cylinder barrel, while the inlet and exhaust passages are cored to be separate casting which covers two cylinders. Note also the arrangement of the starting motor. The gears are a special type, cut bevel, although the drive is of right angles. The conventional sliding gear shifting device is eliminated



Chevrolet chassis with copper-cooled engine. Wheelbase is 103 in. Quarter elliptic springs are fitted front and rear. The draft tube which encloses the cylinder heads and valve gears is shown closed

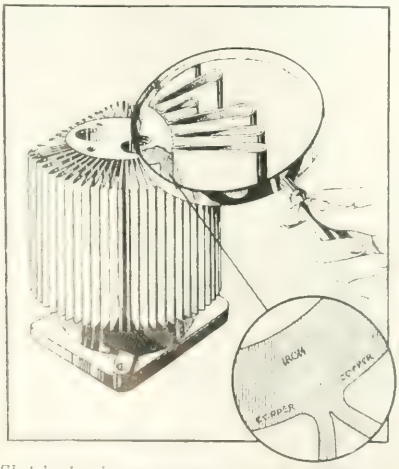
limit the power output of the engine and prevent car speeds in excess of 45 miles per hour on the standard gear ratio of 4.44 to 1.

The standard touring car weighs 1670 lb. and has a wheelbase of 103 in. With the exception of the new cooling system, there is nothing radical about the design of the car. In fact, the chassis is, in its general appearance, very much like the Chevrolet Superior model, although close inspection reveals a number of detail improvements all through. In spite of the close resemblance, very few of the chassis parts are interchangeable with those of the Superior model.

Unique Features of Cooling System

The cooling system, however, differs materially from anything ever placed on the market. Cooling is by air drawn through and around the fins and over the cylinder heads by a centrifugal blower made largely from sheet aluminum alloy. This blower is in front of the engine and is driven by a special form of V-belt from a pulley on the crankshaft. The fan runs at about one and one-half times engine speed. Air enters at the bottoms of the fins around the cylinders. A light steel stamping forms a tubular draft tube which fits closely around the cylinders, so that air can enter the fan only by passing upward, through and around the copper fins and through the space above the cylinders. The hot air is exhausted around the fan periphery.

An interesting point in connection with the design of the engine is the use of the thick metal head which not only provides better conduction, but also maintains a true valve seat. In manufacture, the final valve seating is very carefully done after the valve guides are in place, the guides acting to locate the pilots of the seating tools. A heat insulating gasket is placed between the cylinder head and the cylinder to prevent heat from flowing back from heads to the cylinders. This reduces the heat load on the cooling fins. The valves are mounted off-center to make room for the spark plugs in the head. This results in an unusually effective head construction from the heat removal standpoint.

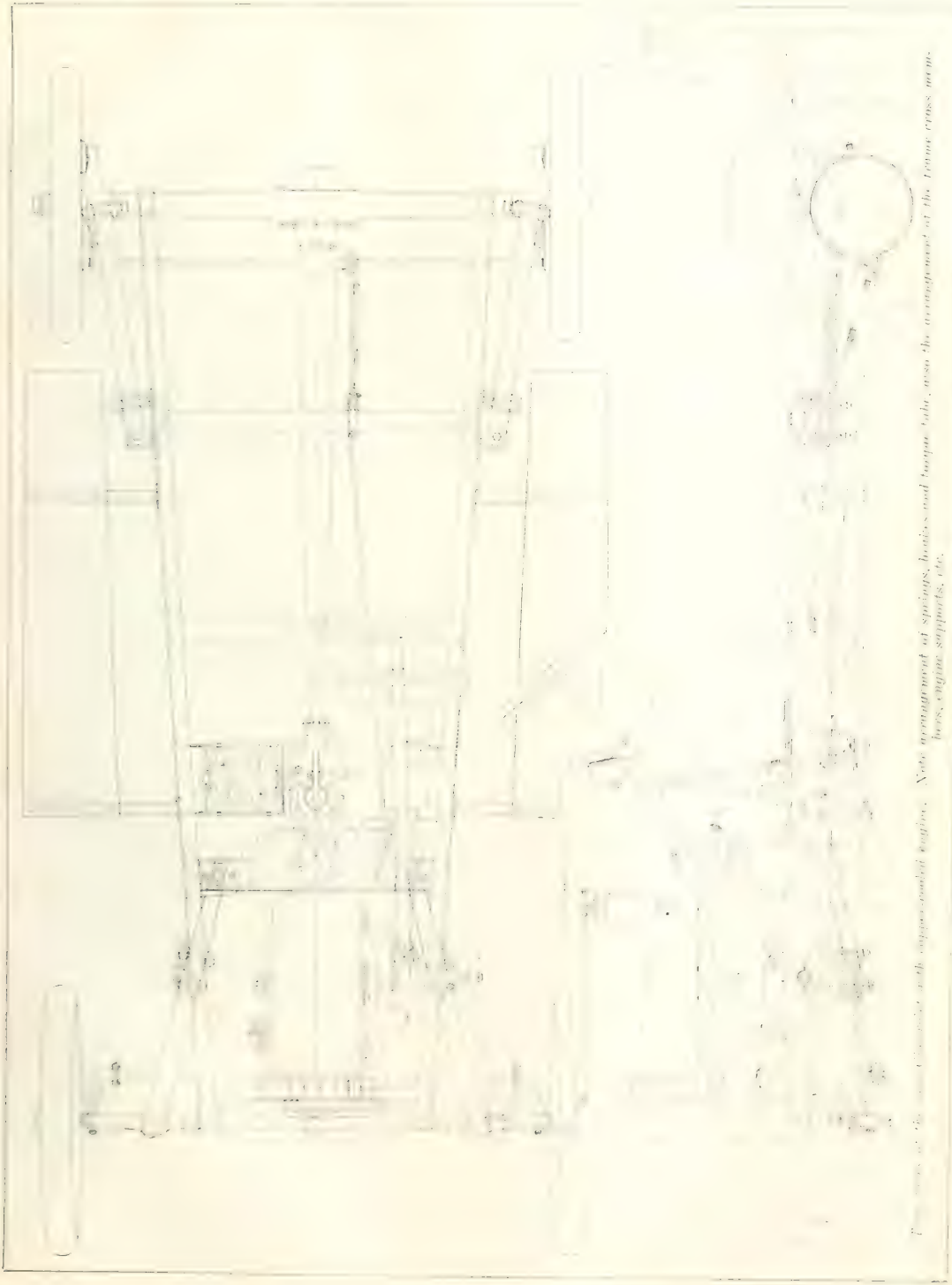


Sketch showing arrangement of the copper cooling fins on the new Chevrolet engine. They are made from sheet copper and are welded to the cast-iron cylinder barrel

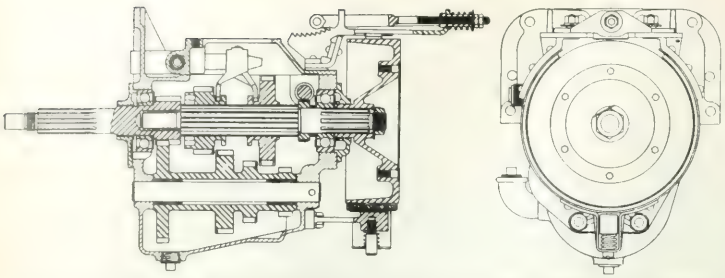
Blower Is Belt Driven

A vital point in the design of the cooling system is naturally the means for driving the fan. The V-belt employed has a woven cord construction on its neutral axis and a durable elastic material on either side of the neutral axis permitting of the flexing necessary for the drive. A considerable amount of experimental work was done on this belt at the laboratory in Dayton. The engineering department has found that with the construction used, a practically unlimited life can be obtained. The drive for the fan is triangular, the belt passing around the crankshaft, fan and generator pulleys. Adjustment for the tension of the belt is secured by swinging the generator, which is mounted on the left side of the engine.

The valve drive is quite similar in general design to the Superior model Chevrolet, but is not interchangeable with it. The overhead valves are operated through aluminum push rods, aluminum being adopted not only for



Frame of the new Chevrolet with copper-cooled engine. Note arrangement of springs, bodies and torque tube, also the arrangement of the front cross members, engine supports, etc.



Gearset, showing also the arrangement of the hand operated propeller shaft brake

its lightness and consequent reduction of the inertia of the reciprocating valve parts, but also because its expansion rate is such as to compensate for the cylinder expansion and, consequently, to reduce variation with temperature change in the push rod clearance. The camshaft is driven by a single gear and the valves are operated through mushroom tappets. The rocker arms are carried on self-lubricating grapho-bronze bushings. This is the combination graphite-bronze bearing recently developed at the Dayton laboratory, and is made from powdered graphite and bronze.

Lubrication is by a pump and gravity feed system, the pump merely being a lifting device which takes the oil to a central distributing point from which it feeds through three gravity-flow tubes to the three main bearings. The oil pump body is cast iron with a die-cast bottom. The gears are bronze forgings. The branch leads are ¼-in. tubes, the main feed to the distributing point being 5/16 in. All of the other bearings in the engine are lubricated by splash. A special drainage design has been worked out so that there is no slopping about of the oil in the case.

The electrical equipment is Remy throughout for ignition, lighting and starting. The generator mounting is on the left side of the engine, as previously described. The starting motor is mounted in a vertical position on the flywheel housing. This permits of a straight mechanical shift for starting. There is no manual spark advance, this being entirely taken care of by the automatic Remy feature. The carbureter is a Carter, 1-in. size, fed by vacuum from the gasoline tank mounted on the rear of the chassis. The throttle control is by accelerator pedal and lever on the dash, there being no quadrant on the steering column.

Multiple-Disk Clutch Employed

The clutch has two driving plates carried by three driving pins in the flywheel. The clutch is faced with asbestos cord fabric applied to the driving plates which act on the two outside-driven plates and on a floating plate between them. The malleable hub is splined on the clutch shaft and has six pins, three of which are for driving and three for alignment. There is one floating plate on the pins. The clutch pressure is provided by six springs mounted in cups. Each spring is placed between two cup members, the springs holding these apart and thus providing the pressure necessary for clutch engagement. The throwout is a bronze casting with a core acting as an oil pocket. This throwout is supported on a fork which sets in a clevis and is secured by a pin. The bronze shoe clears the shaft and the fork is operated by the lever. The bronze shoe acts as the clutch brake. There is one adjustment on this clutch, this being for pedal position.

The gearset is a three-speed, selective type, the countershaft gears being integral with the shaft, which is mounted on plain bearings. New Departure bearings are used on the main shaft. The shifter is overhung from the front end of the housing to permit of the brake ratchet and lever being mounted on the rear. The propeller shaft brake, which is hand operated, acts on a drum which performs the dual function of a brake drum and the propeller shaft driving flange. Actuation of the hand brake is accomplished by two cams acting in a double cam plate. As the plate is pulled by the brake lever, these cams, acting in the cam grooves, pull the ends of the contracting band together. This brake has a 6½-in. drum and a 2-in. face.

The speedometer drive is also located on the gearset, being driven off a worm on the main shaft.

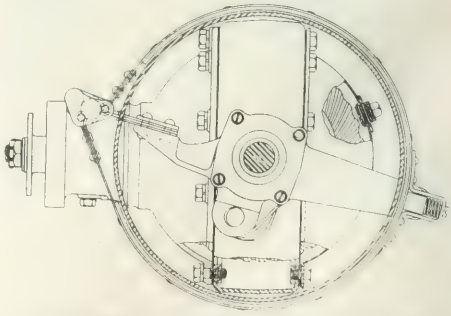
The drive is through a Mechanic metal universal joint to a semi-floating rear axle. The propulsion is taken through the rear springs and the rear axle torque is taken through a torque arm.

The rear axle is unusual in that it incorporates a banjo housing which is a type of construction not generally found on a car in this price class. This has a malleable center and end castings to which latter the rear springs are attached. A two-row, New Departure and a Hyatt bearing carry the pinion shaft, two New Departure bearings are used at the differentials. The differential is a two-pinion cage type. A fixed adjustment is employed on the rear axle because it is considered that a correct tooth bearing is secured in only one position of the gears, consequently shims are used for taking up the differences due to manufacturing tolerance. A ring is employed as a thrust shoulder behind the ring gear and the shims for adjustment at the factory are inside the ring. The differential bearing takes the wheel thrust through the cage.

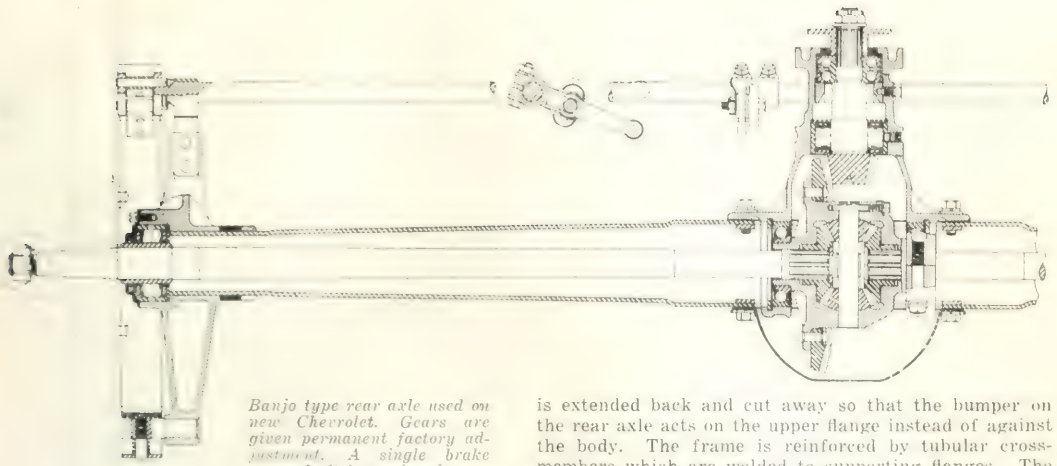
Contracting Foot Brakes on Wheel Drums

The rear wheel brakes are of the contracting full-wrapping type without adjustment at the rear wheels, the adjustment being provided on the linkage. The layout of the actuating mechanism is such that deflections in the suspension springs do not cause pedal motion. The brake drum is 11 in. in diameter and has a 1½-in. face.

The pressed steel torque arm is secured at its rear end by wrapping it about the pinion shaft housing. A



Band brake on rear wheel drums. The malleable iron anchorage and banjo type axle center are also shown



Banjo type rear axle used on new Chevrolet. Gears are given permanent factory adjustment. A single brake shaft is employed

groove is rolled in the arm and it is fastened by means of clamps with through bolts. The torque arm material is cut away to provide clearance for the brake shaft and to leave an opening to give access to the bolts which must be removed in taking down the propeller shaft. The front end of the torque arm is secured to the central frame cross-member by a universal connection.

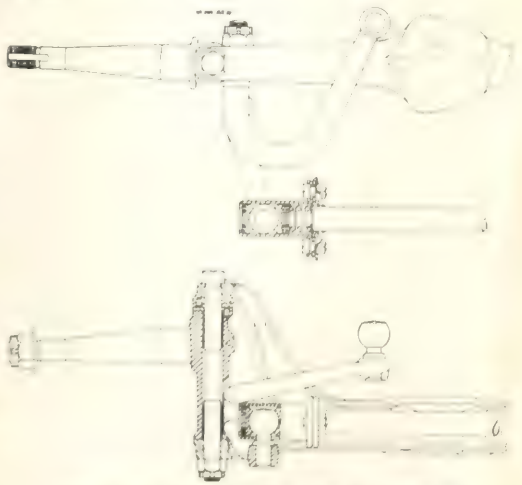
The spring suspension is quarter-elliptic throughout. This is used largely because it eliminates shackles and most wearing parts on the springs and also because the load on the axles is brought close to the wheels. It is further claimed for this spring suspension that the unsprung weight is much reduced because the springs themselves are mostly sprung weight. A single clip is employed to hold the main plate of each front spring to the front axle. The No. 2 plate goes through the clip and is kinked up as a safety precaution in case of main leaf breakage. At the back end of the front springs two clips are employed, one is passed through a hole in the spring bracket and the other clip passes over a horn on the end of the clip. A pressed steel member passes under both clips and extends back to the rear motor support, the frame, motor support and this bracket being securely bolted together, thus tying the whole structure together at this point and reinforcing it in such a way as to take the twist resulting from the quarter-elliptic front spring and also the stresses set up in pushing the front axle.

Rear Spring Arrangement

The rear springs have an eye at their rear end, the only moving bearing in the suspension. The eye bolt passes through the spring eye and two ears thrown up on the spring perch on the rear axle. At the front end of the rear spring is a malleable casting with an angle flange. A bolt passes through this flange to take the drive, and, in addition, there is a clip which passes around the spring and through the casting. This arrangement helps to distribute the driving stresses.

The frame side members are of pressed steel formed into a channel with a 4 7 16-in. web and 1¾-in. flanges. It is made from ⅛-in. stock. The rear end of the frame is extended back and cut away so that the bumper on the rear axle acts on the upper flange instead of against the body. The frame is reinforced by tubular cross-members which are welded to supporting flanges. The flanges of the rear cross-member are bottled through the malleable castings which take the forward ends of the rear springs, thus effectively tying together the chassis at the point at which the propulsive thrust is taken. The rear part of the engine, together with its supports, also acts as a cross-member. These supports are deep webbed piece riveted to the main frame. The engine is supported at the front upon a cross-member to which it is attached by bolts through two lugs on the timing gear case.

The chassis will be put out with five bodies; a two-passenger roadster, five-passenger touring car, two-passenger coupe, five-passenger sedan and four-passenger sedanette. All of these resemble in general appearance the bodies used on the Superior line. In fact, with extremely minor variations, the bodies are interchangeable with the Superior line. The prices on the various models are $200 more than those of the corresponding Superior models.



Front axle on new Chevrolet. The tie-rod has ball ends, neatly enclosed. Knuckle thrust bearings are plain washers

Factories to Play Larger Part in Dealer Education

Sales managers agree that more active work must be done in helping retailers. Distributors have fallen down on the job. Assistance may be given through distributors or direct from factory. Latter method involves heavy increase in responsibility.

By Norman G. Shidle

DEALER education problems are rapidly becoming acute. A very large number of real merchandisers are needed to sell automotive products throughout the United States. Order takers will no longer secure the distribution needed by the manufacturer. There are not enough good dealers to go around. Even the strong, well-established companies, which might be expected to have the pick of dealers, are clamoring for more retail representatives capable of actually merchandising automobiles.

The remark was made to the sales manager of one of these big companies recently that "there are not nearly enough dealers to fill the needs of manufacturers."

"I disagree with that statement," he replied. "There are too many dealers—but not nearly enough good ones."

Since it is only the good ones who will count from now on, manufacturers are trying to develop more of that kind.

Good dealers can be obtained in one of three ways:

1. They can be stolen from another manufacturer.
2. They may be brought in from other lines of merchandising and built up into first-class automotive dealers.
3. Dealers now in business can be helped and educated so as to become efficient merchandisers.

Educational effort on the part of either the manufacturer or distributor is the basis of two of these methods. The first mentioned may be entirely disregarded in considering the problem from the viewpoint of the whole industry. Manufacturers who rely entirely on taking dealers from competitors for accretions to their own force are dodging their share of the responsibility for helpfulness and education and probably will not benefit either themselves or the industry in the long run.

Dealer education is an essential part of future marketing programs. Sporadic efforts have been made along this line already, but much of the literature and speechmaking which has been labeled "dealer education" had no right to the name.

DEALER education must consist of 10 per cent inspiration and 90 per cent practical assistance.

It must involve aid in solving the problems and improving the methods which the dealer is handling in his every day work.

It must consist of a more detailed, more specialized, and more individualized application of the best merchandising principles.

In addition, it must involve the element of timeliness. The dealer must get immediate assistance on specific problems when needed, in addition to general education along the lines of good merchandising. But, on the other hand, the giving of this specific help from time to time should not obscure the necessity for a broad general plan of dealer education.

Such dealer education can be carried on in two ways:

1. It can be left fundamentally to the distributor.
2. It can be carried on directly by the manufacturer.

The first method is that generally in use to-day, frequently with some modifications. The second would involve practically the elimination of the distributor in the marketing scheme and the signing of dealer contracts direct with the factory or factory branches.

Analysis of what has been done is always the best first step in seeking better future methods. With certain notable exceptions, the practice throughout the industry has been to have distributors, who in turn sign up a number of dealers in the territory allotted to them.

THE factory usually has nothing to do with the dealer contract and, theoretically, nothing to do with the education and improvement of dealers. The factory, theoretically, confines itself to the selection and assistance of good distributors. The selection and training of dealers within the given territory is entirely the responsibility of the distributor.

Hundreds of modifications of this theory are now in practice. Every manufacturer has found it impracticable to leave the enthire responsibility for a territory in the hands of the distributor. The distributor himself might be making a good profit, despite the fact that the dealers under his charge were somewhat deficient both as to quantity and quality. From the manufacturer's point of view maximum distribution was necessary to maximum production, but the distributor sometimes reached a point where increased sales in certain parts of his territory cost more than they were forth to him. From a factory standpoint, however, these increased sales were both desirable and necessary.

The distributor was not really competent to carry on an effective dealer education campaign in many cases, even where he considered it to his advantage to do so.

Consequently, the factory, needing maximum distribution, found it necessary to learn more about the possibilities of the territory of each distributor and then to

urge the distributor to build up a better merchandising force to realize those possibilities. This is the practice in most cases to-day, although there is much urging done by factories without a great deal of accurate knowledge about maximum possibilities.

WHEN the factory district manager urges a distributor to take more cars and insists that there is a market for those cars in the given territory, he is frequently unable to back up his statements with facts and figures. It is simply his word against that of the distributor, the latter claiming, usually with justice, that he knows more about the territory than does the district manager.

This situation has led to considerable friction, and has not affected favorably the development of adequate dealer education programs by various distributors.

A third stage is being reached by some of the more important factories. They have realized the necessity for backing up words with information, and are making thorough economic studies of the entire country. They are trying, for the first time, to get something like an accurate picture of market possibilities by territories.

Methods of doing this are still in the experimental stage and every factory will know more about the subject ten years from now. Nevertheless, studies already made and put into use by important companies have had a very favorable effect. They may not be mathematically exact, but they are far more nearly accurate than the unsystematic guesses of the past. They have revealed the inadequacy of the distributor educational and merchandising program in many cases, and have enabled manufacturers to give distributors more help in intensive cultivation of territories than ever before. The manufacturer with this more extensive market knowledge may use it simply as a club over the distributor. He may properly insist that the territory is worth more than the distributor is getting out of it, and then simply tell the distributor to get the increased business possible or move on.

On the other hand, he may use this increased knowledge to help the distributor in the solution of the latter's problems. The manufacturer may put on district managers capable of interpreting this information in terms of the distributor's needs; managers who can help the distributor map out and put into operation a really effective dealer education plan.

Both methods are now being used by manufacturers who have made more or less accurate studies of territorial markets. Those using the latter method are in some cases going so far as to employ special men whose sole duty is to travel with the wholesale man of the distributor and help in solving individual and general dealer problems within the territory. In such cases, the factory practically is providing the ideas, methods, and plans for dealer education, but is still asking the distributor to provide the means of putting them over.

The various steps outlined of the manufacturer's increased participation in actual dealer education have been taken gradually and in most cases almost unconsciously. Each step has been taken as a matter of necessity in solving a particular problem or set of problems.

A group of five important sales managers, representing cars in all price classes, are a unit in declaring that the activity of the manufacturer in dealer education work will continue to increase and that the increase must be more rapid from now on. One of them says, for example:

"It is absolutely essential that the factory have a good control over distributor relations with dealers, even though contracts are direct with distributors. The distributor wholesale man too frequently thinks only of getting rid of as many cars as possible. He is likely to force cars, just at times when cars ought not to be forced. He should be trying, instead, to make better merchants. You can't depend on distributors to do the necessary educational and assistance work for dealers unless factory supervision comes in very definitely."

Another says:

"Dealer education is very largely in the hands of distributors at present, but the distributor has fallen down in almost every instance. The factory can urge them to do more work along this line, but few distributors do it. They say they can't afford it.

"Nevertheless, this educational work must be done, and the factory will have to do it. It will probably mean the entire elimination of the distributor in the long run."

"Dealer education is of primary importance at the present time," says a third, "and the factory will have an increasingly important part to play. Much of this education must be carried on through district managers and traveling men."

This brings us to a consideration of the second main method of handling dealer education, that is, carrying on these activities directly from the factory. One main point should be understood at once.

Whether distribution is accomplished through branches or distributors, the actual marketing cost probably will be about the same. The installation of branches does not eliminate the distributor's profit, as the function of the branch is identical with that of the distributor. This question will not be discussed here at length, as it has been ably and adequately handled by Harry Tipper in AUTOMOTIVE INDUSTRIES, issues of Jan. 19 and 26, 1922.

The possibility remains, however, that if the factory handled dealer relations direct, put over dealer educational work more efficiently, made better merchandisers of the dealers, and thus increased distribution, the unit marketing cost might be decreased even though the actual cost remained the same.

POSITIVE and emphatic opinions supporting both sides of this question can be obtained from many sales managers, all of equal importance and repute. The simple facts of the case are that probably no one is in a position to answer the question to-day on a basis of actual cost studies, involving all the elements. The deciding factor in most cases, moreover, is the human element; the ability and aspirations of the distributor or the branch manager in a particular case.

Even when it is granted that direct factory control

MANUFACTURERS have decided that more good dealers will have to be made. They aren't being born fast enough. There is considerable difference of opinion, however, as to how the making shall be done.

It is generally agreed that dealer education cannot be left entirely to the distributor. Some sales managers are trying to help and urge the distributor to better efforts. Others are in favor of eliminating him and taking over the job themselves.

This article points out the advantages and difficulties of both methods, gives the opinions of some prominent sales executives, and discusses what future action is likely to be best for the industry.

would make dealer educational work more readily conformable to factory ideals, three requirements of direct factory control must be fully recognized:

1. Greatly increased capital investment will be necessary.
2. Increased operating expense will accrue, because the factory assumes the running expenses previously absorbed by the distributor.
3. The factory must be thoroughly equipped with a comprehensive dealer education plan and must be ready to put that plan into operation efficiently and effectively.

THE first two items may be passed over briefly, as practically every executive recognizes them fully and is unlikely to embark on any plan that he is not financially able to handle.

The third necessity is not so fully recognized. Nearly every factory seems to assume, as axiomatic, that it knows what is needed in dealer education and would be perfectly capable of carrying out its plans.

Such a program would involve such matters as the following:

1. A well thought out plan which can be given to the dealer to enable him to put his business on a sound financial basis in the beginning. This would involve a concrete discussion of the relation of capitalization to amount of annual business, turnover, etc. It might be called a plan of fundamental financing for the dealer.

Then traveling men would be necessary who would be capable of properly adapting that general, concrete plan to the circumstances and needs of the individual automotive dealer.

FEW factories have made any detailed study of dealer finance. They understand it in a general way and can distinguish between sound and unsound balance sheets, but do not have readily available a specific outline plan upon which a dealer education campaign along these lines might be based.

2. A similar plan for dealer accounting, which would enable the dealer to put his business records in such shape that he would really know how much money he makes. Such systems as the Motor World Accounting System are available, of course, but here, too, traveling men capable of interpreting general systems for individual needs must be ready for operation.

3. A comprehensive service plan, which will give the dealer a real education in the meaning and possibilities of good service, and which will show him how to adapt and operate that general plan in his own shop. A flat rate system would also be a desirable addition to such a plan.

4. A thorough analysis of sales possibilities by territories. This is necessary, if the factory is to carry on its dealer education campaign effectively. Such an analysis will give the factory a reasonable idea of what to expect from the dealer and will enable it, in addition, to show the dealer how to apply market analysis methods to his own work in a specific manner.

5. The factory would have to establish some means by which it could keep in close touch with detailed current conditions in a large number of small territories.

6. A dealer advertising plan would have to be laid out in detail and operated in connection with a large number of small units.

7. A proper stock keeping system, adaptable to dealer establishments, would be necessary. The factory or its traveling men would have to be equipped to show the dealer how to use and adapt this system to his own business.

8. The factory should be prepared to give the dealer a scientifically worked out plan, telling him what stock of parts he ought to have on hand in proportion to the cars operating in his territory.

OTHER necessities could be mentioned, but those given are sufficient for illustrative purposes. If the factory is to take over the entire work of dealer education, it must be fully equipped with ideas, machinery, and organization for carrying out the work. Otherwise it will do a worse job than has the distributor, because it will have to operate a large organization, all of which will be likely to stand or fall on the basic efficiency of the plan and the home organization. So long as distributors are handling the matter there may be many bad spots, but there are sure to be some good ones.

Direct factory control and operation of dealer education may or may not be the ultimate solution to the problem. It is evident, however, that few factories are equipped at the present time to carry out such a plan immediately with much better chances of success than the distributors have had.

THE best plan would seem to be for the factories to continue the work of investigation and experimentation in connection with dealer education as they have been doing in recent years; to develop further the active and practical assistance being given to distributors in dealer education; to thus equip themselves gradually to better handle a direct dealer education problem involving the entire country if it ever becomes necessary to do so.

Whatever changes are made along this line must come gradually if they are to be successful, because their success depends fundamentally upon the growth of knowledge in the particular field—and that growth is still comparatively slow. Hard work and hard study of the problems involved will do more good in the next few years than an attempt at solution simply by a radical change in the mechanics of operation.

ONE of the large electrical equipment manufacturers has developed a plan of registering electrical units with the factory as soon as sold. This plan has been adopted to insure the proper rendering of guarantee service.

This concern, the American Bosch Magneto Corporation, requires the dealer of automotive products to fill out a card at the time the product is sold which shall give all particulars regarding the electrical unit and name and address of the buyer. The card is then immediately forwarded to the Bosch factory.

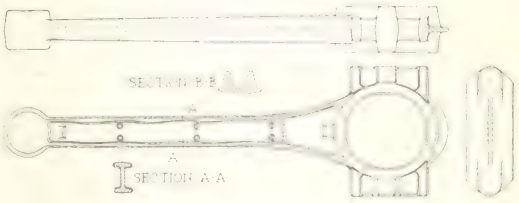
On receipt of the card the factory immediately notifies the Bosch service station that such a unit is now in its territory and informs the buyer where to go to get authorized service, at the same time furnishing him with an identification card which entitles him to free service for the period covered by the guarantee.

This system enables the factory to know in what territories its product is being sold and hence to keep the service stations adequately supplied with replacement parts. It is claimed that much better service and greater co-operation have resulted.

Midwest Adds to Line of Passenger Car Engines

New six has displacement of 268.4 cu. in. and develops 70 hp. at 3000 r.p.m. Features include "wave line" connecting rod, pressure lubrication controlled by manifold vacuum, chain driven camshaft and 1-9 16 in. overhead valves.

As stated in our news columns last week, the Midwest Engine Co. has announced a new six-cylinder passenger car engine of 3⅜ in. bore and 5 in. stroke. This is an overhead valve type following the same general lines of the fours produced by the same company, but incorporating certain additional features. The connecting rod is unusual in that the thickness of metal in the flanges of the section is not of uniform thickness but varies from point to point in such a way as to make wavy inner facing surfaces of the I-section. This construction is said to break up vibrations to which rods made in conventional way are subject, or to prevent their concentration at any one point on the rod.

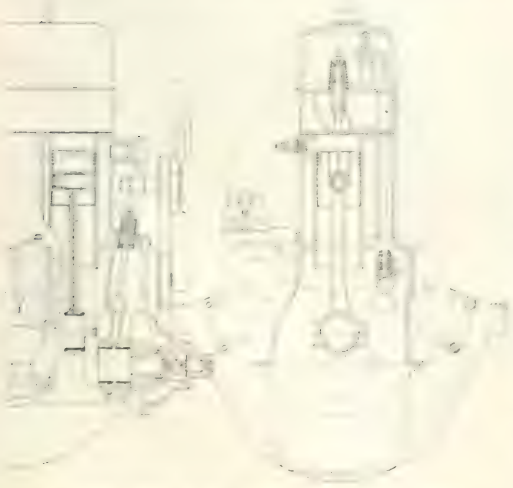


"Wave line" connecting rod used on the Midwest six

Clean External Appearance

Pushrods are carried inside the outer wall of the cylinder block instead of being inclosed by tubes as in the four-cylinder models, a feature which helps to give an unusually clean external appearance.

Grey cast iron pistons measure 4 9/32 in. in length and have four ⅛-in. rings, all of which are above the pin. The latter is free to float in both the rod and the piston bosses, bearing metal plugs being used to prevent scoring of the cylinder. The piston is reinforced by ribs, which also assist in cooling.



Sectional views of the new Midwest six-cylinder passenger car engine

Valves seat direct in the detachable head, special care being used to direct the water entering the engine from the pump around the spark plug and the valve seats. The valves are of special alloy, measure 1 9/16 in. in the clear and have 13/32 in. lift. The stems are ⅜ in. in diameter. Rocker arms are not pivoted on a shaft but are arranged to bear against flat surfaces of the adjusting screw so that they rock on this flat surface. They are held in alignment by centering pins as shown in the accompanying section. Bearing surfaces are hardened and ground to minimize wear.

Large Diameter Crankshaft

The crankshaft measures 2½ in. in diameter at all bearings. The rod bearings are 1¾ in. long and the main bearings, front, center and rear, measure 2¼, 2½ and 2¾ respectively. Wrist pins are 1 in. in diameter. Main bearings are steel backed white metal; while the white metal is cast direct in the big ends of the connecting rods. None of the bearings is hand scraped but they are bored, reamed, broached and burnished. The steel backed main bearings are ground on their outer surface so as to seat well in the case, and do not require reaming when in place. A clearance of 3 to 5 thousandths in. is allowed for the oil film. The crankshaft is drilled and oil is forced to all bearings by a gear pump. A spring loaded plunger, the position of which is controlled by the vacuum in the inlet manifold, is placed at the outlet end of the crankshaft with a view to controlling the pressure on the oil in proportion to the load. Oil which issues from the by-pass is used to lubricate the chain which drives the camshaft. Valve parts are lubricated by oil mist.

The bellhousing is the No. 3 S.A.E. standard and the flywheel is also machined to dimensions conforming to those specified in S.A.E. standards.

High Fuel Economy Obtained in New Waukesha Engine

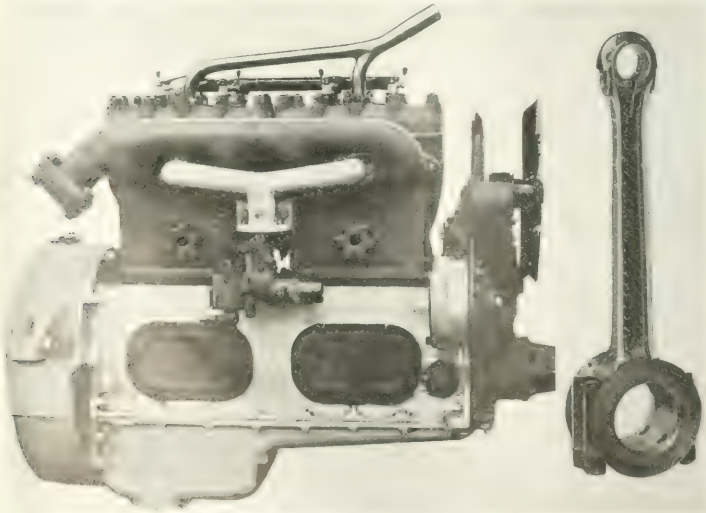
One hundred and ten ton-miles per gallon of gasoline shown in tests. Features include aluminum alloy pistons with two double rings each, Ricardo type combustion head, high compression, valve rotators, and radiated bearings. Experimental data given.

By P. M. Heldt

A NEW engine of 4 x $5^3/_4$-in. cylinder dimensions has been brought out by the Waukesha Motor Co., which, while it does not differ much from the model which it replaces as far as outside appearance goes, shows many important changes in the working parts. This engine has been designed chiefly with a view to sustained economy. It is claimed that an experimental truck in which one of these engines is installed has shown an efficiency of more than 110 ton-miles to the gallon. Some tests under rather unfavorable conditions were made with this same truck in the presence of a representative of AUTOMOTIVE INDUSTRIES early in December and the results will be given further on in this article, after the new mechanical features of the engine have first been explained.

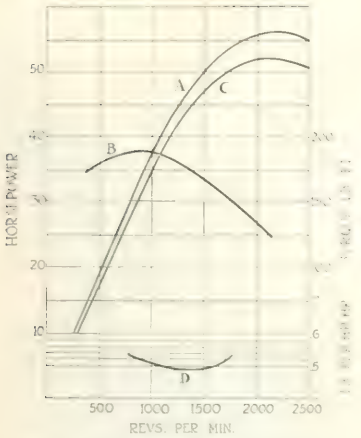
Fuel economy, as is well known, depends to a large extent upon the compression ratio employed, and it should be pointed out first of all that an exceptionally high compression ratio is used. The engine on the experimental truck or bus has a ratio of 4.56 to 1 and an engine tested on the block, a ratio of 4.75 to 1. These compression ratios will appear the more unusual when it is remembered that the engine is of the L head type, which, as experiment seems to have proved, does not stand as high a compression as the valve-in-head type.

To make this high compression practicable, great pains were taken in the design of the combustion chamber to avoid the creation of hot spots. In fact, the hot spot is eliminated even in the manifold, and, as may be seen from the side view of the engine herewith, the inlet manifold is entirely separate from the exhaust manifold. Provision is made for preheating the air entering the carbureter in a muff surrounding the exhaust manifold, but that is all the heat artificially supplied to the mixture before it enters the cylinders. One might expect distribution difficulties without heat to the manifold walls, but from the high fuel economy figures obtained, one can only draw the conclusion that the distribution is excellent. The comparatively small diameter of the inlet manifold and the resulting high air speed and energetic atomization probably account for this.

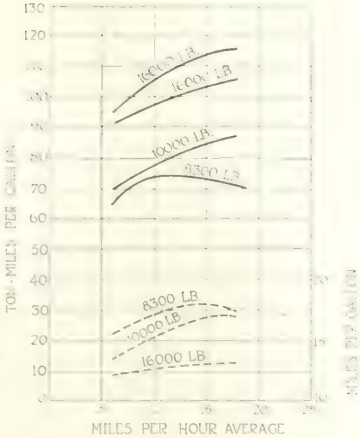


Valve side of Waukesha model FU engine. Connecting rod with radiated bearings

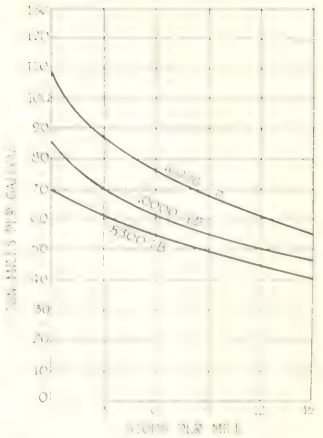
H. L. Horning, general manager of the Waukesha Motor Co., has long been an advocate of turbulence, and he has shown his faith in this principle by adopting for the new engine a modified form of the Ricardo combustion head. Over the greater part of the cylinder section the piston head comes up close to the cylinder head when the crank is in the top dead center position, much of the compression space being directly over the valves. It is obvious that with a compression space of this form there is a great rush of gases just prior to the instant when the piston reaches the end of the compression stroke, across the compression chamber in the direction toward the valves, and hence great turbulence. In some of the first experimental engines the



Horsepower and torque curves with "maximum power" mixture (A and B) and horsepower and fuel consumption curves with maximum economy mixture (C and D)



Bus economy curves for inter-city operation



Bus economy curves for city operation with frequent stops

spark plugs were placed in the inclined portion of the cylinder head, but it was found that better results could be had with the plugs almost directly over the valves, as shown in the sectional view.

The pistons are of aluminum alloy and are designed to insure rapid flow of the heat imparted to them by the burning gases, to the cylinder walls. Two double rings are used on each piston, each set of two rings in a single groove. The rings are pinned, so it is impossible for the gaps in both of the rings to come in line. The piston pins are clamped in the upper end of the connecting rods and have their bearings directly on the aluminum of the pistons.

The valves are made of Silcrome, an alloy capable of withstanding high working temperatures, but to insure further against valve troubles the Pabst valve rotator has been adopted which, in this particular design, causes the valve to turn completely around on its seat once for every 100 revolutions of the crankshaft. A description and an illustration of this valve rotator are given on page 1273 of this issue. To insure effective lubrication of the valve stems, holes are drilled in the horizontal wall over the camshaft which separates the crankcase from the valve chamber—one for each cylinder. Owing to the unequal instantaneous speeds of the two pairs of pistons, a sort of pumping action is produced which throws a stream of oil into the valve chamber and keeps the valve stems thoroughly lubricated, it is claimed.

Connecting Rod Design

There is nothing out of the ordinary in the connecting rod and crankshaft design. The connecting rod is of substantially uniform section throughout the major part of its length, but the section widens upon approaching the bearings. At the lower end the co-called radiated bearings are used, which are provided with deep flanges with corrugated outer surfaces which permit increased heat radiation. As may be seen from the sectional view, the crankshaft is of very sturdy proportions, the diameter being substantially 2¼ in. Lubrication is by the hollow crankshaft system and the oil consumption is claimed to be very low.

A block test of one of these engines was made on Dec. 13, in the presence of the writer, in the laboratory of the Waukesha Motor Co. The engine, fitted with a Stromberg carbureter and connected to an electric dynamometer, was run at various speeds under full open throttle and readings were taken of the average torque and the total number of revolutions made while the engine consumed one pound of gasoline. The gasoline tank was located on a scale which was provided with an electric contact device arranged to light up a signal lamp when the weight of the fuel came down to a certain point. At that instant the revolution counter was set going and observations of the torque were begun. The moving weight on the scale beam was then slid along to a point denoting one pound less than that indicated in the first instance, and when one pound of gasoline was consumed the signal lamp would light up again, whereupon the speed counter was stopped by means of an electric switch. The air entering the carbureter in this test was not preheated and the engine was cooled by means of the regular radiator with a fan behind it.

The electric dynamometer having a torque arm 15¾ in. long, the formula for the torque is

$$\text{Torque} = \frac{\text{Scale reading} \times 15\tfrac{3}{4}}{12} \text{ lb.-ft.}$$

The formula for the horsepower is

$$\text{Horsepower} = \frac{\text{Scale reading} \times \text{R.P.M.}}{4{,}000}$$

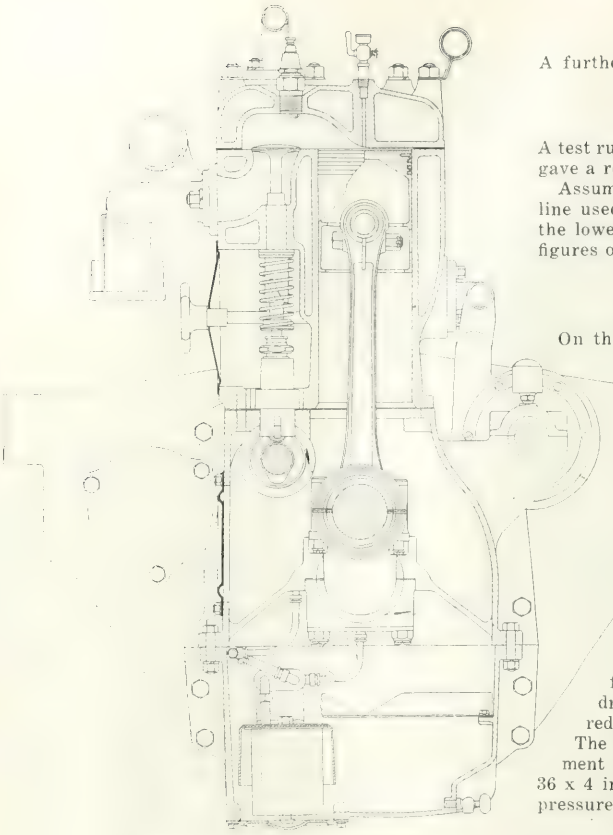
and the formula for fuel economy or relative consumption is

$$\text{Fuel economy} = \frac{240{,}000}{\text{Scale reading} \times \text{total revs.}} \text{ lb. p.hp.-h.}$$

Following are the results of the first test run: Total revolutions, 3614; mean pressure on torque arm, 128.5 lb.; duration of run, 3.59 min.; speed, 1007 r.p.m. The gasoline economy for this run figures out as follows:

$$\frac{240{,}000}{128.5 \times 3614} = 0.517 \text{ lb. p.hp.-h.}$$

The question came up as to whether a correction factor should be applied to this result, the same as is done in making tests for maximum horsepower. While some of the later tests were made, during the



Sectional view of engine

evening, the temperature in the testing laboratory was far above the standard testing temperature and the barometer was low (snow falling). Both a high temperature and a low barometric pressure affect the maximum output of an engine adversely, and for this reason a correction factor of several per cent would have been applied had a horsepower determination been made, to allow for the reduced density of the atmosphere. There is little doubt that, since some of the losses in the engine, such as that due to the shearing of the film of oil on the cylinder walls during the idle strokes, are of constant value, the efficiency of the engine also decreases slightly with decreasing atmospheric density. Evidently, however, the decrease in thermal efficiency is not nearly as rapid as that of the density of the atmosphere and it was therefore decided to refrain from applying any correction factor.

In the second run at a somewhat higher speed the engine made a total of 3684 revolutions on one pound of gasoline, with an average brake beam reading of 125.25 lb. The fuel consumption in this case therefore was at the rate of

$$\frac{240{,}000}{125.25 \times 3684} = 0.52 \text{ lb. at } 1155 \text{ r.p.m.}$$

The third run was made at a still higher speed (1400 r.p.m.) and gave the following result:

$$\frac{240{,}000}{119.5 \times 3934} = 0.51 \text{ lb.}$$

A further run at 1425 r.p.m. gave

$$\frac{240{,}000}{115 \times 4036} = 0.517 \text{ lb.}$$

A test run made at half load (60 lb. brake beam pressure) gave a relative fuel consumption of 0.715 lb. p.hp.-h.

Assuming a heat value of 19,000 B.t.u. for the gasoline used, the brake thermal efficiency corresponding to the lowest fuel consumption recorded in the above tests figures out as follows:

$$\frac{33{,}000 \times 60}{0.51 \times 19{,}000 \times 778} = 26.2 \text{ per cent.}$$

On the following day a test run was made with the motor truck or bus above referred to, which has been fitted with one of these engines. The machine was originally a 2½-ton Sterling truck, but was fitted with a closed body to present the same wind resistance area (39.6 sq. ft.) as a motor bus, and the rear axle is geared to make the operating conditions similar to those of a bus in interurban service. The truck was loaded with iron castings to a total load (truck, dead load and passengers) of 8 tons. The engine of this truck has a compression ratio of 4.56 to 1 and the air intake of the carbureter connects to an air stove on the exhaust manifold. The transmission gives four speeds ahead and one reverse and the final drive is by bevel and internal gears, with a total reduction ratio on the direct drive of 6-1/6 to 1. The rear wheel diameter is 38 in., the entire equipment being 38 x 7 in. single solid tires in the rear and 36 x 4 in. in front. The piston displacement under gas pressure per ton-foot is therefore

$$\frac{3825 \times 6\,1/6 \times 289}{16{,}000 \times 38} = 11.2 \text{ cu. in.}$$

This truck is fitted with the Rushmore steam cooling system whereby the engine jackets are kept at a uniform temperature above 212 deg.

A considerable amount of snow had fallen during the night and it was found impossible to get out of the factory yard without chains on the wheels. A pair of chains was therefore procured and the test made with these on the rear wheels. The fuel system was drained and a supply of Red Crown gasoline of 57 deg. Baume was obtained and poured into a small diameter, vertical, cylindrical tank, with gage glass, at the side of the cab. This tank was calibrated by means of a gallon measure, and it was found that the addition of one gallon to the supply of fuel in the tank raised the level within it by 6 3/16 in. Hence the fuel consumption could be determined by measuring the drop in the level during the run.

Gasoline Consumption Test

The test run was made over concrete roads in the vicinity of Waukesha with about 5 in. of loose snow on the ground and snow falling. At the completion of the run the odometer, which was driven from the propeller shaft, registered 15.65 miles and measurement showed the fuel level in the tank to have dropped 12½ in. Hence the fuel consumption was $12\frac{1}{2}/6\ 3/16 = 2.02$ gallons and the rate of fuel consumption, $(8 \times 15.65)/2.02 = 62$ ton-miles per gallon.

In tests under more favorable conditions Horning claims to have obtained the results shown in the accompanying graph. The weights inscribed on the different curves denote the total weights moved in each case. All of these tests were made without stop, or at least without voluntary stops. In regular bus service, of course, frequent stops have to be made, as a rule, and this will pull down the fuel economy. To determine the effect of stops on the relative fuel consumption Horning made another series of test runs during which stops were made at regular intervals, and the set of curves shown in another figure was obtained.

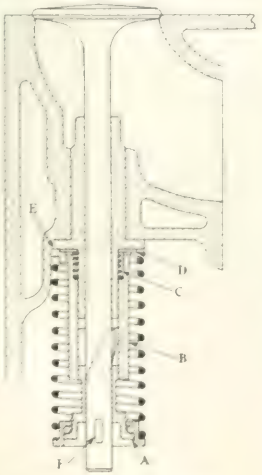
This fuel economy is, of course, far beyond what is being obtained to-day in motor truck operation. It is the result of careful development work in connection with engines and of the considerably more favorable conditions in motor bus operation. These buses go over established routes, for the most part with good pavements and moderate grades, and the gear ratio can therefore be held low. High engine compression and high jacket temperatures are the factors that make for economy, but they are limited by the tendency of the engine to knock. It should be pointed out that in the test described there was absolutely no indication of knocking.

Valve Rotator for Poppet Valve Engines

THE Pabst valve rotator is a device designed to give the poppet valves of internal combustion engines a slight rotary motion at every lift or, rather, descent. The reason for wanting the valve to rotate is that in operation the valve head does not heat up uniformly. In an L head engine that portion of the head toward the cylinder will assume a higher temperature than the rest, and this is likely to cause warping. If the valve is rotated and different portions of the head are exposed successively to the higher temperature of the cylinder side, the temperature of the whole valve head will be materially lower than that of the hottest portion when the valve is not rotated, and the tendency to scoring and pitting is therefore greatly reduced if not eliminated. It is claimed, moreover, that in passenger car engines trouble with the valves is due chiefly to carbon getting onto the seats, and that the rotation of the valves also overcomes this trouble.

Referring to the sectional view, the valve rotator comprises a base member which forms a valve spring washer and a ball bearing at the same time. The cupped member A of the ball bearing has a tubular extension which at its upper end is provided with radial arms engaging into helical slots in what is known as the spiral member B. This spiral member is virtually a sleeve surrounding the lower portion of the valve guide. At its upper end it tapers out, forming the male member of a small cone clutch. It is also counterbored to receive the clutch spring C, which is held in position by the soft steel washer D pressed into the spiral member. Against the female member E of the clutch the upper end of the valve spring bears.

When the valve is lifted, the pressure of the valve stem key F on the base member and the corresponding pressure of the radial arms on the walls of the helical slot in the spiral member, causes the cone clutch to disengage and allows the spiral member B to rotate slightly, in conformity with the valve lift and the spiral angle of the slots. When the valve descends, the clutch engages, and as the female member E of the clutch is held from rotating by being firmly pressed against the cylinder block by the valve spring, the spiral member is now held from rotating, consequently the radial arms on the base member, and with them the base member and the valve itself, are compelled to follow the helical path determined by the slots in the spiral member. Thus the valve has a rotating motion only during its descent and moves upward without rotating during the lift.



Sectional view of Pabst valve rotator

The manufacturers, the Pabst Corp., claim that the use of valve rotators enables an engine to give more power, because it ensures continued gas-tightness of the valves, and they also claim that the wear on the valves is reduced.

Westinghouse Developments in 1922 Reviewed

AN annual review of the engineering achievements of the Westinghouse Electric & Mfg. Co., recently issued, contains several items of interest to the automotive industry. During the past year the company has commercialized its ¾-kw. and 1½-kw. farm lighting sets and they are now in production. A number of improvements were made in connection with the company's lighting, starting and ignition outfits, of which the following are examples: A pedal-operated pinion shift for engaging the starting motor pinion with the flywheel gear which has incorporated in it a slip clutch to take care of back fire, and an over-running clutch to relieve the starting motor when the engine fires and picks up; a new foot-operated starting switch, the perfection of the lubrication of sleeve bearings on automobile generators, a new type of voltage regulator for use with the generator for charging storage batteries, a new ignition and a new lighting and ignition switch.

Among apparatus not classed as automotive but which finds amplification in the development of automotive electrical equipment, is an oscillograph which is mounted in a box measuring 11 by 11½ by 25 in. and weighing 80 lb. The driving motor and film holder weigh about 20 lb. and are carried separately. The complete oscillograph may be taken as baggage on a taxicab or in a Pullman car. Following are the main features of the new instrument:

An improved optical system and lamp control make it possible to use a special incandescent lamp and obtain good results. The day-light loading film holder makes it possible to take as many oscillations as desired without having access to a dark room. The instrument is said to be simple to operate and is designed to be used on either 110 or 220 volt, 25 to 70 cycles, or from a 6-volt storage battery circuit.

Just Among Ourselves

Fisher Body Advance Perturbs Wall Street

WALL STREET and certain financial interests are very much perturbed about the sensational advance in the price of Fisher Body stock and there are rumors of a "corner" of the available supply. General Motors owns 300,000 of the 500,000 no par common shares of Fisher Body and has a contract with its subsidiary, which still has several years to run, providing for the construction of bodies on a cost plus basis. The present situation results from the fact that there is a stipulation in the contract under which the stock not controlled by General Motors cannot be sold without the consent of the holders of 95 per cent of the two-fifths. It is understood that W. C. Durant and his associates control more than five per cent of this two-fifths and that it will be sold to the partners in the Durant enterprises.

Dollar Value Not Likely To Increase Next Year

WE frequently are asked our views on the outlook for 1923 business and just as frequently admit frankly that we have no prophetic vision. There are certain signs and portents which cannot be ignored but most of them relate to general business. The first quarter unquestionably will be much better than it was this year and the second quarter undoubtedly will be fully as good. This will provide six months of splendid business. It would be foolhardy to try to lift aside the veil and peer into the last six months of the coming year. With Ford planning greatly increased production, with the Star coming into the market, with Chevrolet preparing to turn out 2000 a day and with other low priced cars in increasing demand, it will be strange if there are not as many passenger cars sold as there were this year, but we don't believe the dollar value of the total sales will be any larger than in 1922 if as large. It will be only about $300,000,000 larger this year than in 1921, with about 850,000 more vehicles.

Fifth Avenue Unveils Bronze Traffic Tower

WITH rather impressive ceremony, the first of the dignified and really ornamental bronze traffic towers which will supplant the experimental structures in Fifth Avenue, was unveiled the other day at the intersection of Forty-second Street. These towers will be the gift of the Fifth Avenue Association. The wooden structures they will replace were erected at his own expense by Dr. John A. Harriss, the special deputy police commissioner whose hobby is the solution of traffic problems. The same system, which governs traffic for several blocks and which has done much to relieve the fearful congestion on the Avenue, will be continued. Mayor Hylan and Dr. Harriss made speeches at the unveiling. The police band played "Auld Lang Syne" when the old tower was hauled away and the "Star Spangled Banner" when the new one was uncovered.

What Is Best Time To Hold the Shows?

THE old question about what is the most advantageous time of year to hold shows, from the viewpoint of trade stimulation, has been revived and is agitating the members of the N. A. C. C. There are arguments in favor of fall shows and also of winter expositions. If the shows are to be made primarily a display of new models, then the early fall is the time to hold them unless the industry changes its practice in relation to new jobs. If, on the other hand, they are designed to break the winter selling ice and arouse the interest of prospective spring buyers, it would seem that they are now timed about right. It all depends on what is to be the main purpose of the expositions. Judging from the business this year and with the demand for closed models so keen, fall sales need no particular stimulation. The supply of closed jobs hasn't been equal to demand.

Another Evidence of Trading Discount Evil

A NEW ROCHELLE dealer who handles five non-competing lines, advertises in a local newspaper that he will allow $500 "on any automobile that runs" in exchange for a new —— up to Jan. 1. It is hard to believe that this man would make such a proposition unless the factory is making him a liberal "trading discount." This is one way in which a factory can hold back the wheels of progress in solving the used car problem. It may increase production for the time being but it doesn't build solid prosperity.

Ford Two-Ton Trucks Interest Industry

REPORTS that Ford is about ready to bring out a 2-ton truck appear to be pretty well founded. There is no definite information as to when it will make its appearance or the price, but the truck industry is mightily interested. If Ford makes them it's certain he'll sell a lot of them. Thus another monkey wrench will be thrown into the truck merchandising machinery. Commercial vehicle manufacturers who are members of the National Automobile Chamber of Commerce will have plenty of things to talk about when they get together in New York show week. It is hoped some constructive action will be taken. When all are agreed that there are many serious problems to be

More or Less Pertinent Comment on Topics of Current Interest to Men in the Industry

solved it ought not to be impossible to find some common ground upon which to stand in trying to work out answers.

Durant Likely to Add Another Car to Line

THERE probably is considerable basis for recent assertions that another old and favorably known passenger car line, at present in limited production, soon will come under the control of W. C. Durant. As the situation stands today he has nothing between the Durant six, which sells now for $1650 in the 5-passenger touring model, and the Locomobile which is now priced at $7600. The price of the car which he is said to seek is $3750. The new 6-cylinder Flint which Durant is bringing out and which will be displayed at the New York show, will sell for a little less than $1200. The designs have not been completed but they will include some of the features of what was to be known as the Chrysler six. It is understood that in body lines and in some other respects it will resemble the Locomobile.

Not Much Speculation About Price Changes

AT this time last year the industry was speculating avidly on what price changes were likely to be announced at the New York and Chicago shows. It is significant of changed conditions that this year there is little discussion of this subject. Everyone realizes that prices are pretty well stabilized. They can't go much lower and they're not likely to go much higher, notwithstanding increased production costs. If prosperity lags in any industry next year it probably will be due more than anything else to inflation of prices. "Beware a Buyer's Strike" should be a motto on the wall in the office of every executive. Deflation follows inflation just as regularly as day follows night, although not quite so rapidly, and general deflation always brings depression in its wake. The depression lasts until the public reacquires the buying habit.

Industry Retains Sanity on Plant Expansions

WHILE a good many companies in the passenger car field are talking about doubling their production next year, it is gratifying to note that few of them contemplate plant expansion. There are mighty few concerns which can afford to take the chance. We often have pointed out that there is enough production capacity in the country to meet the demand for motor vehicles for a long time to come. It is true that the ability to produce is not ideally distributed but it is there none the less. A few factories are too small but there are many more which are too large. Much of the travail of spirit which followed the industrial collapse in 1920 could have been avoided if the cash which went into factory extensions had been left in the bank. There wouldn't have been so many reorganizations and refinancings.

Other States to Be Told of "New Jersey Plan"

ALFRED REEVES, who seldom overlooks a bet when the good of the industry is concerned, is helping to make New Jersey famous, although he lives in Yonkers. The provisions of the successful $40,000,000 highway bond issue referendum has been christened by him "the New Jersey plan" and all the other States will be told about it. The plan will put into effect the highway platform of the automotive industry which has been that the construction cost of highways should be levied against abutting property owners and society as a whole while maintenance costs should be paid by motor vehicle users. Efforts to promote this scientific system for the building and up-keep of highways probably will be more effective now that it has been adopted by a progressive State.

Durant to Tell Story of Split with G. M. C.

PART of the "inside story" of how W. C. Durant came to retire as head of the General Motors Corp. will be given the public in a magazine article which will be published in a week or so. All the financial details will come out sooner or later. Part of them are familiar to most of the men in the industry. There is a fascinating financial romance in the story of how Durant's personal fortune was engulfed in his effort to bolster up the price of General Motors common. His friends also assert that he protested vigorously against the program of expansion which was entered upon by General Motors just before the depression began in 1920, including the erection of the huge General Motors building in Detroit.

Traction Company Men Are Studying Buses

WHEN superintendents of traction companies are taking time off to go out and study the practical operation of buses by electric railroad interests, it indicates that they are thinking along new lines. We found one up-State the other day who works for a company which operates lines in several cities, who admitted frankly that he had been making a special study of the situation and that his people were prepared to put buses at work as soon as it had been demonstrated that the demand for them was strong enough to insure profitable operation. His inquiry was confined to Ohio and he was visibly impressed by what he had learned. J. D.

A Critical Study of Modern Steering System Design

Part II.

Causes of wheel wobble held to be unstable equilibrium of wheels, faulty drag link arrangement and lack of balance. Certain degree of reversibility in steering gear considered desirable. Reductions in steering gear mechanisms vary from 6 to 1 to about 10 to 1.

By Herbert Chase

AMONG the commonest faults of the steering system and one whose causes are least understood, is that of wheel wobble, by which is meant the periodic oscillation in angular position of the wheel and axle spindle about the knuckle pivot which results in the wheel following a course that deviates alternately to the right and left of a straight line. When this phenomenon occurs, as it often does in step with the natural period of the springs and front end of the chassis, the latter is given a violent transverse motion or shake popularly termed "shimmying."

If the front wheels of a vehicle were in equilibrium with respect to the knuckle pivot in all angular positions of their spindles when the vehicle is in motion, wobble would seldom occur providing the layout of the drag link and the spring is correct. But when the knuckle pivots are inclined either in a transverse or longitudinal plane the wheels are in equilibrium in only one position and if deflected from that position they tend to swing back to and past it, oscillating in pendulum fashion unless the motion is damped out by friction. Consequently any chassis in which the knuckle pivot is tilted has at least an incipient tendency to wheel wobble.

Another primary cause of wheel wobble is faulty layout of the drag link in reference to the spring. If the drag link is of rigid construction or substantially so and if the steering gear arm is held rigidly, the end of the link attached to the knuckle arm will swing through an arc when the front springs are deflected from their normal position. The axle center is constrained, under the same condition, to move in a path which approximates an arc whose center is the eye in the unshackled end of the spring. These arcs seldom coincide exactly, consequently the ball on the knuckle arm is given some motion in respect to the axle center and, since it is constrained to move about the knuckle axis it causes the knuckle, the wheel spindle and the wheel to oscillate.

THIS is the concluding part of a paper to be presented at the Annual Meeting of the Society of Automotive Engineers on Jan. 10, 1923. It is printed here in advance with a view to encouraging discussion at the meeting.

Among the subjects treated in this section is that of wheel wobble. An effort has been made to summarize here the various views expressed recently in these columns in reference to this phenomenon, its causes and cure —matters which have attracted wide attention among engineers here and abroad.

This is seemingly a self-evident fact, yet it is frequently overlooked or else the compromise chosen leaves much to be desired for severe wheel wobble is often caused by failure to adequately consider this detail. Cases have been known in which trucks have even suffered from broken frames or continually loosening engines and other parts due to a faulty layout in this regard.

Wheels or tires which are out of true or out of balance will also cause wobble.

The three primary causes of wobble thus appear to be:

1—Unstable equilibrium of wheels carried on knuckles with inclined pivots.

2—Faulty layout of drag link in reference to springs.

3—Lack of balance or failure of wheel to run true.

There are, in addition, a considerable number of factors which add to or help set up wheel wobble or render it more severe when once it is started. We shall not attempt to deal with all of these in detail, but will mention some which have been brought to our notice.

Friction tends to damp out wobble just as it does any other mechanical oscillation. Conversely, wobble when it occurs, is certain to be more pronounced when friction is at a minimum. This is why vehicles with loose or very free steering connections are more apt to be addicted to wobble than those with joints set up tight. Thus wobble can often be stopped by tightening all steering connections—a rough sort of remedy which if not used with discretion can result in excessive friction and rapid wear of parts.

The greater friction caused by under-inflated tires or increased weight on wheels can easily damp out wobble, while such items as anti-friction bearings on knuckle pivots, better lubrication, loose treaded tires and the like sometimes make wobble worse. This should not, however, be used as an argument against minimized friction in the steering system for it is certainly possible to have free steering without wobble.



Fig. 13—Arrangement of draglink employed on three cars, one bus and one truck chassis of American manufacture. A, Mack; B, Dort; C, Dorris; D, Jordan, and E, Fifth Avenue Coach

It is quite conceivable that wobble so slight as to be imperceptible to the operator can occur especially if the steering gear approximates the so-called irreversible type. It is clear also that any slackness or insufficient stiffness in any part of the steering system or its support, springs and spring parts included, which permits the wobble to take place through a greater amplitude than it otherwise would do, is apt to make the wobble more violent. Thus a weak axle, frame or steering gear housing or insecure fastening of these members will sometimes permit of wobble which would not otherwise become apparent. Much the same can be said of drag links, tie rods, tie rod and knuckle arms and steering gear parts, which are not stiff. Similarly, front springs which are weak or loosely fastened can help to amplify wobble and weak springs in the drag link will do likewise as will also a whipping action of either drag link or tie rod.

Shake of Front End

From the foregoing it will, we believe, be easy to see how wheel wobble occurs. It is not so easy to explain why violent shake of the whole front end of the vehicle, which involves very heavy forces, sometimes results. To help clear up this point, consider the following:

Suppose the wheel is wobbling, due to any of the causes enumerated, and is about to complete one deviation, say to the right. Now suppose that each time it reaches this position it strikes a road inequality which tends to accelerate its angular motion in the same direction, that is, an impulse in step with its natural period. It will swing still further to the right, fetch up short and be snapped back to the left, perhaps again receiving a blow from the road which accelerates it in that direction. Again it fetches up and is again snapped back, building up a cumulative effect which can even become so violent as to put the car out of control.

It is possible also that a physiological reaction from the arms of the driver can under some conditions act as the force which accentuates wobble. In any case, it sometimes happens that a car which is "shimmying" badly will cease to do so immediately if the driver releases his grip upon the steering wheel.

The freer the swing and the greater the play in the linkage, the less damping out there is and the more violent the shocks imposed in fetching up in extreme positions.

The front end of the frame, the engine, radiator, etc., of course, tend to follow the right and left oscillation of the wheels and if the period is in tune with the natural period of the mass involved, the shake becomes exceedingly violent.

There are doubtless some gyroscopic forces involved in this wobble phenomenon. In this connection one commentator states that up and down motion of the spindle tends to induce a wobble of the wheel about an axis at right angles to the spindle. Another points out that a revolving wheel tends to resist deflection from its plane of rotation, but once such deflection is started only a small force will keep it oscillating.

The amplitude of wheel wobble caused by lack of a perfect tie rod and spring layout depends in part, at least, upon the length of the lever arms involved. It is desirable to have the knuckle arm connected to the drag link as long as possible and still clear the spring providing, of course, it is made sufficiently stiff, for the longer this arm is, the less will a given motion of its ball end affect the course of the wheel. A long drag link also has the advantage of swinging in an arc of less curvature than a shot link.

Drag Link Location

It is customary for steering gear makers to advise their customers to so locate the gear that the ball on the gear arm, that on the knuckle arm and the pin on the unshackled end of the spring are in the same plane, (or in line as viewed in side elevation) when the vehicle is under normal load. This brings the drag link approximately in line with the main leaf of the spring. Others contend that a somewhat different layout is better. It is agreed, however, that the best layout is that which causes least motion of the wheel spindle about the knuckle pivot when the axle is moved under influence of spring action. At best the layout is a compromise which requires careful study if ill effects are to be minimized. A number of layouts employed on modern passenger car and truck chassis are shown in Fig. 13.

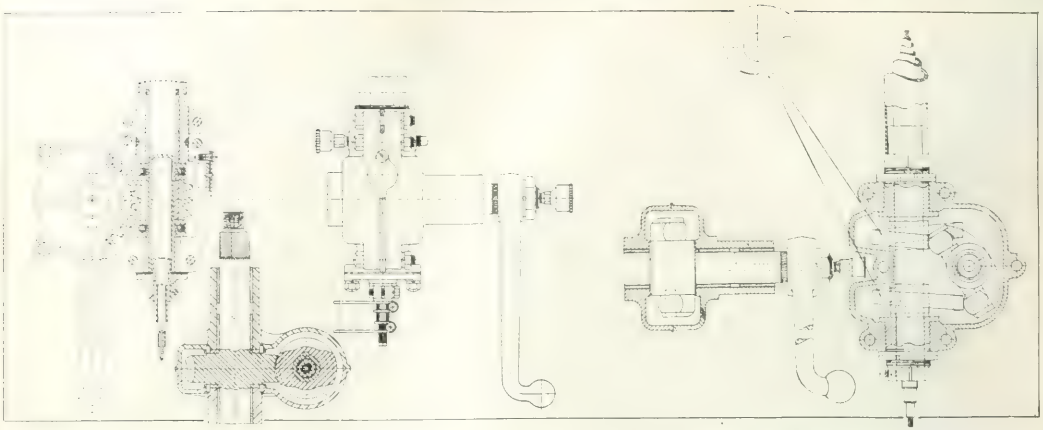


Fig. 14—Gemmer worm and wheel type steering gear

Fig. 17—Ditweiler (Marles) cam type steering gear

There are some advocates of a transverse as opposed to a fore and aft arrangement of the drag link. One of these contends that it avoids the use of a crooked drag link and in most cases gives a better layout, especially when maximum wheel cramp angles are considered. Another engineer takes the view that a cross type drag link is not satisfactory with the usual spring suspension, a contention which he says is readily borne out by studying the layout on the drafting board. This may well be true in some instances, but it is evident that each case must be considered on its merits and the best compromises selected.

On some short wheelbase passenger cars and on trucks in which the driver's seat is well forward, a transverse drag link arrangement is often quite satisfactory. The frame must, however, be designed to withstand the twisting stresses which such a layout will sometimes impose.

Irreversibility

There is much loose talk to be heard concerning the so-called irreversible steering gear, but, so far as the writer is aware, there is no such thing used as a completely irreversible steering gear, nor does it seem desirable to employ such a construction even though it should prove feasible to produce it.

Perhaps the closest approach to an irreversible gear is the worm and wheel, or worm and segment type. With this type the wheels can be moved by applying a steady side pressure on the wheel, proving that it is not irreversible, but a sudden shock tending to deflect the wheels from a given position has a tendency to cause such a gear to become momentarily irreversible or self-locking. This is probably due to the fact that the lubricant is momentarily forced from between the relatively small contact surfaces of worm and wheel, thus increasing friction and preventing the turning which would otherwise occur. On this account a gear of this type is practically irreversible under shock, which is precisely the condition under which irreversibility is held by some to be desirable.

So far as we are aware all other types of gears are more readily reversible than the worm and wheel type and are, therefore, for the same reduction ratio and steering system layout more apt to permit any shock tending to deflect the road wheels to be transmitted to the steering wheel.

Some engineers take the view that it is not desirable to have the steering gear approach closely the self-locking condition, for the reason that when so made the linkage and bearings between the steering gear and the wheels are more heavily stressed when shocks are imposed. When the gear is free enough to transmit the motion caused by the shock to the steering wheel some of the energy of the shock is dissipated in the mechanism of the gear, thus bringing about a certain cushioning action which is advantageous. If, however, the motion on the steering wheel becomes excessive it is much less comfortably handled by the operator.

Those who favor the comparatively easily reversed type of gear are apt to favor also a center point steering arrangement which, as pointed out elsewhere, tends to eliminate shocks in the plane of the wheel, the kind of shock most frequently encountered.

All things considered it is probable that a certain degree of reversibility is a desirable thing, but it is certainly not desirable to employ gears which are so easily reversible as are used in some present-day cars.

Comparison of Steering Gear Types

The following types of steering gears are in more or less general use today:

a—Worm wheel and worm and segment.
b—Screw and nut, including differential nut types.
c—Bevel gear.
d—Planetary gear.
e—Spur gear and rack.
f—Cam type.

It is impossible to consider here all of the advantages and disadvantages of the various types, especially since it is not always easy to differentiate between advantages inherent in the type and those which are chiefly dependent upon the particular embodiment of the type.

The worm and wheel and the worm and segment type appear to have a certain advantage in respect to their tendency to become irreversible under shock—a tendency not common to other types. This characteristic is discussed elsewhere under the head of irreversibility.

When well proportioned and well lubricated the worm and wheel type has excellent wearing qualities, even though the bearing area between worm and wheel is rather small. If, however, lubrication fails, considerable friction and rapid wear are apt to result.

A disadvantage of this type is the fact that it is prac-

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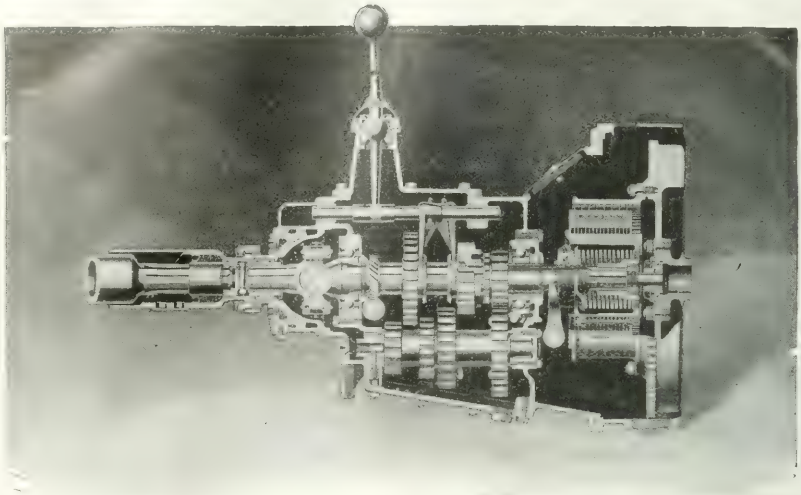
Hours of conversation are consumed all over this country, talking about its virtues and faults. Evidently a lot can be said. These hundreds of thousands of people would be interested if the advertising said something.

What would happen to the automobile business if the advertising of the product became really interesting to read?

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HARRY TIPPER.

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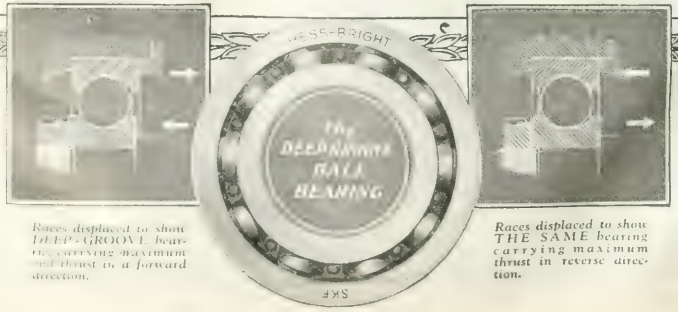
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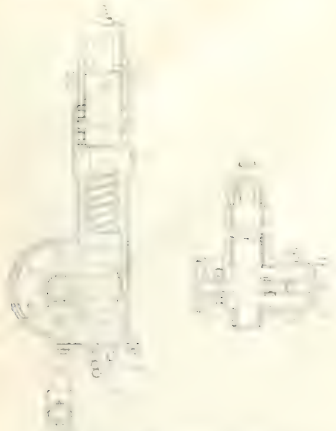


Fig. 15—Ross screw and nut type steering gear as used by Autocar

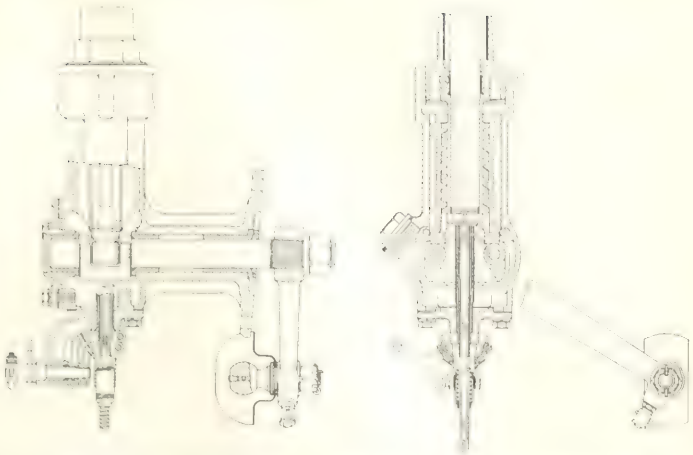


Fig. 16—Packard differential or screw and split nut type steering gear

tically impossible to take up any lost motion caused by wear, although, when the full wheel instead of a sector is employed, the wheel can be successively moved to four different positions 90 deg. apart, thus compensating for wear in the wheel, but not in the worm. It can be said, however, that well proportioned and well made gears of this type wear almost indefinitely provided they are kept well lubricated, so that the disadvantage cited can be made relatively unimportant.

Examples of the worm and wheel type of gear are shown in Figs. 4, 5 and 14.

Screw and Nut Type

One of the most widely used types of steering gear is the screw and nut type, which is generally regarded as being very satisfactory when well made. A good example of this type is the Ross gear, in the form used by Autocar, shown in Fig. 15.

The chief advantage of this type is good wearing quality due to the large bearing surface between the screw and nut and its chief disadvantages are its lack of adjustability and rather high cost of manufacture when the nut is well fitted to the worm. It can be said, however, that adjustment is seldom required, provided, again, that lubrication is properly cared for.

Alternative constructions of the same general type are used to overcome the disadvantage of non-adjustability just cited. In one of these the nut is made in two halves, one having a right and the other a left-hand thread, so that they move in opposite directions. This differential movement is transmitted to the steering lever shaft by a mechanism which can be easily adjusted to take up all lost motion. An example of this type of construction is the Packard gear shown in Fig. 16. In another make the right and left threads are cut on the inner and outer surfaces of a sleeve and the units or outer and inner mating parts are arranged to transmit their motion to a shaft on which the steering arm is carried by the use of a mechanism much the same as that shown in Fig. 16.

Types c, d and e are used only by a few manufacturers, chiefly on light cars where a large reduction is not required and where easy reversibility is not considered of much importance, or is outweighed by a relatively low cost of production. The latter is about the only advantage of these types unless their ability to operate after a fashion without or with indifferent lubrication is regarded as an advantage. It is worthy of note, however, that some recent designs of American passenger cars intended for large production at a low price are equipped with the worm and wheel type of gear, so that any advantage of type c, d and e may have in respect to low production cost appears to be outweighed by their inherent disadvantages.

The only example of the cam type with which we are familiar is produced under Marles patents. The Ditweiler gear illustrated in Fig. 17 is of this type. It has yet to see any very wide commercial application, but has the advantage of simplicity and is said to have high mechanical efficiency. This type of gear has been designed to give its full motion either with one or with two complete revolutions of the steering wheel.

There is considerable difference of opinion as to the total reduction which is necessary or desirable in the steering gear. This reduction naturally depends to a great extent upon the weight of the car and the mechanical efficiency of the mechanism employed. The reduction ordinarily used on passenger cars varies from 6.0:1 to 9.66:1, and the number of revolutions of the wheel necessary to move the road wheels from locked to locked position varies from 1.5 to 2.25.

There are certain advocates of rather "fast" steering mechanisms, that is, mechanisms which require a relatively small angular motion of the steering wheel for a given angular motion of the road wheels. Others prefer a "slower" gear, or one with a greater reduction, even though this type does not respond as rapidly to the demands of the operator. Other things being equal, the slower the steering the less are shocks on the road wheels transmitted to the steering wheel and vice versa.

Tie-Rod Arms and Tie Rods

Tie-rod arms should be as stiff as weight and manufacturing considerations admit. If yoked tie-rod ends are to be employed it is important to see that the axes of the yoke pins are truly parallel to each other and to the knuckle pin axes, otherwise, if the yoke pin is well fitted, binding will occur in some positions. If the knuckle pivot axes are not intended to be parallel, as in the case of transversely raked pivots, it is necessary to use a ball joint or its equivalent between the ends of

the tie rod and the tie-rod arms to prevent binding.

One prominent designer states that it is practically impossible to fit yoked tie-rod pins tight enough to prevent rattle and still avoid binding. Even though the knuckle pivot and yoke pin axes are made truly parallel in machining, they are certain to be thrown somewhat out of this relative position when the axle is deflected, as it always is to some extent, under normal load. For this and other reasons a ball and socket joint such as is used on the ends of the drag link has certain important advantages. Some engineers consider it safer than the ordinary yoke construction. The springs back of the bearing blocks afford a cushioning action against shock which, if the springs are properly proportioned, is highly desirable. An unusual design of ball and socket tie-rod end is used in the Excelsior design, shown in Fig. 10.

A rather common and serious fault on some of the cheaper cars and trucks is the use of tie-rod yokes which are poorly fitted to begin with and which have a totally inadequate means for locking them in position. The tangent bolt employed is frequently too small and the shank of the yoke is not split far enough or with a wide enough slot to insure secure locking. As a result the yoke soon rattles loose and becomes a source of danger.

When the tie-rod is of tubular section and especially when the walls of the tube are thin, care must be used to see that sufficient metal remains at the base of the thread to prevent failure under constant vibration. A yoke clamped to the tube by a tangent bolt sometimes compresses the tube under the influence of road shocks and the yoke loosens on this account. This fault has been remedied in some cases by the use of a tight fitting metal plug, somewhat longer than the threaded portion, forced into the ends of the tube.

There are some advantages in the use of a lock nut bearing against the inner end of the yoke shank instead of a tangent bolt, but close-fitting threads are very important in this case.

Two New Clutches Added to M. & E. Line

Have flexible driven member, direct acting springs and positively moved pressure plate. Easily adjusted for wear.

TWO new clutches are now being marketed by the Merchant & Evans Company of Philadelphia. These clutches are practically identical in design except that one of them is provided with a single plate, the other with a pair of plates and an additional driving member. Each model is made in 8, 10 and 12-in. size (torque capacity varying from 1500 to 3300 lb. in.). There are six springs acting direct on the pressure plate and giving a total pressure of 1200 lb. Disengagement is accomplished by three multiplying levers attached to the driven member and so proportioned that a throwout pressure of 125 lb. is required at the point of release.

As will be seen by reference to the accompanying cut the light driven element is formed from pressed metal with the friction facings riveted to the flange. At its inner diameter this plate is riveted to a flanged steel hub which is splined to the driven shaft. The driven disk is made flexible to compensate for any lack of alignment, while the heavy cast iron pressure plate tends to prevent chatter.

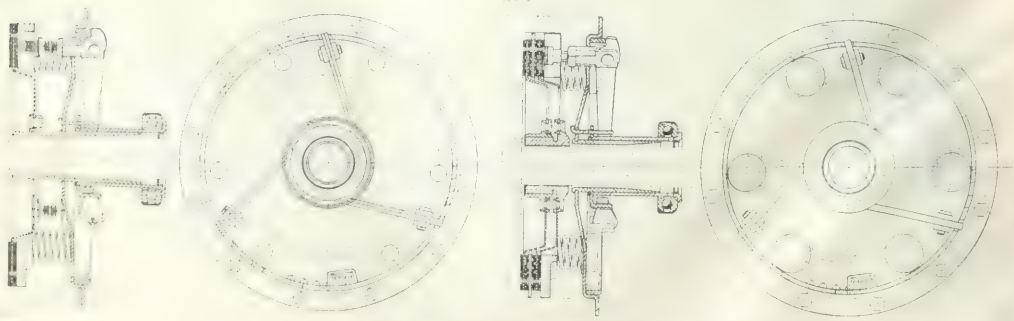
Double ended screws are fitted between the pressure plate and the throwout lever fulcrums so that the levers can each be adjusted exactly the same distance from the pressure plate thus preventing uneven working of the clutch and correcting for faults in machine work.

The arrangement of the pressure plate is such that it is positively released when the clutch is disengaged, thus tending to prevent drag. It is claimed that no clutch brake is required.

The release sleeve is so designed as to entirely clear the driven shaft, so that no lubrication is required between these two members. Only one ball throwout bearing is required as compared to two used in earlier clutches of the same make.

The clutch can be adjusted for wear by moving what may be termed a fulcrum ring upon which the outer ends of the disengaging levers bear. The bearing surfaces for the levers are arranged in steps of definite height so that circumferential motion of the ring changes the height of the bearing point for each lever the same amount, thus affording positive, fool proof and convenient means for effecting the adjustment.

Since the clutch forms a self contained unit it is easily assembled in the car.



New M. & E. single-plate and two-plate clutches

American Farmer Will Be Bigger Purchaser in 1923

He has been buying motor vehicles and will take farm equipment when convinced of price deflation. Implement dealers must drop antiquated customs and adopt automotive merchandising methods.

By Fred M. Loomis

THE American farmer is coming back to the market, at least as respects equipment for his farm. He is finding himself in much better position to buy than he thought he was.

A good deal of hocus-pocus has been said and written about the decline in the buying power of the farmer. Admittedly, on the basis of a comparison between the prices he received for his products during the war and what he gets to-day his buying ability has been sadly impaired. But even so, he is about 40 per cent better off than in pre-war days.

This is not an unsupported assumption. Those who have been in closest touch with the farmer and who have had the greatest personal interest in an interpretation of his condition assert confidently that his purchasing in the coming year will be much greater than it was last year. For instance, one of the best known and most influential of the farm papers says, under date of Nov. 17, 1922:

> A study of crop and market conditions and of the volume and price movement would seem to effectually confirm this. The value on the farm of 12 leading crops at present is 5980 millions of dollars, according to deductions made from November report Department of Agriculture; same 12 crops with the estimated farm values one year ago 4705 millions. This notable difference, in producers' favor, is more than a billion and a quarter dollars.
>
> It is the difference between then and now. Twelve months ago, a slough of despond accompanying the drastic deflation in which farm prices were cut in two; to-day, a higher trend in farm prices toward a parity with other commodities and labor costs. This pendulum swing has been helpful, even though it needs to go still further.
>
> Nor is this all. Over half of the three-billion-bushel corn crop will be converted on the farm into beef and pork; and rightly handled, at an additional profit over what would be realized were it all to be sold in the grain.
>
> Meanwhile cotton prices have shown further material gains. Other staple and special crops, together with poultry and dairy products, have been leaving the farm on an advanced November price level.
>
> Assuming the farm output of 1922 is distributed in an orderly manner, at a price level comparable with going quotations, it is not out of the [illegible] to say the farmers will have upward of two billion dollars more to spend during the next six months than in the opening half of 1922, when cereal prices made fair yet ragged recoveries. Fortunately for producers, the higher prices are obtainable this season early in the year, directly benefiting producers; something not always realized.

At the present time it is not so much the actual buying ability of the farmer which is important as it is his inclination or desire to buy. He is purchasing readily enough those commodities on which he feels a reasonable concession in prices has been made.

Prefers Automobiles to Plows

For this reason he feels more kindly disposed toward the automotive industry than he does toward the implement industry. It is estimated that the farmers of the country this year spent in the neighborhood of $500,000,000 for motor cars and trucks, accessories and maintenance, while their expenditure for farm implements has not been the half of that. Nor is the explanation far to seek.

The reason for the farmer's friendliness toward the automobile in contrast to his aversion to the plow and the threshing machine is to be found in his estimate of the methods of pricing these commodities.

Automobile prices go up or down at the factory and dealer prices follow automatically. It happens that for nearly two years the trend of automobile prices has been downward, and that at the present time the prices on makes of cars most favored by the farmer are as low or lower than they were before the war. Automobile manufacturers have taken their losses, and prices of motor cars, in the eyes of the farmer, have been reduced to a level somewhere near that of former prices. Hence, he feels he can afford to sell wheat and corn and hogs and spend the proceeds for an automobile, for the prices have all been deflated.

That the farmer of the corn belt actually is purchasing automobiles, thus evidencing not only his willingness but his ability to buy, is demonstrated by the fact that at New Haven, Mo., 100 automobiles have been sold during 1922, "mostly to farmers"; that at Monticello, Ill., 225 automobiles have been sold during the year, "mostly to farmers," and that at Emporia, Kan., 100 automobiles have been sold durlng 1922, "about 50 per cent to farmers," and so on. Such instances run into the hundreds and provide the best possible proof of the ability of the farmer to get what he wants or what he needs.

Does Not Understand Implement Prices

Implements, on the contrary, have never been priced or sold like automobiles or like staples. For instance, implement prices never have followed closely the fluctuations in the raw materials which enter into them.

Furthermore, changes in implement prices always have been expressed in percentages, which make little or no impression upon the farmer mind, while price changes expressed in concrete amounts, like changes in automobile prices, make a decided impression.

Rightly or wrongly, therefore, the farmer believes that prices for implements have changed but little and still are high as compared with the prices he gets for his products.

The implement industry as a whole has been slow to realize that the farmer mind works along concrete rather than along abstract lines. Only recently has it come to see his preference for definite figures rather than for indefinite percentages.

The retail implement dealers were the first to sense this, and at the annual convention of their national federation held in Chicago a resolution was passed calling upon those farm equipment manufacturers who advertise nationally to use net prices, f.o.b. factory in their advertisements.

The dealers contended that this would tend to stabilize prices and correct some of the abuses of irresponsible competition because then every dealer could make the same resale price, with the freight to his town added to the factory price. Also, whenever it became necessary for the manufacturer to change his price he could express that change in concrete amounts so that the farmer could understand it.

This is clearly automotive practice and is only another indication of how fundamental automotive ideas are modifying customs and practices which have been in vogue for upwards of a half century in a kindred but much older industry.

It has been the custom of implement manufacturers, in attempting to change the farmer's conviction that implement prices are excessive, to quote the price per pound the farmer pays for what he buys. But this gets no one anywhere. The farmer is not impressed by the statement that his piano costs him 37 cents per pound or that his automobile cost 27 cents per pound, while for his implements he is asked to pay only 10 or 12 cents per pound. That isn't the way the farmer figures. He thinks implement prices are too high and for this reason he has been buying no more than he has had to have. Implement men fear he still feels the same way and will continue to defer his purchases indefinitely.

Buying Power Coming Back

The buying inclination of the American farmer is coming back but it is coming in a new way.

The farmer is buying, and buying generously, along certain lines, but the motives which prompt him are not the same as they were a few years ago. Times have changed and he has changed with them. Other and newer things appeal to him and one reason why the implement industry, as an industry, is languishing is because it still is trying to sell the "old" farmer in the old way.

The automotive element in the implement business has, on the contrary, kept up with the procession, and this is why automotive dealers are selling. They have recognized the changed conditions and they have changed their methods likewise.

It is a mistake to suppose the farmer spent $500,000,000 for automotive products this year just because he wanted to joy ride. The automobile is a necessity for the up-to-date farmer. His car leaves the farm fifteen times where the old horse and buggy used to leave it but once and this simple fact goes far to explain the change that has taken place in the farmer market.

Necessity more than desire has governed farmer buying for more than the last two years and it will continue to govern his buying for some time to come. But necessity is a relative term and is interpreted differently by different farmers. To one the automobile may appear to be the greater necessity; to another the tractor, and to still another the plow or the threshing machine. But the farmer buys to meet whatever he considers is his particularly pressing need.

The farmer has been buying automobiles and not always the cheapest ones at that. Within a few weeks the writer talked with a dealer in a town of 3500 inhabitants who had sold 16 Studebaker cars to farmers and with another dealer in a town of 24,000 inhabitants who had sold 12 Packard cars to farmers. Such instances are so numerous as to be almost typical.

Steady Tractor Sales

Within the last few weeks also the writer has talked with automotive dealers in New York, Ohio, Indiana and Iowa who have sold as many as 57 tractors to farmers. In addition he has seen letters from individual automotive dealers in 13 states who report 1922 sales of tractors as follows:

Arizona ..	40	Iowa	11	Ohio	22	Kansas ...	25
Arkansas.	20	Iowa	16	Ohio	31	Michigan .	13
California	20	Iowa	11	Ohio	13	Montana ..	11
California	20	Iowa	10	Ohio	25	Nebraska .	12
Florida ..	15	Iowa	14	Ohio	22	Nebraska .	14
Florida ..	18	Iowa	20	Kansas ..	10	Nebraska .	33
Illinois ..	35	New York.	27	Kansas ..	22	Nebraska .	10
Illinois ..	18	N. Carolina	51	Kansas ..	47	Nebraska .	31
Illinois ..	56	N. Carolina	10	Kansas ..	25	Nebraska .	37

The modern farmer knows his needs more clearly than did the farmer of a few years ago and he buys more discriminatingly. The dealers who sell him are those who in turn have recognized the changed conditions and who are meeting them with up-to-date merchandising methods. It is no accident that these dealers happen to be automotive men for the most part. It means merely that they happen to be better business men than were the old-time dealers. The greatest trouble with the implement business to-day is that there are still too many of those old-time dealers hanging on.

The up-to-date dealer has been selling the farmer automobiles, tractors and other farm equipment all this year. This does not mean that the farmer is back to normal in his buying or that he already is buying as much as he will buy in the future, but he is meeting his immediate needs in ever-increasing volume. His buying power is coming back if the records that have been made during the last few months by automotive dealers are any criterion.

Straws in the Wind

The manager of a branch house of one of the big implement companies, a concern most intimately associated with the development of power on the farm and in the manufacture and sale of power farm implements said a few days ago that there had been from 200 to 300 per cent increase in dealer orders for 1923 spring deliveries compared with the orders placed a year ago.

Another implement manufacturer declared a day or so later that dealer orders for spring delivery thus far showed an increase of 200 per cent over orders placed a year ago at this time.

Within the last 30 days Floyd R. Todd, vice-president of Deere & Co., who was elected to the chairmanship of the executive committee of the National Association of Farm Equipment manufacturers at the annual convention of the association in October last has changed very

materially his opinion as to the business outlook. Thirty days ago he was a pessimist and could see no hope of better times in the implement industry until some time in 1924. At the annual meeting of the Tractor and Thresher Division recently in Chicago he expressed himself as highly encouraged over the prospect and intimated that the industry might look for much better things very soon.

In October last Todd said:

"It is my judgment that a number of factors are gradually working in the interests of the implement industry; that our drastic liquidation is over; that while the coming year is not going to be profitable, it will present less serious problems than either of the two years that have gone before, and that we can confidently look forward to the year 1924 as the beginning of a new era of demand for our products and a return to profitable operation."

In November Todd declared:

"The year which is just closing will write some more red-ink history into many of our balance sheets. The year 1923 seems to hold better things in prospect. A month ago I felt that while 1923 would be a much more favorable year than either of the two that have gone before, it was not likely to be a profitable one. The developments of the last thirty days, particularly in the increasing prices of farm products, have to my mind improved the outlook and I think that there are now possibilities that the year 1923 may cover the turning point when red-ink figures in our balance sheets will give place to black. I am quite sure that this will be the case if farm products will advance so as to cover any increase in implement prices that may be made necessary by our growing costs.

"I am quite certain that with fair crops in 1923 there can be no question about the return to conditions of at least normal profit in the year 1924. It seems to me that the industry is now facing a gradually increasing demand which, within the next twelve months, will assume proportions of importance and bring back that measurable degree of prosperity to which so basic an industry is entitled."

Inasmuch as Todd is the recognized spokesman for the implement industry this change in his mental attitude is important and significant. In addition, it may be assumed that it represents fairly a cross section of the farm equipment manufacturers.

Thus all along the line the sentiment has been changing, particularly in the last 30 days. The implement industry is feeling better, largely because of the favorable reaction from the dealers, a very large percentage of whom are of the automotive type accustomed to automotive merchandising methods. It is these men who have come into the farm equipment trade so largely within the last few years who are putting the lever of better business and better merchandising methods into an industry which has been practically unchanged in these respects for 59 years. If the farmer is buying again and clearly he is, he is doing so primarily because better dealers are inducing him to do so.

Comparison of Grinding Practices in Industries

GRINDING practices of a considerable number of firms, several of them in the automotive industry, are dealt with in a descriptive way in "Production Grinding," by Fred B. Jacobs. The method of holding the work, the location of operations, grinding machine used, grit and grade of grinding wheel, number of grinding operations and stock allowed for grinding are given in most instances. Machine operations preceding or following the grinding are given in some cases to emphasize the importance of the grinding operation.

The appeal of the book is likely to be weakened somewhat by the tone of the introductory paragraphs of the different chapters (each chapter deals with the practice of one company), which often smacks of publicity. The accuracy of expression also leaves something to be desired. Thus, for instance, in the first chapter it is stated that "Almost innumerable time studies at this plant have proved beyond doubt that grinding processes in the manufacture of automobile parts is not only the most accurate method to use in producing parts in quantities. . . ." It is hard to see how time studies can prove anything regarding the accuracy of parts. In Chapter IX it is stated that "The principle involved in the modern roller bearing dates from the time when prehistoric man discovered that he could expedite the moving of a heavy body by placing it on rollers fashioned from the trunk of a tree." By the same token America dates from the time Columbus sighted land in the Caribbean Sea.

The concluding paragraph of the last chapter gives the impression that in the matter of precision of workmanship we are going backward. This chapter deals with Precision Grinding Work of Other Days and describes the work of the grinding department of the Reece Button Hole Machine Co. which, about 1895, was in charge of Frank Hurd. Of Mr. Hurd and his work the author says: "Mr. Hurd was an accurate workman. Tolerances in those days were unknown. Thus a piece that called for a diameter of $\frac{3}{8}$ in. was finished to 0.375 in. It was neither 0.0001 over nor 0.0001 under. All work was gaged by micrometers which were frequently tested for accuracy."

The book is published by the Penton Publishing Co., Cleveland.

A NEW edition has recently been brought out by the publisher, M. Krayn of Berlin, of the Work on Carburetors, by H. Dechamps, originally published some 15 years ago. The new edition has been completely revised and contains additional material relating to aircraft carburetors, etc.

The book, which is printed in the German language, deals with the general principles underlying carburetor design, besides containing descriptions of numerous different constructions, both new and old. The theory of the simple spraying carburetor is developed, following which are discussed the various methods adopted for compensating for the tendency of this type to unduly enrich the mixture at high suctions. All of the parts of the carburetor are then taken up in succession and the conditions which control their design are analyzed. The chapter on aircraft carburetors in the new edition has been written by Mr. Dechamps, the author of the first edition, while the work of revision generally was done by K. R. H. Praetorius. There is also a chapter on kerosene carburetors, which deals to a large extent with American practice in the tractor field. The book contains 227 pages (10 by 7 in.) of text with 189 illustrations.

Develops Plan to Solve Electric Equipment Service Problem

Special committee of Automotive Electric Association to offer recommendations. Stations properly fitted to service all makes of equipment to be installed with official authorization. Plan would benefit small town car owners as well as manufacturers.

SOME time during the next few weeks the Executive Board of the Automotive Electric Association will have presented to it a report of a special committee, appointed at the last annual convention of the association, which, if adopted, will go very far toward solving one of the most serious and perplexing of the problems which confront the manufacturers of automotive electric equipment. The problem is that of servicing effectively and economically the standard electric equipment used on motor cars.

The special committee will present the plan to the Executive Board in the form of a resolution. It will recommend the institution and authorization of electric service stations throughout the country which shall be equipped for servicing all makes of automotive electric equipment. It will urge that the Automotive Electric Association officially authorize these stations to service all electrical equipment manufactured by the members. The membership of the association comprises almost 100 per cent of the automotive electric equipment manufacturers, hence if the resolution be adopted and put into effect, service will be available wherever one of the authorized stations may be located.

The plan to be recommended by the committee follows closely in detail some of the plans already employed by several of the automotive electric manufacturers to insure service on their equipment and to protect their guarantee. Some of these plans are quite elaborate and have in their development already hundreds of authorized service stations. Difficulty has been met in that an insufficient volume of service calls has made equipping for service on just one make of electric equipment unprofitable for the station except in the large centers of population. Also as the plans are worked at present, there is very commonly a slip up somewhere along the line, so that the manufacturer cannot insure service being rendered in all cases by the station he authorizes.

THE plan suggested by the committee of the Automotive Electric Association would substitute for this individual plan one which would include all of the systems manufactured by its members. This would make the probable volume of service greater and more profitable per station, insuring better equipment for service and more competent service. This last consideration is particularly important in the smaller communities of the country.

Hitherto servicing automotive electric equipment has presented a serious problem due to the peculiar conditions surrounding guarantees covering electric equipment which has been and is now employed as standard equipment on motor cars. This is due to the twofold nature of the guarantee which equipment the manufacturers must give.

For instance, there is the phase which affects the relation between the electric equipment manufacturer and the motor car manufacturer. This is relatively easy to meet, since the engineering departments of the car manufacturers nearly always can assure themselves by test whether the representations made by the equipment manufacturer are justifiable and dependable. It is fair to assume that the car manufacturer has satisfied himself on this point before any electric system is adopted.

The other phase of the equipment manufacturer's responsibility presents itself after the car has left the hands of the car manufacturer and passed through the channel of the car distributor and dealer into the hands of the ultimate purchaser.

IT is customary for the automotive electric manufacturer to place a guarantee on his equipment which is limited both in scope and time and which presupposes some degree of responsibility and cooperation on the part of the car owner.

The automotive electric manufacturer is forced to give this guarantee because the car manufacturer's guarantee very plainly and emphatically disclaims any responsibility for parts or accessories on his car which are not of his own manufacture. The car manufacturer never makes his own electric equipment, hence he is absolved from any responsibility for it. He puts it up to the equipment manufacturer to protect not only the reputation of the car as a whole, because that will depend largely upon the durability, capability and dependability of the electric system, but also to protect the guarantee of the latter which affects his own electric equipment.

The problem which the automotive electric manufacturer must solve, therefore, is how he is to follow his particular equipment into the hands of the car owner. He must see that the latter observes the conditions of the guarantee he accepts and make sure that the right kind of service is rendered on the installation, to the end that car owners shall be satisfied and that the standing and reputation of both car and electric equipment do not suffer.

This is the more difficult to do because, as a rule, the automotive electric manufacturer never comes into direct contact with the car owner. Most of the devices and

plans designed to meet this situation in use to date have proved unsatisfactory and incompetent to insure even indirect contact through dealers, repair shops and service stations.

All manner of expedients have been tried to bring about this contact, to insure co-operation on the part of the car owner which will protect him and which also will enable the equipment manufacturer to make good on his guarantee. While some of them work more or less efficiently, the majority break down because some of the intermediate factors between car manufacturer and car owner do not do what they ought to do.

NO plan has been devised to date which appears to correct the weaknesses which seem to develop inevitably in every plan tried. This is particularly true when the car owner lives in the smaller communities of the country or in the rural districts.

The situation is somewhat better in the larger cities because service stations have grown up there during recent years which specialize on automotive electric equipment and which, for their own interests and to advance their own business, make a conscientious and determined effort to get into contact with the car owner and to solicit his business. Typical among such metropolitan electric service stations are Cowie in Kansas City, Jones in Chicago and Reinhard in Minneapolis. Similar institutions commonly may be found in most of the larger cities.

THE problem of getting adequate service on electrical equipment as well as on the motor vehicle has been a stumbling block and source of much friction within the industry.

Manufacturers of both equipment and motor vehicles have had their reputations damaged by the lack of proper servicing on the product of the former. The car owner has suffered and has demanded that there be an improvement.

This article tells of the solution proposed by a committee of the Automotive Electric Association. It shows that co-operation among the equipment manufacturers is absolutely necessary to insure the car owner getting the service that is rightly his and outlines the method to bring it about.

Recognizing the importance and convenience of such institutions, and appreciating how much they can do to render the automotive electric manufacturer's guarantee effective, the custom has grown up of giving official authorization to such electric service stations qualified to service automotive electric equipment. It is very common to find such a station authorized by practically every automotive electric manufacturer in the country to service his equipment. Also there are numbers of electric service stations which specialize on only one or a few makes of electric equipment.

When combined, these exclusive and general electric service stations meet fairly well the requirements in metropolitan districts. In all there are, to date, some 1500 of these officially authorized stations. Most of them are located in the larger population centers, leaving the smaller towns singularly devoid of competent electric service. Possibly it is in these smaller communities and rural districts that electric service is most acutely needed.

It is this condition in the smaller towns which the special committee of the Automotive Electric Association hopes to meet by the adoption of its recommendation.

Most of the automotive electric manufacturers cannot economically maintain such a multiplicity of service stations as would be required should all attempt to follow the example of the few who have established individual stations. The association stations, therefore, would meet this situation.

It happens that this problem is being solved already in whole or in part in certain sections. Take the State of Ohio, for example. Entirely through the instrumentality of the Cleveland Ignition Co. of Cleveland, fifty-five regularly authorized electric service stations have been established in that State, mostly in county seat towns, and through these competent and efficient electric service is being given to car owners in the smaller towns.

Each of these stations works under factory contracts which are made by the Cleveland Ignition Co. Each has a territory within which it has exclusive rights of service on certain equipment and of sale on genuine parts for one or more of the automotive electric systems commonly in use as standard equipment. The number of systems serviced and on which exclusive rights are given is determined in every instance by the extent of territory controlled by the Cleveland Ignition Co. On some of the products it services in its Cleveland shop it has the entire State and on others only a part of the State. However, in so far as the company itself has exclusive rights and protection it gives corresponding rights and protection to all the authorized service stations it establishes.

The Cleveland Ignition Co. started originally as an exclusively local electric service station. As its business grew it acquired the authorized local rights to service more and more systems of electric equipment. To-day it is authorized to render electric service on Delco, Remy, K-W, Bijur, Dyneto, Atwater-Kent, Splitdorf, Eisemann, Zenith, Briggs & Stratton, Fafnir, Connecticut, Westinghouse, Bendix and Johns-Manville. Its control on some of this equipment is purely local; on others it has rights which extend over varying areas within the State.

Impressed by the success which attended the development of its local business, and sensing the importance of extending similar service wherever possible throughout Ohio, the company began, about three years ago, to select men either competent already, or who could be trained to become competent, to render exclusive electric service in the smaller towns in the State. As rapidly as such stations were established they were given the exclusive rights to sales and service on such electric equipment as the Cleveland company was authorized to give. Also each station established was accorded official recognition by designating it an authorized electric service station by the Automotive Electric Association.

This development in Ohio seems to solve many problems. It has solved the problem of distributing electric equipment through the small towns effectively and economically and that of selling accessory parts on which the element of service and not that of merchandising is the predominant factor.

IT establishes a body of electric service men so bound by factory contracts and so protected by generous discounts on parts that they will handle nothing but genuine parts, thus limiting the opportunity and trade of the gyp concerns which used to flourish by selling substitute parts in these communities. It makes obligatory at all times a conveniently available stock of genuine parts commensurate with the car population of the locality.

This development makes possible the maintenance of a traveling organization which can represent economically the automotive electric manufacturers who are willing to grant the Cleveland company territorial rights and who could not afford to travel the territory individually. In short, it furnishes the solution of the problem which the automotive electric manufacturers must meet in coming into contact with the small town car owner, and thereby protects not only his guarantee and reputation but the reputation of the car manufacturer as well.

If the Automotive Electric Association should adopt the recommendations of its special committee this plan of electric service stations could be spread rapidly throughout the small towns of the country. Some such plan as that employed by the Cleveland Ignition Co., authorized by the association and thus servicing all makes of automotive electric equipment, would correct the weak spots at present apparent in the Cleveland plan and would make possible the rendering of efficient electric service everywhere. Some such development is desirable, and it should be encouraged by all factors interested in the manufacture of automotive electric equipment.

Field of Airship Transportation Distinct from Other Carriers

IN a paper presented at the annual meeting of the American Society of Mechanical Engineers, Ralph H. Upson, chief engineer of the Aircraft Development Corp., stated that the improved airship will be available for commercial traffic over either land or water in rough proportion to the extent to which the following conditions exist:

Length of route should be 500 miles or more.
Density of traffic—at least 200 passengers or 50 tons of goods per trip.
Time-value of pay load—passenger's time worth $6,000 per year or more; goods $2 per ton-hour.
Favorable meteorological conditions—(no definite minimum)

Upson arrives at the above conclusion through a study of the prime factors or variables entering into the consideration of a commercial airship line, namely size, speed, route, cost of transport and time value.

On the basis of this study Fig. 1 shows a comparison between all the available means of transportation.

Here the speed is taken as net, with allowance for average stops, delays, time required to get in and out of terminals, and to load and unload. The shaded areas represent the respective economic fields to be served by steamship, railroad, and airship, which may be termed primary transportation units. The secondary units, motor truck and airplane, are not directly comparable with the others because their value lies in various special features peculiar to themselves.

In respect to size the airship is affected in much the same way as the steamship. The weights of various parts of an airship structure vary all the way up to the fourth power of the linear dimensions. Hence beyond a certain point there is an actual increase in structural weight per unit displacement. Considerations of power

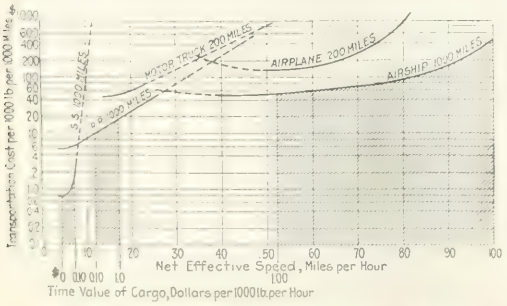


Fig. 1—Transportation diagram showing economic relationship between different carriers

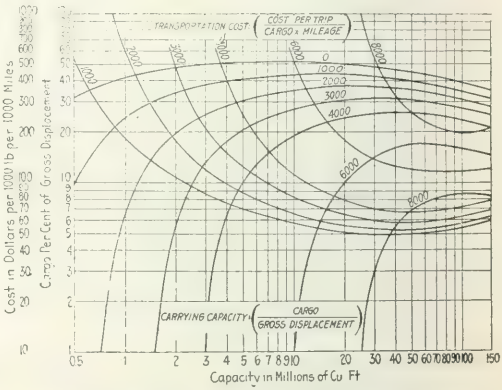


Fig. 2—Effect of size on airships of similar design, assuming an average air speed of 70 m.p.h.

and fuel consumption, however, bring the range of economical size far beyond that of greatest structural efficiency. This is because the resistance, for equal speeds, varies as not quite the square of the linear dimensions.

All the above data have been taken into account in computing the data for Fig. 2, which shows the effect of size alone on freight service over routes of different lengths. The curves that are concave downward show the net cargo weight as a percentage of the gross displacement weight, the figures on the curves themselves referring to the length of route in statute miles. The other set of curves (concave upward) shows the cost of transport in dollars per 1000 lb. per 1000 miles for the different routes marked.

This takes care of three of the prime factors or variables entering into the consideration of a commercial airship line. The remaining two factors are cost of transport and time value. The latter is the value of time, or of saving time, per unit of passenger or cargo carried. Taking the simpler case of freight (including mail and express), if time has any value it has a money value per hour on any unit weight of the cargo carried.

Taking everything into account on a basis of present values, it seems probable that anything having a time value of $1 or more per 1000 lb. per hr. ($2 per ton-hour) can be shipped more economically by air than by rail, or about half of this figure in the case of shipping by water. This is assuming in each case the speed and size of unit best suited to the quality of goods carried.

Liberal Credit Policy Will Develop Automotive Market in Holland

American exporter's handicaps gradually being overcome and German lead wanes. More liberal terms to dealers result in price reduction and help neutralize unfavorable rates of exchange.

By E. C. Petrie

HOLLAND is a country of intensive production and demands intensive transport facilities. A small country, with a large overseas trade, it has realized that, if it is to maintain its commercial position, it must make the most of the benefits offered by the internal combustion engine. Increasing railway deficits in a land inhabited by a conservative, level-headed people, backed by slow deliveries, growing pilferage, and high freight rates, has driven home this fact very forcibly.

Though its motor transport advance has been rapid, this market is still a long way from a saturation point. Registration figures issued last February show that there are 20,000 motor vehicles in Holland. A proportion of one motor car to every 350 inhabitants indicates that for such a wealthy country many potential buyers must be ripe for the enterprising salesman.

Since 1920 Holland's imports of motor vehicles have been as follows:

	1920	1921	1922 (First quarter)
Passenger cars	6,089	2,843	652
Car chassis	767	269	?
Trucks	1,646	728	302
Truck chassis	789	287	144
Motorcycles	11,439	5,660	?

These figures suggest that though passenger cars imported during 1922 will be on a par with the figures of last year, the absorption of trucks will closely approximate the total of 1920. One hundred of the truck chassis imported during the first three months of this year came from the United States; Germany sent 30, and France the remainder.

The chief supplying countries of complete vehicles during this period have been:

	1920		1921		1922 (First quarter)	
	Cars	Trucks	Cars	Trucks	Cars	Trucks
Germany	2,144	1,398	1,224	573	388	289
United States	2,968	83	520	29	148	..
France	235	63	468	66	..	9
Belgium	402	..	286	..	..	..
Great Britain	207	..	167	..	..	..
Italy	67	..	94	..	..	..
Other countries	66	102	84	60	126	4

A comparison of the unit value of vehicles imported from these countries is interesting:

	1920	1921
Germany	Fl. 3,451	Fl. 4,003
United States	4,111	4,038
France	5,106	5,555
Belgium	4,726	6,993
Great Britain	6,280	6,587
Italy	4,818	5,799

It will be seen from these figures that the unit value of the American vehicle dropped to within Fl. 35 of the value of the German product; that double the number of French cars were imported, that the Belgian vehicle increased almost 50 per cent in price, and that British cars, despite their high cost, only fell about 14 per cent during a period of depression.

America is making a great effort to regain its position as the leading supplier of Dutch motor needs. It suffered last year as a result of overstocking in 1920, to German underselling, to unfavorable exchange, and to an unsatisfactory selling policy.

This policy is being radically amended. Under the old system vehicles were bought cash down by Dutch dealers, and this body, to ensure profits, increased the selling price to such an extent that the cost of an American car to a Dutch buyer was double that of its retail value in the United States. Credit terms to dealers and quotations c.i.f. Dutch ports are the sales methods now being adopted, and, as a result, current American truck prices have already fallen 44 per cent this year compared with last, while car prices are 35 per cent lower.

German Competition Wanes

At the same time, the bogey of German competition in Holland is being dispelled. Certainly, many German vehicles are entering the country this year, but mainly because outstanding contracts are being fulfilled. Dutch owners of these vehicles are discovering that they are expensive to keep in repair, and their popularity, induced by low price, is waning. It is not improbable, therefore, that by the end of this year Holland will have lost its place as the leading absorber of German motor products.

British vehicles, despite German dumping and American and French activity, show a tendency to interest Dutch buyers. Their excellent construction and reliability will result in increasing sales, and particularly noteworthy is the current demand for municipal vehicles.

The one-tonner is the most popular type of truck, and, while there is a certain demand for the high grade car, medium and light types attract more buyers.

Holland has been described as a pocket paradise for motorists, for the country is flat and the roads generally are good. Vehicles for the Dutch market, therefore, need not be powerfully engined. Cabs for trucks should be so constructed as to protect drivers from cold winds and rain.

The secret of successful representation in Holland lies in the establishment of adequate service facilities, and complaint has been made that some manufacturers have been lacking in this respect. It is well to remember that one of the most potential markets in the world, the Dutch East Indies, obtains many of its motor vehicles through Dutch dealers.

Holland Needs Automotive Imports

As practically all raw materials necessary to the manufacture of motor products have to be imported, as wages are high and the country demands a great variety of vehicle types, it is improbable that Holland will ever become self-supporting as regards automotive products. A certain amount of manufacturing activity, however, exists, and recently a maker of motorcycles was seeking representation in Egypt and the Levant.

The United States contributed 52 out of the 102 tractors and steam wagons imported by Holland last year. Germany sent the remainder, excepting for a few steam wagons sent by Great Britain. The larger farms in the northern and eastern districts benefit most by power farming methods, and good sales should be effected in these districts. In the other parts of the country small holdings and market gardens predominate, and here the tractor is only a moderate marketing proposition.

Commercial aviation is making great strides in Holland. Over the lines subsidized by the State 1,548 kilog. of mails, 38,634 kilog. of goods, and 1,674 passengers were carried last year against 2,962 kilog. of mails, 21,963 kilog. of goods, and 345 passengers in 1920.

Holland is actively engaged in airplane construction, and just recently a new factory was opened at Rotterdam.

During the first three months of this year 18 airplanes were exported, 10 of this number going to Russia. A further 10 machines have also been ordered by the latter country from the Fokker factory at Veere for use over the Moscow-Konigsberg route. These machines are planned to fly 100 miles an hour and have been fitted with 350 hp. Rolls-Royce engines.

Motor barges are very popular in Holland, and are becoming a feature of its canal traffic. Most of the engines fitted to these craft are manufactured in the country, but it is thought that imported engines could successfully compete in supplying the fool-proof, crude oil burning type that is most in demand.

The value to Dutch fishermen of motor-propelled craft is shown by a study of last year's herring fishing operations. Of the 86 luggers employed in this industry six were motor driven, and, whereas, the average annual catch of the sailing lugger was valued at Fl. 11,040, the revenue of each motor lugger was valued at Fl. 20,799.

Holland is potentially a great motorcycle market. It is said that the country possesses more bicycles per capita than any other country in the world, and in some trades 90 per cent of the employees cycle to work. Both sexes have the touring mania. One of the railways' most acute problems is to transport bicycles on a Sunday or holiday afternoon and stringent regulations on the part of these companies are driving many cyclists in the direction of a natural ambition—the possession of a motorcycle. Besides solo machines, light combinations will always be in demand, for even with only a day available the Dutchman will go touring with his family.

At the Amsterdam Motor Exhibition held this year motorcycles were strongly represented. Forty makes were on view, the exhibits of American, Belgian, British, French and German manufacturers. British machines are viewed with considerable favor by the Dutch, and it is in this branch of the motor industry that British competition is most to be feared.

About 75 per cent of the business done at the last Amsterdam show is said to have gone into American order books. In all 150 vehicles were exhibited, the products of one Dutch, two British, 11 German, 12 French and 16 American makers. About 50,000 visitors were attracted. Stalls, both at this and the Spring International Fair at Utrecht, are worth taking by American makers, for it is in the early part of the year that Dutch dealers seriously consider the replenishing of their stocks. Not only is there the expectation of the home summer demand, but about this time thousands of vacationists arrive from the Dutch colonies, many of them armed with buying commissions.

Two-Thirds of British Road Accidents Due to Fault of Drivers

THE British Ministry of Transport has been conducting inquiries into a number of road accidents which have occurred during the period January 1 to August 31, 1922, and in a statement which is issued it is pointed out that the number of accidents due mainly to negligence or incompetence on the part of drivers forms almost exactly two-thirds of the total.

The Ministry has no authority to hold public inquiries concerning road accidents or to take evidence on oath, but private inquiries were made into the causes of 94 road accidents during the period named. An analysis of the results is given below. It should be understood that more than one of the causes named may be contributory to any particular accident, so that the classification is approximate to a certain extent, but nevertheless indicative of conditions.

Cause	Accident	Killed	Injured
Negligent driving	55	35	90
	(58.5%)	(46.6%)	(60.8%)
Faulty judgment	6	17	5
Inexperience	1	1	..
Insufficient lighting	1	..	2
Faulty steering gear ...	5	2	12
Burst tire	1	1	4
Mechanical defect	1	..	1
Faulty brakes	4	4	9
Rear axle failure	1	..	2
Missed gear change ...	1	..	2
Pedestrian at fault	5	5	5
Bicyclist at fault	1	..	1
Alighting from moving bus	1	..	1
Horse took fright	2	1	2
Unknown	5	7	2
	94	75	139



The FORUM



Electrical Standardization Will Lighten Industry's Burden

Improvement in Service Will Help Foreign Trade. Service Must Be Built into Product, Not Furnished Second Hand After Sale

Editor, AUTOMOTIVE INDUSTRIES:

AUTOMOTIVE INDUSTRIES is much to be commended for the space it is giving to the subject of Electric Equipment Standardization, and C. B. Griffin's article in the Nov. 30 issue should go a long way toward convincing the industry of the vast importance of accomplishing this result.

If the automotive industry as a whole prospers, its individual concerns prosper. Undoubtedly the industry will prosper in proportion as it serves its clientele, the buying public. It can serve the public in no better way than to simplify design details on the basis of designs that are most serviceable to the motor car owner; for the more reliably and economically he can run his car, truck, bus, etc., the more widely and rapidly will the field for these vehicles extend and insure increased sales.

The public is vitally concerned with reliability of operation and pays less and less attention to details of construction. Most folks know little more of the internal workings of an axle or a motor than they do of a mongoose —and they care less so long as the vehicle carries them or their goods cheaply and safely to destination, especially if repairs can be made quickly and cheaply when necessary.

The era of detail variations for individuality's sake has long passed, but the curse of a multitude of non-essential variations in parts is with us to an astounding degree. This calls for heavy service station inventories and expert mechanics' wages that annually run to millions upon millions of dollars, and it induces the manufacture of pirate parts. Sometimes it seems as though the public paid the bill. But really the automotive industry bears the burden, for the millions spent on service parts and labor should go toward the purchase of new cars, trucks, etc. Further, a reduced maintenance charge will induce more sales, the first investment having more than justified itself.

To supply electrical equipment to cover the unwarranted variations in engines that exist to-day means a heavy expense to the manufacturers of this equipment. This expense is reflected in the sale price of the equipment. The condition entails much more care in their manufacturing and engineering departments. Even then mistakes are made, which not only cost money but put a burden of worry on the executives and engineers when these men should be spending their time with clear minds, to better and reduce the cost of a simple line of serviceable parts.

C. B. Griffin makes a plea for reliability and repair accessibility, as against the tendency to shave off a cent in first cost wherever possible. C. F. Kettering, in addressing the S. A. E. Production Meeting in Detroit, stresses the importance of having "a minimum number of places in a car to get out of order." The call to the automotive industry to-day is to produce vehicles into which "service" is built rather than furnished second hand at a comparatively extravagant cost when the car is in the hands of the user.

Standardization must be patiently and conscientiously done so as to embody the best knowledge and practice, cover an adequate range of sizes, reduce net costs, and be capable of progressive adoption. This done, the standardization of many details will go a long way toward furnishing vehicles with "inbuilt service" as well as quick repair service. It will make cars more serviceable and therefore more profitable to the owner. It will mean more profit for the vehicle manufacturer. It will mean more profit for the parts manufacturer. It will mean fewer worries on the part of any of these three, more dependable sources of supply, and a much lower service inventory.

It will mean a big advantage to American cars in foreign trade to be able to serve them with a large number of parts from one big warehouse. For American cars first have to meet competition as American cars, and where foreign concerns may have many local advantages. The cars that serve and are serviced best, however, are bound to win markets, and the industry can well afford to give close attention and substantial support to Mr. Griffin's plea for electric standardization, and to similar work in other fields.

CORNELIUS T. MYERS.

Dilution and Oiliness

Editor, AUTOMOTIVE INDUSTRIES:

A. Ludlow Clayden's recent article on Dilution and Oiliness brings out some interesting points on the relation of dilution to viscosity. I am not sure of the soundness of his contention that diluted oil of the same viscosity as clear cut oil is unsuited for cylinder lubrication. It looks like a logical conclusion, but I don't know of any real data on the subject.

The effect of dilution on carbonization is probably as bad as he makes it. He is also right in saying that we know little or nothing yet about oiliness.

I also agree that a dilution indicator on present-day cars would be a good thing. Of course, the oil pressure gauge as distinguished from the pressure indicator may serve this purpose to a limited extent.

His last statement about the responsibility of the engineer, or better, the production manager, for dilution is, I believe, all true, but likely to be unpopular.

H. C. DICKINSON.
Research Manager, Society of Automotive Engineers.

American Exports of Cars and Trucks for October, 1922

COUNTRIES	GASOLINE PASSENGER CARS						GASOLINE TRUCKS						PARTS
	Up to $800		$800 to $2000		$2000 and over		Up to 1 ton incl.		Over 1 to 2½ tons		Over 2½ tons		
	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	No.	Value	Value
Europe													
Austria													$580
Belgium	333	$93,997	32	$35,917			212	$50,102					65,259
Bulgaria													136
Czechoslovakia	4	1,731					2	758					180
Denmark	5	2,423	7	8,386			1	871	1	$1,088			17,632
Finland	6	3,960											73
France	2	926	3	3,674	1	$3,000			2	5,200			298,769
Germany	5	1,572	3	3,048									4,150
Gibraltar			4	5,100									15
Greece	8	4,243			1	2,263							1,941
Hungary													300
Iceland and Faroe Islands			4	4,278									6
Italy	2	750	1	923	1	2,200							652
Malta, Gozo and Cyprus Islands	7	2,636											716
Netherlands	8	5,187	4	5,050	2	5,925							6,251
Norway			2	2,250									5,873
Poland and Danzig	5	3,427	4	4,000			1	650					6
Portugal	3	2,261											447
Roumania	13	4,136	1	1,500	1	3,000	1	404					3,957
Russia in Europe	10	3,805					17	8,262					1,205
Spain	42	27,542	77	89,440	6	20,439							45,930
Sweden	68	51,148	69	64,760			1	2,000	1	2,600			23,702
Switzerland	6	3,455	9	9,589	5	15,163							1,814
Turkey in Europe	10	3,864	1	1,149									544
England	198	146,381	88	95,361	14	46,332	10	9,870	13	13,479			179,629
Scotland	1	300											14,718
Ireland	10	3,920											
United Kingdom													
Yugoslavia, Albania, etc.	1	414											2,559
North and South America													
Bermuda													22
British Honduras													351
Canada	234	126,916	406	479,298	54	147,733	19	10,087	50	73,678	14	$42,768	1,401,966
Costa Rica									1	1,088			3
Guatemala	1	500	2	2,744	1	2,070							1,743
Honduras	1	800					1	651					2,582
Nicaragua													97
Panama	13	8,449	17	20,335									3,893
Salvador			3	3,200									1,502
Mexico	489	197,626	240	235,359	12	33,039	63	36,998	15	18,730			95,536
Newfoundland and Labrador			1	939									1,537
Barbados			3	4,000									1,175
Jamaica	24	10,536	11	13,844			6	2,820					10,526
Trinidad and Tobago	9	3,591	2	2,120			5	1,820					4,344
Other British West Indies	19	7,571	7	5,638	1	2,200	5	1,956					3,649
Cuba	204	73,128	19	24,463	20	46,799	21	9,893	4	6,151			68,247
Dominican Republic	15	6,628	6	6,601					1	1,749	2	3,966	14,595
Dutch West Indies	5	1,751											1,139
French West Indies	3	1,309					1	364					1,742
Haiti	17	10,738	1	1,500			1	404	1	1,256			4,530
Santo Domingo													
United States													
Virgin Islands of U. S.	1	445											1,697
Argentina	275	179,098	206	203,810	10	26,717			3	3,673			181,788
Bolivia													239
Brazil	61	43,136	94	97,959	5	14,736	1	792					341,991
Chile	56	18,450	7	8,620			19	8,508					11,067
Colombia	12	6,906	23	25,109	2	5,000	3	3,056			1	1,983	11,183
Ecuador			1	1,397									3,248
British Guiana	10	4,876	3	2,757									682
Dutch Guiana	3	1,168											1,195
French Guiana	1	414											130
Peru	2	900					2	1,556					7,223
Uruguay	157	60,752	33	34,618	1	2,678	41	10,835					9,515
Venezuela	45	18,091	6	5,417	3	9,106	1	439	1	1,250			6,722
Asia													
Ceylon	22	14,395	7	6,954			1	1,213	2	3,048			2,124
China	40	25,037	15	18,940	1	2,500			4	4,472			9,401
Chosen	1	50											82
Kwantung													62
British India	59	33,434	9	10,863			5	4,856	4	7,061			33,074
Straits Settlements	29	21,854	6	6,327									1,891
Java and Madura													7,369
Other Dutch East Indies			2	1,836									840
French Indo China													36
Hejaz, Arabia and Mesopotamia													8,016
Far Eastern Republic									3	4,906			70
Hongkong			2	3,300	3	8,400							1,883
Japan	170	68,459	22	21,949	10	23,898	3	1,125	6	11,631	31	183,162	39,428
Palestine and Syria	52	26,031	16	16,102			4	5,314	3	3,451			6,989
Persia													171
Philippine Islands	45	29,316	36	36,402	1	2,414							13,054
Siam			1	1,800									149
Oceania													
Australia	831	513,380	645	690,850	28	69,369	44	43,897	52	69,601	9	12,999	101,573
New Zealand	103	62,008	95	103,067	1	2,026	4	10,320	17	24,320	8	17,716	23,891
Other British Oceania	2	920											388
French Oceania	1	200	2	2,485									282
Other Oceania	12	6,709											1090
Fiji Islands													
Africa													
Belgian Congo	6	2,318					8	3,232					
British West Africa	4	2,020	4	3,318			20	17,590	3	4,320			6,451
British South Africa	41	27,786	137	136,381	1	4,500			1	2,600	1	4,200	17,604
British East Africa	8	4,366	4	3,479									4,540
Canary Islands	3	1,820	3	3,342			10	4,600					6,165
Other French Africa	3	1,243											
Egypt	8	4,661											3,930
Liberia							3	2,261					979
Portuguese East Africa	4	2,052											136
Other Portuguese Africa	11	5,505					1	305					
Spanish Africa			2	2,233									
Other Countries													
Total	3,853	$2,095,124	2,408	$2,387,081	185	$501,507	537	$257,809	188	$265,352	66	$266,794	$3,164,849

Canadian Exports

ELECTRIC PASSENGER CARS AND TRUCKS		PASSENGER CARS		MOTOR TRUCKS		PARTS
No.	Value	No.	Value	No.	Value	Value
1	$1,147	12	$12,785			$1,053
						79
						11,007
						476
						28
		5	5,241			40
						519
		23	26,766			34
		1	1,324			22
		10	6,671			51
		6	3,460			
		926	935,154			15,716
		3	2,306			58
						24
			2,260			
		7	6,916			195
		1	554			1,064
		10	7,320			453
1	1,992					
			2,315			123
		13	2,850			817
1	3,000	252	156,034			21,982
						89
		28	32,527			4,631
		5	3,562			77
		1	723			36
						12
						100
						38
1	3,650					41
				1	300	
						186
		24	9,701			854
		12	9,143			
		271	120,400			43,035
						8,991
			3,379			
		28	23,003			
		13	14,507			148
						2,030
	1,500	1,130	540,766	163	68,008	91,739
		448	236,726		32,616	21,635
						272
		444	198,956	15	5,610	34,828
		2	880			6
16	$21,742	3,657	$2,365,403	251	$107,524	$388,497

Tractor Bonus Paid in Lettland

THE Government of Lettland since July 1 last, pays a bonus on farm tractors put into service in that country under certain conditions, according to an article in *Der Motorwagen*, by W. Wencelides of the University of Riga. These conditions include the following: The engine power of the tractor must not exceed 30 hp.; they must be strictly one-man tractors and be able to operate on kerosene or some other fuel of at least the same heat value and no greater cost in Lettland. Tractors to be sold in Lettland must be submitted for a test by the Department of Agriculture, and the manufacturers must maintain a stock of repair parts in Riga and give purchasers free instruction in the operation of the machines. The Department of Agriculture pays 40 per cent of the cost of the plowing set (tractor and plow). Purchasers of tractors will have the duty on kerosene rebated back to them and they will, moreover, be paid a bonus or premium of 150 Lettish rubles per acre plowed. The bonus is not paid to individuals but only to cooperative organizations consisting of several farmers, and only in districts where the land has lain fallow for at least five years. By paying the balance, the cooperative society becomes the owner of the tractor. The 40 per cent paid by the State need not be repaid. Recipients of the bonus must pledge themselves to plow a certain minimum number of acres within three years and not to resell the machine within that period.

Since the new law became effective six makes of American tractors, one Finnish and one German have been accepted as entitled to the bonus. The American models and the amounts of bonus on them are as follows: Case 15-27 (172,000 Lettish roubles); Fordson (100,000), Oil Pull 12-20 (120,000), Ihace 10-20 (133,000), Samson 10-20 (100,000), and Cletrac 16 hp. (89,000). Up to the time this article was written thirty-one tractors had been purchased under the bonus plan, including twenty Fordsons. For next year a bonus credit for sixty tractors has been passed.

Wencelides states that in the other border States and also in Soviet Russia the small tractor using kerosene as fuel is the preferred type and the Fordson is sold in by far the largest numbers. In 1920 it was shown that of the 250,000 acres of arable land in Lettland, 75,000 had not been cultivated since the outbreak of war.

THE sale of motor buses in Great Britain is being pushed by bus manufacturers through Spain by the organization of motor bus lines in Madrid and other cities.

The company leading, reported to be extending their sales by this method, is the Tillings-Stevens Motors, Ltd. They are selling bonds in the various cities of Spain and will extend their services to cover the total area of each city through municipal concessions.

In Madrid already 107 buses have been put into regular operation. The projects are being financed by the sales of bonds locally, the board of directors of the company being made up of prominent British and Spanish financiers.

In Barcelona the company has organized with 10,000,000 pesetas, and will install 150 buses, covering all the routes in the city.

"It is to be regretted that American motor car manufacturers do not develop foreign markets for their product in a like manner with the assistance of American bankers," Commercial Attaché Charles H. Cunningham, at Madrid, writes the Department of Commerce in reporting on the matter.

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Large High Speed Engines

RECENTLY there appears to have arisen a demand for high-speed—and consequently light—engines of 80 hp. and over, for such purposes as high-speed trucks, omnibuses and railcars. Engines of the marine type of this output are on the market, but they are not fast enough and therefore too heavy. It seems that with the improvement in highways there has come a demand for the transportation of passengers in public services and for goods transportation at speeds which are comparatively much higher than have been customary heretofore. The introduction of giant pneumatic tires is, of course, also in a large measure responsible for this development.

At the present time people working in these fields are hampered by the lack of suitable engines. There should be no difficulty in building engines for this class of service having an operating speed corresponding to from 1600 to 1800 ft. p. m. piston speed. While the demand for such an engine might not be large at first, it is quite certain to increase as the tendency in transportation is constantly toward higher speeds.

Constructive Publicity Needed

AUTOMOBILE manufacturrs and dealers sometimes feel that newspapers aren't as liberal as they might be in the way of publicity. In some cases that may be true but in many instances the wonder is that they use as much as they do of what is sent them under the name of publicity.

In this connection there is the text for a sermon in the position taken by the New York *World* which has sent a circular letter to the trade asserting it is convinced the time has come when individual "puffs" and free "publicity" items "are of no value to the industry and of little interest to the reader."

The *World* adds that "the reader is keenly interested in live, general news of the industry" and that in future it will handle automobile news in this way, eliminating individual "publicity" items and devoting its space "to live news of the industry handled in a big way, and articles of interest to motorists."

The newspaper says it "will endeavor to build up a real interest in its automobile pages among its motorist readers." If it does, it will be doing more than most papers have accomplished. There is mighty little reader interest in the average automobile page. Too often the news space is doled out with an eye on the advertising columns.

We believe with the *World* that there is a genuine interest in live news of the automotive industry and we are convinced the time has come when the industry as a whole should have constructive publicity, built on a bed rock of truth. More newspaper readers are interested in automotive products than in any other commodity except the necessities of life. In point of general interest it marches close behind the theater, the motion picture and professional baseball.

There is plenty to say to which would be well worth printing as news. Why not say it? Let's get away from the methods of the circus publicity hounds.

No More Easy Profits

THERE have been many favorable comments on the paper of H. G. Person, managing director of the Taylor Society, printed recently in AUTOMOTIVE INDUSTRIES, in which he called attention to the necessity of shaping management to meet changing industrial conditions. In this connection it is interesting to note in a prospectus of "Economics for Executives," written for the American Chamber of Economics, the statement that while the man who "sat tight" and managed with passing ability was reasonably sure of a profit in the period from 1900 to 1920, the next swing will be of even longer duration and "during it profits will go only to those who manage with exceptional ability. The merely passingly capable business man will find it difficult to carry on."

Capable management will have much more to do with profits in the future than in the recent past.

Highway Transport Regulation Program Lacking

WITH the near approach of the legislative season, motor truck regulation seems to be in the air. Various States propose to exercise a closer supervision over their operation and it is probable several law-making bodies will enact statutes placing highway transport under control of public utility commissions or similar bodies.

We stated some time ago that if State regulation is to be sane, fair and simple instead of burdensome and even confiscatory, it is high time motor truck interests agreed upon some definite program for presentation of their cases to legislators.

The American Electric Railway Association, old and experienced in legislative affairs, adopted at its convention in October a proposed uniform statute for the regulation of commercial vehicles. It was worked out by a special committee. Some of its provisions are satisfactory to truck interests, but some of them are not. It will give the traction companies a platform upon which to stand, however, in relation to their buses and competition by independents.

The motor truck committee of the National Automobile Chamber of Commerce, in cooperation with the Motor Vehicle Conference Committee, has sent a draft of its views on the subject of regulation to truck manufacturers, but it has been impossible to prepare a report up to this time because the replies have come in very slowly. The automotive industry, therefore, will go into the new year with no very definite notion of what it thinks would be a fair measure of regulation.

Hindsight is much less difficult than foresight, but it's a heap less helpful.

Numerous interests are crying for regulation of highway transport. The voice heard loudest is that of the railroads. They are actuated by purely selfish motives. Their arguments are too familiar to need repetition. If the time comes in a few years, as it is quite likely to, when they will be operating large fleets of trucks themselves, they may wish they hadn't raised such an outcry.

The traction companies want exclusive franchises to prevent the competition of jitneys and independents with their bus lines, but they are not eager for the type of regulation which would injure their interests.

Some organizations of selfish motorists would like to have the commercial vehicle taxed off the highways so it wouldn't interfere with their cars. They are working against it insidiously by carefully veiled propaganda directed against the building of hard surfaced roads. They are playing into the hands of the railroads.

Most passenger car operators, while not opposed to the truck as a means of transportation, feel a perfectly logical resentment against those operators who drive heavily loaded vehicles at an excessive speed and hog the road, endangering the lives of other users of the highways.

People who do not drive cars of any kind, and they are still the big majority, are up in arms against the truck because they hold it responsible for many deaths and injuries on the highways.

Operators of regularly organized freight and passenger transportation lines would like to see regulation which would protect them from "fly-by-night" competition.

Some measure of State regulation is coming. It depends largely upon motor truck interests themselves whether it shall be really burdensome. It is much easier to have an oppressive bill amended so that it will be reasonably fair than it is to have an evil law repealed once it is on the books.

The railroads lost the right to make their own decisions on rates, new lines and various other questions because of the wrongs done the public through unjust and unreasonable charges, unfair rebates to favored customers, discrimination in service, discrimination in rates to certain localities and commodities, lack of uniformity in rules, practices and classifications.

Highway transport is assuming large proportions. Up to this time its rates, practices and methods of competition have been practically unregulated. The insolent disregard of other peoples' rights by drivers of trucks is an early indication that they are beginning to take the same attitude toward the public as that of the railroads in the days before the people rose in their majesty and demanded their rights.

Not only should motor truck interests formulate without delay a definite legislative program upon which they can stand honestly after giving full consideration to all the interests involved, but they should stamp out definitely and finally the practices which are building up ill-will and which would lead ultimately to entanglement in a network of regulations such as now binds the railroads.

J. D.

Demand Cuts Period for Figuring Stock

Plants to Operate with Little Interruption in Activities Over Holidays

NEW YORK, Dec. 26—Evidence that the automotive industry is operating under high pressure of orders is given in the advices that few of the major automobile producing plants will direct a complete cessation of manufacturing activities during the annual inventory taking period. Some of the factories may shut down for a brief time after the first of the year, but the majority will take stock while operations continue, although on a necessarily reduced schedule.

Good Current Demand

This situation results not only from the exceptionally good current demand but for the reason that the shortage of closed car bodies has resulted in the accumulation of back orders in the hands of the car manufacturer. Some plants in the last few weeks have been forced to a modification of their daily programs because of the body scarcity.

Body producing plants still find their facilities inadequate to meet the unprecedented volume of business at this season of the year, and even with builders working at capacity, no prompt delivery of finished products is possible. Stocking of open cars, chiefly for spring demand, is proceedingly slowly.

The unusually heavy winter business is attributed principally to the popularity of the closed car; but a factor less important, but still to be considered, is the success with which the so-called sport model is meeting. Manufacturers have been expanding their schedules gradually to provide for a larger percentage of production of this type.

Deliveries Still Behind

The arrival of real winter weather in the Detroit zone added to the transportation difficulties, both as to finished cars and materials. Deliveries of cars are still far behind.

Reports point to continued activity among the parts makers during the first quarter of the new year. While a few plants at this time are not operating at capacity, the majority have sufficient business to keep them at top speed production. This is one of the surprising features of December conditions, especially in view of the fact that October and November were two remarkably good months. Car manufacturers are increasing their orders to the extent that parts makers will be compelled to operate at high pressure to meet them.

(*Continued on page* 1302)

Business in Brief

NEW YORK, Dec. 28—The past week was marked by generally heightened activity in practically all lines. Retail buying exceeded all yearly records since 1909. Many basic industries which normally experience quiet at this time of the year have received orders which will keep them occupied steadily.

Pig iron activity continues at many points and steel orders are coming in from implement and motor vehicle manufacturers.

Orders for railroad equipment developed materially so that actual car purchases for the year exceed a total of 154,000.

Exports for November aggregated $383,000,000, a figure not reached since March, 1921. This increase was probably due in a large measure to exports of agricultural products.

Car loadings for the week ending Dec. 9 were 74,609 larger than for the previous week and reached 919,828. The demand for freight cars in excess of supply was reduced slightly but continued high.

Anthracite production made an estimated gain of 162,000 tons while soft coal output fell off some 489,000 tons due to lay-off for election at the mines. More eager coal buying is noted.

Class 1 railroads showed larger gross earnings for the month of October than at any time since Dec., 1920. Net operating income was the largest since October of last year.

Building continues active with resultant higher prices and demand for materials. Sales of structural material for eleven months is estimated at 1,460,000 tons.

Stocks showed a weakness early in week but rallied sharply. Bond trading was generally dull and in small quantities. Bank clearings for week ending Dec. 21 aggregated $7,831,613,000, a gain of 17.5 per cent over the previous week. The pound sterling suffered a slight decline, a reaction to be expected after its great rise.

NO CLOSING FOR SPICER

POTTSTOWN, PA., Dec. 23—The local plant of the Spicer Manufacturing Co., because of improved conditions, will be kept in continuous operation until further notice, it is announced.

Ford Will Construct Plant Near Chicago

To Cost $6,000,000—First Step in Vast Industrial Expansion Program

DETROIT, Dec. 22—Ford Motor Co. has announced its intention of building a $6,000,000 plant at Hegewisch, near Chicago, on the Calumet River and Nickel Plate Railroad. It will be composed of four units, each costing $1,500,000. The first will be in operation by next May. Sixteen thousand men will be employed at the start, according to present plans of Ford officials.

The plant will be used for the additional assembly of Ford cars in the Chicago district and, to a large extent, for the assembly of knock-down bodies for the six car assembly plants in that territory. It will be one of a group located at several points in the country for the assembly of closed bodies from parts cut and manufactured at the Ford woodcutting and metal stamping plants. These bodies in turn will be shipped to the car assembly plants.

Ford officials state that the erection of the plant is the first step in a program of expansion which, when completed, will prove to be an almost unprecedented industrial development. The program includes the building of plants at New Orleans and St. Louis and water power development at St. Paul. There is no intention of withdrawing from Detroit, Ford's idea being to make that city the hub of a great wheel of industry that he hopes will take in eventually many cities in the country.

Stockholders Subscribe $150,000 to Elgin Fund

CHICAGO, Dec. 26—Plans to reorganize the Elgin Motor Corp. now in the hands of a receiver and resume the manufacture of cars were discussed at a meeting of creditors with the referee in bankruptcy and representatives of the stockholders.

It was announced that stockholders have subscribed $150,000 toward a fund to be used in getting the company out of its difficulties. It was suggested that this money be used to resume operations at once. The company's liabilities are $833,649 and its assets approximate $400,000.

UNION TRUCK PROPERTY SOLD

DETROIT, Dec. 23—The property of the Union Truck Co., Bay City, has been purchased by Howard P. Woodworth and associates, interested in the reorganization of the company, at a price that will pay common creditors the remaining 65 per cent on their claims spread over a period of five years. Plans are underway for an immediate resumption of manufacturing.

Body Builders Work With Little Let-Up

Plants in Milwaukee Operate at Top Speed—Production Advances on Open Models

MILWAUKEE, Dec. 26—More regular employees are at work in Milwaukee automotive industrial shops this week than probably ever before in the period between the holidays. Ordinarily the layoff for the year-end begins on the day before Christmas and sometimes does not end until Jan. 8, the extra week being for inventories; but this year most shops are too busy for the customary extended recess.

Body shops are especially busy, and the local plants specializing in closed types are working at top speed, with only brief interruptions over Christmas and New Year's Day. Very little is going into stock, as most shops are not yet caught up with current orders. On open types of bodies, production is going forward, too, but the main effort is to satisfy shipping instructions on coupe and sedan bodies.

Liberal Advance Orders

Advance orders for passenger car units, including engines, frames, axles, gears, etc., held by Milwaukee manufacturers, are liberal, and while shipments this week are expected to aggregate rather light, and will be next week as well, increases are expected which will mean a resumption of heavy deliveries about Jan. 8 to Jan. 10.

The automotive industries are still among the principal customers of local manufacturers of metal working machinery. It is reported that one of the largest single purchases of milling machines on record in 1922 is that booked a week or ten days ago by a large Milwaukee machine-tool concern. The order is said to number about 25 or 30 machines, largely standard types, and came from the Ford interests.

Conditions in Retail Trade

Talks with prospects by dealers in the Milwaukee buying territory reveal a certain degree of confusion of mind regarding the price situation. Due to further reductions by some makers and a tendency among dealers to stress "reduced prices" in advertisements of certain makes, the majority of prospects feel that they will be able to save money by waiting until spring. On the other hand, some good sales are reported by the convincing argument that there is every reason to believe that prices of passenger cars on Jan. 1, 1923, probably will stand as the low record for a year or two.

Used cars are moving very slowly, despite the low prices at which they are being offered to buyers. At the same time dealers have made sharp cuts in their allowances on trade deals. Many people who want new cars next spring are placing their used cars with dealers now, not caring to operate them under the extreme conditions which winter has already brought. This has inflated the supply of used cars, already large.

Motor Vehicle Should Bear Just Burden of Taxes But Only for Maintenance of Highways

By ROY D. CHAPIN,

President of the Hudson Motor Car Co.

Detroit, December 27.

FOR the first time in its history the automotive industry is facing an organized effort to set up obstacles in the form of legislation and taxation which are designed to reduce greatly the popularity and usage of motor driven vehicles as transportation for passengers and freight. This effort will make itself felt this spring in more than forty legislatures. In each there will be a discussion of taxation and regulation of motor vehicles. Through the activity of persons whose interests are foreign to those of the motor car user efforts will be made to place new taxes and restrictions which will impose a serious handicap upon the development of highway transport.

Though the attack will be made directly against the motor truck, the passenger car will also be affected by many of the proposed measures, particularly with regard to increased taxation.

The automotive industry takes the position that the motor car should pay its own way and we want it to. Rather than escape its proper share of burden, it should be urged that in each State the motor vehicle taxes levied be sufficient and at the same time fair. When taxation and regulation reach the point where they are unfair they will not only impose a severe hardship upon the free development of highway transport but will defeat their own avowed purpose of raising more money for the highways by automatically reducing the number of taxpayers.

For years our industry has been built up because of the popular service it gives in producing a new means of transportation. At prices existing today the motor car is within the reach of almost every grown person in America and they are entitled to operate them upon the highways of the country without the imposition of unfair taxes or regulations.

There is a wide divergence in motor car taxes in the various states—some being high today and others plainly too low. The industry should help any State bring the basis of taxation to a point where it will be adequate to provide funds for the proper maintenance of its highways, the only purpose for which money derived from motor vehicle taxes should ever be used. Whether these taxes are raised directly on the motor vehicle or as a gasoline tax is not particularly material.

To insure proper expenditure of the funds a highway budget should be prepared annually in advance by the state highway department so that it can be known accurately how much money must be raised. Taken by and large throughout the country the best results are obtained if these funds were expended by the state highway department.

Prohibitive tax rates in Europe have driven the motor vehicles from the highways, and consequently decreased the efficiency of the people. England and France are now preparing to derive more money from automobile taxation by decreasing the rates and thus increasing ownership by such a figure that it will increase the total payment. The industry in this country cannot afford to neglect the experiences abroad and though the situation is not analogous there is a similarity in the conditions.

DORRIS RE-ELECTS OFFICERS

ST. LOUIS, Dec. 27—The stockholders of the Dorris Motor Car Co. re-elected the old directors and officers at the annual stockholders' meeting. George P. Dorris is president and chief engineer; Frank C. Thompson, vice president, and J. F. Culver, general manager and secretary-treasurer. Re-elections to the board of directors included George P. Dorris, Frank C. Thompson, H. B. Krenning, George C. Griffith, Parker H. Woods, Judge Jesse McDonald and B. E. Chappelow.

1923 Franklin Schedule Calls for 50 Cars Daily

SYRACUSE, Dec. 27—The production schedule of the H. H. Franklin Manufacturing Co. for 1923 calls for 50 cars a day, according to William Dunk, production manager. If this schedule is carried out, it will prove the biggest in the history of the company. During the first quarter, Dunk states, it is expected that 3523 cars will be built at the plant in this city.

It is also announced that the local plant will not close down for the usual 10-day inventory period. The heavy demand for cars and the fact that shipments of bodies are more nearly normal is given as the reason for the omission of the inventory shutdown.

Committee Directs Service Truck Plan

Creditors, Reorganizing Company, Appoint Paul Moore as General Manager

CHICAGO, Dec. 27—Reorganization of the Service Motor Truck Co. of Wabash, Ind., is under way under the direction of a committee of creditors which has placed Paul Moore, formerly director of sales, in charge as general manager. Moie Cook has resigned as secretary to become associated with the Indiana Truck Motor Co., in which he has acquired a substantial interest.

Pending the reorganization, the Service company is operating in the usual manner and, according to members of the committee, is receiving an increasing number of orders. Especially good business is developing in the sale of gasoline driven railway cars, which have recently been developed by the company. The company now has cars of its make in operation on more than 10 railroads.

Members of the creditors committee are George P. Steele, Union Trust Co., Cleveland; Ralph Van Vechten, Continental and Commercial National Bank, Chicago, and Charles W. Folds of Hathaway, Smith, Folds & Co., representing the bank creditors, and C. W. Dickerson of the Timken-Detroit Axle Corp. and H. M. Sloan of the Buda Co., representing merchandise creditors.

Assets Exceeded Liabilities

On Nov. 1 last, the assets of the company aggregated $5,389,003 and the indebtedness was $2,293,984. Of this indebtedness, $1,699,095 was owing to bankers and $299,489 to merchandise creditors. Miscellaneous debts were $295.399. The outstanding capital stock issued and subscribed amounts to $2,796,438.

The reorganization plan provides for the formation of a new corporation to which all the liquid assets of the old company would be transferred. In payment, the new corporation would give to the old its entire capital stock to be held for the benefit of all the creditors. The old company would, therefore, receive all the profits of the business for the purpose of paying creditors.

WOULD LIMIT TRAILER USE

PHILADELPHIA, Dec. 27—An effort to bar all motor truck trailers from the streets of Philadelphia will be made at the next meeting of the Legislature, according to Coroner Knight. The coroner is convinced that truck trailers are dangerous because, he says, "they swing all over the street when being drawn."

WILLIAM E. CAIRNS DEAD

DETROIT, Dec. 23—William E. Cairns, formerly a development engineer with Cadillac Motor Car Co. and the Detroit Pressed Steel Co., died at St. Petersburg, Fla., according to a dispatch received here this week. For years Cairns was a prominent engineer in the industry, his research work in pressed steel winning him wide recognition.

He learned the trade of toolmaker with William Smith, chief development engineer of Ford Motor Co., and at different times was in the organizations of the John R. Keim Co., Buffalo; Parish, Bingham & Co., Cleveland, and the Cadillac and Detroit Pressed Steel companies.

Hendee Buys Back Harley for Amount of Mortgage

SPRINGFIELD, MASS., Dec. 27—The Harley Co.'s plant was sold on foreclosure proceedings Saturday to its former owner, the Hendee Manufacturing Co., for the amount of the mortgage, $625,000. This property, with stock and equipment, was bought from the Hendee company a year ago for $1,100,000, subject to a mortgage of $725,000, which was subsequently reduced to $625,000.

Henry H. Skinner, president of Hendee, states that no interest had been paid on the mortgage but that the trustees of the Harley company had enough money to cover the taxes. He said that no plan for the operation of the plant had yet been formed.

It is reported that the plant may be opened in about six weeks, the drop forging department for the purpose of making forgings for "Indian" motorcycle parts, and the foundry department as a separate division under its own management for the manufacture of automobile parts and various metal castings.

Receivers Try to Collect from Purchasers of Stock

DECATUR, ILL., Dec. 27—Efforts are being made by the receivers of the Pan-American Motors Corp. to collect money due from persons who subscribed for stock but who failed to pay. Purchasers of common stock owe $40,000, and it is expected that they will not receive more than ten cents on the dollar when the final settlement is made.

The law holds that such stock subscriptions are legitimate debts and must be paid, regardless of the fallen value of the stock. It is not known when the affairs of the company will be settled. The process of adjustment is slow, due to the difficulty in making collections.

CHAIN OF TIRE STORES

CHICAGO, Dec. 26—Carlsten-Williams Co., tire jobber, announces the establishment of a national chain of tire stores operating under the name of C-W Tire Stores. Each operator will own his own establishment and retain all profits from it. Behind the plan is a scientific sales and advertising service arrangement conducted by the Carlsten-Williams company.

New Plants Acquired by Springfield Body

One Located in New Jersey, the Other in Detroit—17,500 Annual Capacity

NEW YORK, Dec. 26—The recently formed Springfield Body Corp. has entered into a contract for the purchase of a plant in Northern New Jersey with a capacity of from 5000 to 7500 custom jobs yearly, and has secured an option on another plant in the Detroit district with an annual capacity of 10,000 bodies.

The plant in New Jersey is within one hour of New York, occupies 14 acres and has 175,000 sq. ft. of floor space. It will be equipped, manned and in production by early spring. July 1 next is the date set for starting operations in the Detroit district plant, which has 283,000 sq. ft. of floor space.

Five acres adjoining the Springfield plant have been purchased, and buildings will be erected at once, permitting the capacity of this unit to be doubled.

Officers elected at a meeting of the corporation are: Clarence S. Dame, president and treasurer; Arthur H. Wolfe, vice-president, and Frank M. Livingstone, assistant treasurer and secretary. Dame and Wolfe formerly were president and vice-president respectively of the Smith-Springfield Body Co., whose plant at Springfield, Mass., was the first unit acquired by the new organization.

The fiscal agents of the corporation, which has 50,000 shares of class A common stock and 50,000 shares of ordinary common stock, are Chester B. Cook & Co., New York, while the banks are the Gotham National Bank, New York, and the Chicopee National Bank, Springfield, Mass.

Mestre & Blatgé Suffers Big Loss in Paris Fire

PARIS, Dec. 8—(*by mail*)—Damage to the extent of 2,000,000 francs was caused by a fire which broke out in the Mestre & Blatgé automobile supply stores, Avenue de la Grande Armée, Paris, yesterday afternoon. The fire was discovered when the staff returned after the midday meal, and is believed to have been caused by the explosion of an acetylene bottle near a heating apparatus. The entire Paris fire brigade was soon on the spot, but within an hour the roof fell in. Two hours later the firemen had control of the outbreak.

The Mestre & Blatgé Co. is the biggest automobile accessory firm in France. It is both a manufacturing and a selling organization, doing wholesale and retail business. The building destroyed by fire was completed only a few months ago. When the fire was at its height, the surrounding buildings were cleared. Among those turned out was the French branch of the Hartford Shock Absorber Co.

Durant Takes Stock, Closing Some Plants

Leaside, Lansing and Muncie Shut Down—Long Island and California Operate

NEW YORK, Dec. 26—Durant factories at Leaside, Lansing and Muncie closed last Saturday for inventory taking and will not resume operations until Jan. 2. Long Island and California plants are taking inventory, but without halting manufacturing operations. The Mason plant at Flint also is taking account of stock without a shutdown, while Locomobile will inventory during the first ten days of February.

All Durant plants have had an exceedingly busy December. The total production for the month will total 6000. Elizabeth is making preparations to start manufacturing the Durant four Jan. 2. Until the new Durant plant at Flint is completed some time in March, Long Island City will turn out 25 Durant fours a day.

The Star is moving briskly and the first of the year will find it 6000 behind schedule, the booking calling for a total of 10,000 by Jan. 1. Elizabeth is well into production with the Star and only recently the first shipment of 255 Stars, together with 50 Durant fours, was made from this factory consigned to the Harper Motor Car Co. of Washington, the city in which the Star first was shown.

The Mason plant by the end of this week will have manufactured 140 trucks this month, of which 90 were sold in the East. A production of 100 for January is planned.

Waukesha Officials Lead Discussion Before S. A. E.

MILWAUKEE, Dec. 26—One hundred ton miles per gallon of gasoline is entirely possible provided there is a proper co-ordination of the units making up the truck and the temperature of the engine is properly controlled. This is perhaps, the major thought coming out of the joint meeting held here of the Mid-West section of the Society of Automotive Engineers and the Engineers' Society of Milwaukee.

The meeting was addressed by H. L. Horning and James D. Fisher, general manager and chief engineer, respectively, of the Waukesha Motor Co. The topic chosen was "One Hundred Ton Miles Per Gallon of Gasoline." This did not represent a "stunt test," but rather a definite practical accomplishment by the Waukesha Motor Co. in connection with experiments conducted with a 2½-ton truck.

During the course of the meeting, Horning stated that the knock or "Ping" absolutely controls the output of the engine. He also mentioned that the whole problem of efficiency and getting economical performance is in keeping the temperature of the engine within certain limits. Aluminum pistons, he stated, are far superior in this respect to iron pistons.

He also emphasized and dwelt at some length on the statement made by Fisher that efficiency cannot be obtained by the truck makers getting some good units and some bad units and then attempting to fit them together. Guests at the meeting were taken on a tour of inspection through the A. O. Smith, Nash, Seaman Body Corp. and Harley-Davidson plants.

Ford Urges Orders Now To Avoid Delay Later

DETROIT, Dec. 23—Ford Motor Co.'s Highland Park plant will be closed from Dec. 27 to Jan. 2 for inventory, the period having been shortened from the usual holiday week because of the pressure of business. Inventory in the assembly branches will be taken in the shortest time possible at the same season.

National advertisings are being run by the company, bearing its signature, advising all persons who contemplate buying a Ford car in the spring to get in touch with their nearest Ford dealer at once, to avoid a long delivery delay later.

France and Canada Sign New Commercial Treaty

WASHINGTON, Dec. 27—Automobiles are among the principal products on which France will enjoy more favorable concessions in the Canadian market than does the United States as the result of a new commercial treaty signed by representatives of the French and Canadian governments at Paris on Dec. 15.

The treaty provides that Canadian products are to enjoy the minimum rates of the French tariff on 120 important items and the intermediate rate on 400, with the understanding that all other articles are to receive the same rate as is now, or may at any later time, be granted to the United States.

In return, Canada grants to the products of France and the French colonies and possessions the intermediate rates of the Canadian tariff with an assurance of treatment equal to that which may be granted to the most-favored nation, except Great Britain and the Dominions, which enjoy the British preferential or minimum rates of the Canadian tariff.

FOREIGN TRADE MEETING

NEW YORK, Dec. 27—The annual convention of the National Foreign Trade Council will be held in 1923 at New Orleans, the dates having been fixed as April 25, 26 and 27, according to an announcement by O. K. Davis, the secretary. As at former conventions, a large representation of automotive representatives are expected in attendance, and it was stated that convention delegates might well link up attendance at the New Orleans meeting with business trips to Mexico and Cuba.

English Maker Sees American Invasion

Sir Herbert Austin Says "Saturation Point" Will Soon Be Reached Here

BIRMINGHAM, ENGLAND, Dec. 16 (*by mail*)—The American automobile industry, in the eyes of Sir Herbert Austin of Austin Motors, Limited, manufacturer of automobiles in this city, must soon curtail production because of the "fact that it will soon be impossible to find a new customer in the United States."

This observation is made by the British producer following a five months' tour of the United States, investigating automobile plants in Detroit and elsewhere. Following his tour, Sir Herbert has the following to say in comparing American production methods with those of the British:

The total number of cars in the world is about 12,000,000. In the United States alone there are 10,500,000, leaving 1,500,000 for the rest of the world. Shortly it will be impossible to find a new customer in the United States, and the only cars sold there will be to replace worn out vehicles. What does this portend? Is it conceivable that factories laid down to produce 5000 cars a day will curtail their production and shut down the greatest production?

That is not possible, but what they will do will be to exploit other countries, including England.

Says British Car Is Superior

It must be admitted that the Unites States manufacturers can build a cheap car, if they desired, but the American car can never equal that of the British in value or workmanship. For the additional price paid for the home product a corresponding extra value is secured, which is not the case with the American built car.

English automobile manufacturers are warned, however, that it will be necessary to bring down the prices in England as low as possible without reducing value, in order to meet the competition from the United States that must of necessity result when the American customer is a scarcity. This should be the aim of home manufacturers in the production of both private and commercial vehicles.

Sir Herbert also states that he was impressed with the full time employment of labor in the United States as contrasted with that of England, where there is still much unemployment. He is of the opinion that there are some concessions yet to be made by the British laboring man in his dealing with manufacturers before American competition can be met.

TRACTORS IN PENNSYLVANIA

PHILADELPHIA, Dec. 19—The number of farm tractors in use in the State of Pennsylvania is approximately 12,125 as against 8500 one year ago, according to a report of the state Department of Agriculture. In 741 townships alone, 5782 farm tractors are reported.

Durant's Flint Car Has First Showing

Engine of New 6-Cylinder Addition Has Engine with 7-Bearing Crankshaft

NEW YORK, Dec. 26—The Flint, a development of the Chrysler Six which was taken into the Durant family some time ago, made its bow this week. It was a private view, the official debut being scheduled during the New York show when the Flint will be on display at the Hotel Commodore. This Commodore showing will be the only appearance of the Flint on the show circuit until well into March. There will be four or five different body styles in the exhibit.

The formal announcement of the Flint now gives Durant a most complete line, including the Star, Durant four, Flint, Durant six and Locomobile, in the price order named as well as the Mason Road King in the truck field. The Flint will be manufactured at Flint, Mich.

The Flint will be sold as a 5-passenger open car at $1,195, a 4-passenger coupe at $1,895 and a 5-passenger sedan at $1,985. It is designed as a high powered six at a moderate price, with conventional engineering features throughout. If there is anything unconventional in the make-up of the chassis it is the fact that the engine has a 7-bearing crankshaft, practically all other low priced sixes having either three or four-bearing crankshafts.

The cylinder size is 3⅜ by 5 in., giving a piston displacement of 268 cu. in. On test the engine is said to have developed a torque of 170 lb.-ft. at 800 r.p.m. and an output of 70 hp. at 2500 r.p.m. The engine is built by the Continental Motors Corp. but is of special design for this car.

All six cylinders and the major portion of the crankcase are in a single casting, to which the head casting and the aluminum oil pan are secured by bolts. The pistons are of cast iron with three rings each. The usual drop forged connecting rods are used, 10½ in. long between centers, with a bronze bushing for the piston pin. The big ends are tinned and have the bearing metal cast into them. The crankshaft is of 2 in. diameter at both the crankpins and the main bearings.

Fuel is fed from a 20 gal. tank at the rear through the Stewart vacuum system to the Stromberg 1¼-in. carbureter which is bolted to a hot-spot manifold. Ignition is by the battery system, the whole electrical equipment being of Auto-Lite design and make. The ignition coil is mounted on the cylinder block adjacent to the distributor, which makes for shortness of wiring, while the high tension cables to the spark plugs are carried in a steel tube over the engine.

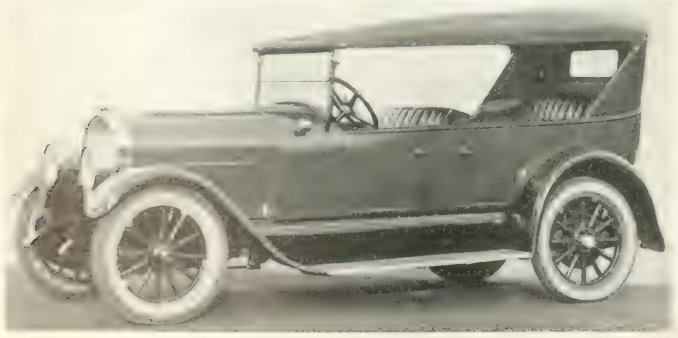
The starter drives through a Bendix drive to the exposed flywheel. It is located on the right-hand side of the engine, with the generator almost directly above it. The latter is driven through the pump. The so-called front end drive is by a Morse silent chain of ½-in. pitch and 1½-in. width. The drive is of the triangular type, and provision for taking up wear in the chain is made by arranging the front bearing and the pump so they can be slid outward and secured in place by means of screws. The generator is driven through a long shaft with two flexible couplings of the hose pipe type. The battery is of USL make and has a capacity of 120 amp.-hours.

Lubrication Arrangement

Lubrication is by force feed to the main and connecting rod bearings, the oil being circulated by means of a gear type pump driven off the accessories shaft. An oil gage on the dash indicates the pressure on the oil. The radiator is of the cellular type (Fedders) and a thermostat is built into the return pipe on top of the engine. The four blade 16-in. fan is driven from the crankshaft through a ⅝-in. V-belt.

The engine has four point support on a tubular sub-frame consisting of 2½-in. steel tubes welded into the front and center cross members of the frame. These tubular sub-frame members carry out the Durant idea of adding to the rigidity of the frame by longitudinal tubular members. This keeps the main

(*Continued on page* 1305)



New Flint five-passenger open car priced at $1,195

Aims to Standardize Financing of Sales

Association in Chicago Defines Restrictions Governing Time Payments

CHICAGO, Dec. 27—A move toward standardization of practices in the financing of retail sales of automobiles on the deferred payment plan has been made by the Central Auto Finance Association, with headquarters in Chicago, which is preparing to send out to the trade a circular defining certain conditions and restrictions which are to be observed.

The circular sets forth the following conditions:

For new passenger cars, open and closed, notes are to have a maximum maturity of 12 equal monthly payments.

For used passenger cars, open and closed, the minimum down payment must be 50 per cent of the time price and notes are to have a maximum maturity of 10 equal monthly payments.

Cars sold as demonstrating cars, because of insurance restrictions, will be treated as used cars and are subject to the used car terms and rates.

The financing of used cars will be restricted to cars not more than four years old, as per conference insurance rulings.

No deals involving hold-outs, reserves or infractions of the foregoing, can be accepted.

The circular emphasizes the statement that the monthly payments must be equal and, from members of the association, it is learned that the reason for this is that in a good many cases where payments of the balance in 12 equal monthly installments would require a monthly sum beyond the means of the buyer it has been the practice to accept 11 small notes with a large one at the end. This practice is frowned upon by the association as a poor business method.

Although the circular does not state a minimum down payment on new cars, the members of the association generally require not less than one-third of the time price.

EDWARDS TO MAKE RAIL CAR

SANFORD, N. C., Dec. 26—The Edwards Railway Motor Car Co. announces that practically all of the $200,000 stock of the company has been disposed of and that preparations are being made to start manufacture here at an early date. Officials state that enough orders are in hand to insure operation of the plant for some months.

WARREN A. MYERS DEAD

SPRINGFIELD, OHIO, Dec. 26—Warren A. Myers, secretary-treasurer of the Robbins & Myers Co., manufacturer of electrical equipment, died yesterday of heart disease after a lengthy illness. In addition to his connection with the Robbins & Myers Co., he was a banker and former publisher of a Springfield daily newspaper.

Liability Insurance May Be Compulsory

Legislatures Expected to Take Up This Question at Approaching Sessions Next Year

NEW YORK, Dec. 26—Compulsory insurance, it is believed will be one of the phases of automobile legislation that will be attempted next year when 43 State legislatures meet. Many signs point to this, and in at least four of the commonwealths steps have been taken in that direction. While it is not definitely known, it is thought that there are others which are waiting only for some State to take the lead before bringing up the subject.

New York, Pennsylvania and Massachusetts already have gone into the question deeply, while another State, Nebraska, has indicated that it is gathering data that can be used as a basis for a bill. Massachusetts has taken definite action through the filing of a measure by Senator-elect Abbott B. Rice to require general liability insurance of motor vehicle owners.

Follows New York Measure

The Massachusetts bill is patterned after a New York measure fathered by State Senator S. W. Straus, Jr., and drafted by Miles Dawson, who wrote the workmen's compensation act. It provides that a person injured by an automobile or his dependents will be entitled to receive indemnity from the State fund, whether the car is registered in Massachusetts or in another State, while Massachusetts owners will be insured against liability arising from accidents occurring in the Bay State, as well as in any other State which enacts a similar law.

The amounts of the indemnity have a basis similar to that of the workmen's compensation law. The maximum for death is $6,400 and for incapacity $4,000, while the minimum payments specified are $1,000 for death, $8 a week for total incapacity and $5 a week for partial incapacity, besides medical attendance and certain specified sums for loss of limb. It is further provided that an injured person or his dependents will receive weekly payments unless the board deems it advisable to pay a lump sum, and he cannot assign the payment nor can it be attached for debt.

Can Sue Owner for Damages

The bill also provides that, if an injured person desires to sue the owner for damages rather than accept indemnity from the State fund, he is free to do so, in which case the State fund will pay to the owner of the car the amount which the injured person is entitled to under the act. Should an owner prefer to furnish a bond, he may do so and may also insure additionally in any insurance company.

New York, it is said, has two forms of compulsory insurance coming up, one along the lines of the Massachusetts plan and the other an indemnity bond. The latter is criticized because private companies would handle the business and it would be necessary for the insurance applicant to show assets before he could get the bond. With compulsory insurance of the other sort an injured person could collect either through the compensation plan or could sue separately under his common law rights, which could not be taken away from him by any such legislation. It is figured that this sort of a law would be inadequate in that it would not offer sufficient coverage to the insured, and that it would be necessary to take out additional liability insurance.

In the expectation that legislation of this sort will be attempted considerable thought is being given to the subject by those identified with the automotive industry.

MICHIGAN CITY TESTS POSSIBILITIES OF BUS

DETROIT, Dec. 23—City officials of Kalamazoo are testing out the possibilities of bus transportation in that city, preliminary to deciding upon the future transportation system. Serious consideration is being given to replacing the present trolley system of the Michigan United Railways with buses, the franchise of the traction company expiring Feb. 13. The commission has rejected a new 30-year franchise proposed.

Under the new franchise fares would be increased from eight to ten cents and provision would be made for bus lines as feeders to the trolley system. The franchise also gives the M. U. R. first opportunity to adopt an all-bus system in the event of street cars becoming obsolete within the lifetime of the franchise.

A special election will be held Jan. 30, at which the voters will determine whether a municipal bus system is to be inaugurated. A tentative contract for 30 buses, subject to confirmation at the election, will be signed within a few days. The total cost of the municipal bus plan would not exceed $175,000, proponents declared.

RECEIVER TAKES BURDICK TIRE

NOBLESVILLE, IND., Dec. 27—Charles W. Jordan, president of the American Trust and Savings Bank of Richmond, Ind., which was appointed receiver of the Burdick Tire & Rubber, has taken charge of the company's plant which has never been operated since it occupied its new building two years ago.

The concern is a $5,000,000 corporation.

1922 Road Building Will Break Records

During Year Work on 17,716 Miles of Federal Aid Highways Was Completed

WASHINGTON, Dec. 27—Federal highway construction in the United States for the year 1922 will break all records for road construction, according to estimates of the Bureau of Public Roads. During the year construction of slightly more than 10,000 miles of Federal-aid roads and more than an equal mileage of State highways without Federal assistance was started and completed.

The figures show that there were 17,716 miles of Federal-aid highways completed during the year with 14,513 miles still under construction. In other words, 7716 miles of roads begun in 1921 were completed, 10,000 were begun and completed and 14,513 miles of highway started, which will be completed in 1923. The total length of projects in all stages, including those which have been completed and those which are in the stages of preliminary construction, is 39,940 miles.

The roads brought to completion during the year average over 200 miles for each State. The greatest increase in complete mileage is in Texas, which during the year has added 933 miles to its complete highway system. Arkansas, Georgia, Iowa, Minnesota and North Carolina each reported an increase of more than 500 miles, and Montana and Wisconsin of greater than 400 miles.

Aeromarine Transported 9167 Passengers in Year

NEW YORK, Dec. 26—Aeromarine Airways, Inc., reports that during the year ending Nov. 1 it carried 9167 passengers and that it had transported more than 20,000 in the past two years without accident.

It has three divisions. In the Great Lakes division, where a daily service between Cleveland and Detroit, is maintained, 412,854 passenger miles were flown in 574 flights and 4388 passengers carried. In 744 flights 2399 passengers were carried by the Key West-Havana, Miami-Bimini and Nassau-Palm Beach division. In the New York division there were 807 flights, during which 57,658 miles were flown and 2380 passengers carried.

FORD TRACTOR PLANT STARTED

WALKERVILLE, ONT., Dec. 27—The Ford Motor Co. has commenced operations on the construction of part of its new building. When this portion is finished it is the intention of the management to proceed with the manufacture of tractors.

Sales in California 48 Per Cent Greater

November Shows Big Increase Over Record Established by Month Last Year

SAN FRANCISCO, Dec. 27—Sales of automotive vehicles, both passenger cars and trucks, were greater by 48 per cent throughout California in November, 1922, than they were in the same month of 1921, which, up to this year, had been the record November of the industry in this State, according to figures published by Motor Registration News of Oakland, which collects each month a record of the sales of the entire State.

One of the unusual facts brought out by these statistics is that sales were uniform all over the State, that is to say, the proportionate increase was as great in the smaller cities as in the larger. The month—which is never an especially good sales month on this coast—shows by the business done, and by the steady increase day by day from the first to the thirtieth, that the entire automotive merchandising industry is on the upgrade in all parts of the State. Total sales of passenger cars and trucks for November, 1922, were 17,365, as compared with 11,658, for November, 1921, an increase of 5707 vehicles.

Truck Sales Increased

Of this total for the month just closed, 15,604 were passenger cars, compared with 10,424 in November, 1921, an increase of 49 per cent for the passenger cars. Of trucks, 1761 were sold in November, 1922, as compared with 1234 a year ago, an increase of 520, or 42 per cent. Northern California dealers sold 6268 passengers cars in November, 1922, as against 4299 in the same month a year ago; while southern California dealers sold 9336 passenger cars in November this year and 6124 a year ago. Northern dealers, however, sold 278 more trucks this November than last, while the southern dealers sold only 249 more for the month just closed.

Los Angeles County led all the other counties with a record of 6761 sales in November, 1922, an increase of 2443, or 56 per cent, over November, 1921. Los Angeles County also sold 202 more cars than the total of the next fourteen largest counties in the State combined. The largest percentage gain was registered by San Diego County whose dealers sold 639 cars in November, 1922, as compared with 348 in November, 1921, a gain of 83 per cent. Alameda County showed an 82 per cent gain.

Detroit Sales Decline

DETROIT, Dec. 27—Retail sales of new cars in the city of Detroit in November totaled 2099, of which 845 were open and 1254 closed, with sales of new trucks in all classes aggregating 278. October new car sales were 1464 open and 1525 closed with 356 new truck sales. In the car sales Ford's represented about one-third of the total and in trucks about two-thirds.

These figures are now being compiled monthly by the Detroit Automobile Dealers Association through an office opened in Lansing. Under the provisions of the Condon bill, cars and trucks in Michigan are fully described when licensed which makes possible the complete recording of sales according to make.

Philadelphia Demand Continues

PHILADELPHIA, Dec. 23—Automobile distributors and dealers report a continued demand for all classes of cars, with preference shown for closed models. Sales of used cars are somewhat slow, as are truck sales, though sales of truck parts are good.

IMPLEMENT DEALERS PREDICT GOOD YEAR

MILWAUKEE, Dec. 27—Question box discussions at the annual meeting of farm machinery dealers of Wisconsin in Milwaukee developed that most of the dealers look for considerable improvement in business in 1923. This was especially true of dealers in the dairying sections of the State, who said that farmers had not been as hard hit by the depression, and that recent increases in the price of milk, butter, etc., had been beneficial psychologically as well as financially.

Grain and potato growers, however, were less optimistic, dealers from these sections said. While the crops were large and of excellent quality, prices received for them were very low, besides which heavy losses were sustained, especially on potatoes, due to the breakdown of railroad transportation.

Discussing tractors specifically, dealers said that sales during the last half of 1922 were far better than the first half, although still of very limited volume. Prospects, however, were regarded as encouraging but no sharp rise in demand is looked for.

Year's End Brightened in Section of Indiana

TERRE HAUTE, IND., Dec. 27—The automobile dealers in this section have had a fairly good Christmas trade to end what has been a rather disastrous year for them. The year started fairly well but the prospects were soon broken into by the probability of the mine strike.

The immediate effect of that strike was the complete demoralization of the used car market, and when the market went to pieces, the sale of new cars to others than miners went with it. With this con-

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New York Prepares for National Show

Eighty Different Makes of Cars to Be Exhibited—Active Week Scheduled

NEW YORK, Dec. 27—A week away from show time finds the industry keen for the national automobile show, which opens as the twenty-third annual exhibit in Grand Central Palace Jan. 6. There will be eighty different makes of passenger cars and more than 300 exhibitors of equipment in the big building.

The calendar of show events is longer than usual with big dinners for everyone and luncheons galore for the dealers.

There are to be four major banquets, the first being set for Monday night of show week, when the Rubber Association of America will entertain at the Waldorf. On Tuesday night the National Automobile Chamber of Commerce will hold its annual function at the Commodore, with Will Rogers as one of the two speakers, telling the industry "What I Think About the Automobile." The Motor and Accessory Manufacturers Association has reserved Wednesday night at the Commodore and as usual the banquet will be speechless, but the rest of the show will be most entertaining. The Society of Automotive Engineers will banquet at the Pennsylvania on Thursday night.

S. A. E. Annual Meeting

The S. A. E. will hold its annual meeting during show week, inducting into office its new officials and discussing subjects of interest to the engineer. The M. A. M. A. also holds its annual meeting during the week. An added feature is to be the special meeting of the truck members of the National Automobile Chamber of Commerce, set for Thursday, Jan. 11, the whole day being given over to a discussion of matters in which the truck manufacturers are particularly interested.

As usual the hotels will house a number of cars which have been unable to get in the Palace. There will be such displays at the Commodore, Astor and one or two other places, and in addition there will be a sort of an overflow in Madison Square Garden, the former home of the national shows. The Garden affair is promoted by William H. Wellman and the display will include several foreign cars, two or three American trucks and several exhibits of taxicabs, as well as automotive equipment.

Body Builders' Show

Still another feature is the annual show of the Automobile Body Builders Association at the Twelfth Regiment Armory. It will open Monday night, Jan. 8, and last throughout the week.

The show in the Palace will not introduce many new makes of cars. Of the few new comers the Star and Climber

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Men of the Industry and What They Are Doing

Bill Manages Owen-Dyneto

Harry L. Bill, who has been in charge of Saxon since the retirement of President Clarence Peffer and who has been connected with factory management since the early days of the industry, has been appointed vice-president and general manager of the Owen-Dyneto Co. of Syracuse, N. Y., by R. M. Owen. Bill was factory manager for Winton and held similar positions with Chalmers, Springfield Metal Body Co. and the Corbin Co. when it manufactured the Corbin car.

Hanson Directs Haynes Advertising

Walter P. Hanson, who for a number of years has held the position of assistant director of advertising for the Haynes Automobile Co., has been appointed advertising manager. Ross H. Garrigus becomes assistant advertising manager under the new organization plan. Previous to his connection with the Haynes company, Hanson was engaged in newspaper work in Chicago.

Pierce-Arrow Advances Sales Heads

Laurence E. Corcoran has been named general sales manager of the Pierce-Arrow Motor Car Co. He has been associated with the Pierce-Arrow Co. for 17 years, and for the last two years has been passenger car sales manager. He will have complete direction of merchandising and distribution of both passenger cars and trucks. Immediately in charge of car selling will be Thomas J. O'Rourke as car sales manager. O'Rourke has been associated with the passenger car sales division of the company for 16 years. Robert C. Patten, who for several years has been truck sales manager, has been appointed executive in charge of the development of sales of fleets of trucks to national users.

Charles S. Shuman Resigns

Charles S. Shuman has tendered his resignation as treasurer of the Vacuum Muffler Corp. of New York and Bridgeport, to become assistant cashier of the Catawissa National Bank. He will remain on the board of directors of the Muffler Corp. E. Christophersen, president of the corporation, will take entire charge of both the executive and developing work.

Norris Made Western Manager

E. G. Norris, Seattle branch manager of the McQuay-Norris Manufacturing Co., has been appointed western manager of the company with headquarters in San Francisco. He will have jurisdiction over the sales and distribution of McQuay-Norris products in California, Oregon, Washington, Idaho, Montana, Utah, Nevada and Arizona. The position of western manager has been created for the purpose of uniting the western States under one central department. Branch offices located in San Francisco and Seattle are not affected by the change. Norris became associated with the piston ring industry shortly after the founding of the McQuay-Norris company and has been located in Seattle for eight years.

Bartels Represents Dort

J. F. Bartels, for years affiliated with the Moline Plow Co., has joined the Dort Motor Car Co. as factory sales representative in New England, New York, Pennsylvania and Delaware. Bartels formerly was branch manager for the Moline company at Minneapolis and recently became assistant division manager of the Atlantic States division, with headquarters at Poughkeepsie. He succeeds C. R. Teaboldt, who has taken over the management of the Dort branch in New York.

Sykes With Gray Tractor

George Sykes has been appointed general manager of the Gray Tractor Co. of Minneapolis. The acquisition of Sykes will not change the personnel of the organization, J. W. Gray continuing as president, H. D. Dodge in charge of sales and George Gird as branch manager of the Wichita office. The management of the Gray Tractor Co. of Canada, Ltd., remains in the hands of Albert Prugh and James Letham.

McMillan to Take Up Financing

Thomas C. McMillan, former president of the Milwaukee Automotive Dealers Association, and one of the best known men in the passenger car trade of the Middle West, has retired as secretary-treasurer of the Overland Wisconsin Co. and affiliated concerns, to devote his entire attention to automotive financing. He has worked out a new plan of financing dealers as well as buyers.

Rowan Goes With Distributor

E. P. Rowan, formerly with the B. F. Goodrich Co., has become associated with Thomas J. Hay, Inc., Chicago, Chandler distributor for northern and central Illinois, in the capacity of manager of the wholesale department. Rowan was identified with Goodrich from 1897 to 1921 as Chicago branch manager and later district manager. In 1919 he went to Akron as sales manager for Diamond tires.

Hallett Joins G. M. Research

Major George E. A. Hallett, formerly in charge of the powerplant section of the Air Service, engineering division, at McCook Field, Dayton, Ohio, has resigned to accept a position with the General Motors Research Corp. Hallett has been actively identified with the industry since the war. His work in particular has been in the development of aircraft engines.

D. S. Campbell Resigns

D. S. Campbell, who has been associated with Tuthill Spring Co. for over 16 years, has resigned as secretary of the company. Campbell is one of the pioneers in merchandising and marketing automobile springs for replacement. He has not announced his plans for the future.

Manhattan Electrical Names Smith

K. M. Smith has been appointed general battery sales manager of the Manhattan Electrical Supply Co., Inc. He was formerly general sales manager of the Gould Storage Battery Co. During the war he served as assistant to William C. Potter, director of aircraft production.

Fitch Goes with Marmon

Charles M. Fitch, who has resigned as manager of the Falls Motors Corp., has become associated with the Nordyke & Marmon Co., as general superintendent of the body department, recently greatly enlarged.

Four Wheel Hydraulic to Exhibit New Brake

DETROIT, Dec. 26—The Four Wheel Hydraulic Brake Co. is preparing to place its new hydraulic four wheel brake upon the market and will exhibit it this year at one of the hotels during the week of the New York show. Demonstrations of the brake will be given on a standard type automobile which has been specially equipped at the Detroit factory of the brake company. The brake is patented under the name "Lockheed," a phonetic spelling of the last name of Malcolm Loughead, the inventor.

The company abandoned a plan to announce the brake earlier when it was found that a change in the detail of its construction would improve its efficiency. This has been worked out after a year's experimenting, and the brake as exhibited will represent the type to be manufactured.

Kelly Truck Receiver Will Save on Salaries

SPRINGFIELD, OHIO, Dec. 26—Pearl A. Lewis, receiver of the Kelly-Springfield Motor Truck Co., has reported to the Common Pleas Court that he will make a saving of $36,000 a year by reducing the number of executive officers and combining the work of others.

The savings in payroll, aggregating $3,000 a month, are being effected by the substitution of three executives drawing a total of $1,176 a month for officers and executives receiving $2,591 monthly and the discontinuance of eight officials drawing a total of $2,328 a month. The receiver will receive $500 a month.

1922 Was Best Year in Hudson History

Balance Sheet Shows Current Assets of $15,497,577, Tripling Liabilities

DETROIT, Dec. 27—Hudson Motor Car Co., in its consolidated balance sheet as of Nov. 30, shows current assets of $15,497,577 as against current liabilities of $5,031,411, a ratio of three to one.

Cash on hand of $7,236,547; sight drafts, $2,385,802, and inventories of $5,378,007, together with $497,219 in accounts receivable are included in current assets.

Current liabilities embrace accounts payable of $3,957,491, and distributors' deposits and accrued accounts of $1,073,920. Reserve for Federal taxes in 1923 is $1,012,200.

In a statement to stockholders, President Roy D. Chapin says that the past fiscal year had been Hudson's most successful, both with regard to earnings and to the development of the product. Sales for the year were 26,271 Hudson and 34,962 Essex, he states. Cars are being shipped to all parts of the world, with foreign shipments constantly increasing.

The list of dealers has been made much larger, the statement says, and a large demand for closed cars has been built up, thus greatly increasing sales. "We believe," Chapin states "our percentage of closed models produced this year to be the highest in the motor car industry."

Stock Offering Beneficial

Reference is made to the opening of stock in the company to public participation which, it is declared, assures an additional friendly interest for the company's product.

Plant assets are listed at $8,828,300 after provision for depreciation. Capital stock is $13,201,000, and the surplus is $5,289,475. The consolidated income account shows gross profits from sales of cars and parts of $12,631,176 which, with interest earned and other income, places the total income at $12,948,842. Selling service, administrative general expenses and other charges against income, total $3,339,661. Depreciation is $1,220,387 and interest paid $133,917. This leaves a net income transferred to surplus account of $7,242,677.

The surplus account shows a surplus of $10,508,287 on Dec. 1, 1921, with net income from this year making $17,750,964, less dividends during the year of $1,761,489, and surplus transferred to capital stock account of $10,700,000. The surplus on Nov. 30, 1922, was $5,289,475.

HARVESTER TRANSFERS FORCE

SPRINGFIELD, OHIO, Dec. 23—Starting Tuesday the force in the motor truck department of the Springfield works of the International Harvester Co. will be reduced until the warehouse is cleared and there is an increased demand for light models.

The larger part of the force, according to C. H. Smart, superintendent, will be transferred to the foundries and hay press departments. The output of castings for the foundries will go to the Akron plant, which is manufacturing the heavy type of motor truck. The Springfield works has been turning out from 25 to 50 trucks daily since last January.

Demand Cuts Period for Figuring Stock

(*Continued from page* 1294)

A consistent gain is being shown in the truck field, with promise of more pronounced advances the early part of the new year.

Tire makers are increasing their schedules to replenish stocks that were allowed to reach low level and to prepare for spring trade. They report a greater number of orders booked for spring delivery than heretofore experienced, indicating the approach of an unusually active season.

Wills to Show New Cars at New York and Chicago

DETROIT, Dec. 27—C. H. Wills & Co. will exhibit new models at the New York and Chicago shows, in both closed and open styles. The new models involve changes in both chassis and bodies. The company has not declared whether the new models will sell at prices differing from former models in its line and is withholding all details pending the completion of the appraisal this week.

The company is planning an extensive closed car business in 1923.

Dividend of 17 Per Cent Ordered on Willys Claims

TOLEDO, Dec. 27—An additional dividend of 17 per cent on all adjudicated claims against the Willys Corp. has been ordered paid by Judge Killits in the Federal Court. The sum of $2,498,641 is available for that purpose. Of that amount, $243,641 is in the hands of the receivers here, $400,000 in New Jersey and $1,850,000 in the northern district of New York. The total approved claims to date amount to $14,506,165.

Settlement of the claim of the Sowers Manufacturing Co. of $943,025 for $500,000, as suggested by interested parties, has the approval of the court here.

U. S. TIRES TO ADVANCE

NEW YORK, Dec. 28—Prices of United States tires will be advanced on Jan. 2. It is said that the increase will amount to 5 per cent on dealer business and 12 per cent on consumers'. This applies to all cords of all sizes of tubes and fabrics above 30 x 3½. Truck pneumatics and solids and small size fabrics are not affected.

G.M.C. Takes Over Brown-Lipe-Chapin

Has Held Interest in Company—Former General Manager Becomes President

NEW YORK, Dec. 28—The Brown-Lipe-Chapin Co. of Syracuse, N. Y., is now a definite unit of the General Motors Corp. through the acquisition of all outstanding stock by the G. M. C., according to an announcement made today by Pierre S. duPont, president of General Motors. At the same time it was stated that H. W. Chapin, who has been general manager since the company started business, has been elected president of the Brown-Lipe Chapin Co., succeeding Alex. T. Brown.

General Motors for some time has had a considerable interest in the company, which specializes in the manufacture of automobile differentials and gears, but did not control it. This interest is said to have been about 20 per cent. Under the new deal the G. M. C. becomes complete owner of the company.

Interest Acquired Ten Years Ago

The first interest was acquired about ten years ago, when the Weston-Mott Co. of Flint, Mich., became a G. M. C. unit. Up to 1912 General Motors owned 49 per cent of the Weston-Mott stock, with C. S. Mott owning the remaining 51 per cent. At that time Weston-Mott owned a large interest in the Brown-Lipe-Chapin Co., so that in 1912, when General Motors acquired C. S. Mott's interest in the Weston-Mott Co., the deal included the Brown-Lipe-Chapin stock.

This deal in no way involves the Brown-Lipe Gear Co., also of Syracuse, which has been closely identified with the other company. A. E. Parsons, general manager of the Brown-Lipe Gear Co., when reached at Syracuse today over the long distance telephone, declared positively that the purchase of the Brown-Lipe-Chapin stock by General Motors would have no bearing upon the Brown-Lipe Gear Co. He asserted that his company is not in any sense a subsidiary of Brown-Lipe Chapin, and that there has been no change in stock ownership in the past six years. Brown-Lipe Gear will continue to operate as an independent enterprise, Parsons said.

Incorporated in 1910

The Brown-Lipe-Chapin Co. was incorporated Feb. 2, 1910, with a capital stock of $1,500,000 and no funded debt. Dividends ranging from 20 to 30 per cent were formerly paid. Previous to the present General Motors deal, the officers of the Syracuse concern were: Alex T. Brown, president; A. E. Parson, vice-president; S. H. Cook, vice-president and assistant general manager, and H. W. Chapin, secretary-treasurer and general manager. The directors were Brown, Parsons, Chapin, C. S. Mott and Alfred P. Sloan, Jr.

Open Winter Makes Shipments Easier

Less Difficulty Experienced in Moving Products—Fewer Trucks Being Used

NEW YORK, Dec. 27—Thanks to the open winter and a marked improvement in the railroad situation within the last few weeks, the industry is moving its products with less difficulty than formerly. Because of the improvement in conditions automobile manufacturers are not so greatly worried about the materials situation, and not many of them are using motor trucks to get their supplies as they were doing a few weeks ago.

Reports received by James S. Marvin, head of the traffic division of the National Automobile Chamber of Commerce, show that the railroads are rapidly solving their problems and giving better service. As an indication of this improvement, the car shortage of 133,785 the last week in November had decreased to 111,961 at the end of the first week in December, and the accumulation of unmoved cars had been cut in half from the high mark of Sept. 22.

Car Loadings Keep Up

Car loadings are well maintained. The week ending Dec. 8 showed 919,828, an increase from 845,000 the week previous, of which 539,420 were merchandise and miscellaneous. No marked improvement is shown in motive power, although there is a slight decrease in locomotives requiring repairs—27.9 per cent as compared with 28.5 two weeks previous. The percentage of freight cars in bad order continues to decline and on Dec. 1 had reached 9.9 per cent as compared with 15.8 per cent a year ago.

Marvin finds that the railroads have carried a good volume of automobile freight in the year just closing. Figures he has gathered show that shipping of assembled automobiles from main factories and assembling plants during the past twelve months reached the record figure of approximately 400,000 carloads, transporting 1,700,000 motor vehicles.

Industry Advances in Shipments

Manufactured parts will amount to about 100,000 carloads, and it is not at all unlikely that this heavy shipping will place automobiles and parts third in the number of carloads of manufactured articles shipped by railroads. In 1921 it ranked fourth, being exceeded only by refined petroleum, iron and steel products and cement. Much of the refined petroleum and a considerable part of cement and iron and steel shipping, however, is the direct result of motor car manufacture and use.

The railroads, too, are reaching out for the automobile business as evidenced by the fact that 18,000 new automobile box cars have been included in railway equipment orders during the past year, which will bring the total of such cars in service up to 111,000.

Another bit of interesting information Marvin has gleaned is that more than 750,000 motor vehicles, 30 per cent of the 1922 output, were delivered through the medium of driveaways, showing how the industry has met the transportation problem.

Duplex to Add Models and Build More Buses

DETROIT, Dec. 26—At the annual meeting of the Duplex Truck Co., President H. M. Lee declared that the disposal of thousands of trucks used in the war to States for highway building was largely responsible for the poor conditions in the truck market in the last two years. The financial statement of the company showed a deficit of $49,386 for 1922.

To meet conditions in the truck field, the company plans to devote about 40 per cent of its facilities to the manufacture of buses, which are reported to be in big demand. The present truck line will be increased by two models. The call for heavy duty vehicles is declared to be limited at this time.

Oldsmobile Producing New 2-Passenger Car

LANSING, MICH., Dec. 27—A new two passenger closed car is being fitted to the four cylinder Oldsmobile chassis and will sell for $1,195. It will be shown at the New York and Chicago shows. The finish is in blue with gold striping, the upholstery being gray spanish leather with inside top lining of taupe velour. The doors are 25 in. wide, seat 43 in. wide and cab height 46 in.

Plate glass is used throughout and there is a roll curtain for the rear window. The standard equipment will include gearset lock, cowl ventilator, windshield wiper, visor, dome light, drum shaped headlamps and double windshield. The rear luggage compartment contains 12 cu. ft. and the compartment back of the seat 3 cu. ft.

Taxicab Owners to Hold Convention in Chicago

CHICAGO, Dec. 26—The semi-annual winter convention of the National Association of Taxicab Owners will be held at the Hotel Sherman, Feb. 15 to 16. Membership of the association includes more than 100 companies located throughout the United States, with members also in Canada, Mexico and Japan.

Problems of vital interest to taxicab operators will be discussed, including subjects such as insurance, municipal ordinances for the regulation of taxicabs, "jay walking," rate reduction and safety campaigns.

John J. Boobar, general manager of the Terminal Taxicab Co. of Washington, is president of the association. John G. Williams is secretary.

Want Reorganization of Syracuse Rubber

Members of Stockholders' Committee Favor It in Preference to Forced Sale

SYRACUSE, Dec. 26—Reorganization of the Syracuse Rubber Co., now in the hands of William F. Rafferty, as receiver, is proposed by a stockholders' committee. The definite plan has not been worked out but one will be presented before time comes to take action on the proposed sale of the plant.

The committee in urging reorganization instead of a forced sale of the plant points out that a sale of the plant and assets would not provide sufficient funds to meet the claims of all bondholders and cover current liabilities, to say nothing of paying dividends to the 5300 stockholders.

The company is capitalized for $6,000,000, of which $1,447,310 is in outstanding preferred stock and $1,263,930 in outstanding common stock. The appraised value of the plant is $455,530 against which is an issue of 20-year 7 per cent first mortgage bonds amounting to $134,000 and $53,500 pledged as collateral.

The committee figures that $250,000 working capital and $220,000 to cover current liabilities is necessary, making $470,000 required for refinancing, less $125,000 the net cash value of current assets. Orders on hand approximate $200,000, while the proposed reorganization plan, it is said, would mean a production of 350 tires a day with a profit of $28,000 a month.

Stromberg Will Decide on Increased Capital

CHICAGO, Dec. 26—Stockholders of the Stromberg Carbureter Co. of America, Inc., have been called together for a special meeting on Jan. 10 to vote upon a proposal of the directors to increase the capital stock from 75,000 to 150,000 shares. The new stock would have no nominal or par value. In the letter notifying the stockholders of the meeting, President C. W. Stiger says:

"The proposed increase of the capital stock of this corporation is needed for the purpose of enlarging our business by adding to our present facilities and by acquiring additional properties."

It was definitely stated that the proposed stock increase would not be used for the purpose of a stock dividend distribution at the present time.

G. M. APPEARS IN SUIT

WILMINGTON, DEL., Dec. 26—In the Deppe-General Motors patent suit, John P. Laffey, counsel for General Motors Corp., entered a formal appearance in the United States District Court here today.

December Exceeding Best Mark in Texas

Surpassing Previous Christmas Periods—Likely to Be Record Month of Year

DALLAS, Dec. 27—Despite the present winter weather and the fact that there was a tendency toward "tightening up" in all lines, the actual retail sales of automobiles in Texas during December probably set a record for the year, and certainly will surpass any previous December in the history of the business in this State, according to reports from various sections.

Dallas dealers report retail sales are showing a 20 per cent gain over those of last December. In Houston sales are running 25 per cent better than a year ago, and San Antonio retailers say the increase in that territory will be 30 per cent. A 15 per cent increase is indicated in Fort Worth and Wichita Falls. Galveston, Beaumont, Waco, Abilene, Orange, El Paso, Amarillo, Denison, Sherman, Tyler, Greenville, Palestine, Port Arthur, Corpus Christi and Texarkana report a probable gain of from 10 to 15 per cent when compared with December of 1921.

No record is available as to the actual number of cars sold at Christmas, but a solid trainload of Buicks was distributed at San Antonio, another trainload at Houston, a trainload of Dodge Brothers cars at Dallas and a trainload of one or two other makes at Dallas and Houston. A trainload of Hudsons and a trainload of Studebakers were scattered out in north and south Texas, while several trainloads of Fords went to east and southeast Texas. This is the first time automobiles have been moving to all sections of Texas in trainloads for any one season of the year. Each trainload consisted of from 25 to 30 freight cars with from four to six automobiles to the car.

New York Prepares for National Show

(*Continued from page* 1300)

never were shown before. The Gray is a year old and during the last show made its debut at the Commodore. The American is somewhat of a veteran, which is staging a comeback this time under the direction of Carl Page. Among those shown last year and out this time for various reasons are the Holmes, Jackson, Stevens-Duryea, Goodspeed, du Pont, Kelsey, Dixie Flyer, Kline, Saxon, Standard, Templar, Fergus, Hanson, Itala, and Vauxhall.

Preparations for the Palace show are nearly completed. The plan of decoration is to be accomplished by boxing in each of the square columns with velvet of American Beauty rose shade in gold frames. The columns in turn are to be joined, each to the one adjoining, by valances of velvet edged with gold braid. All the windows on the main floor are to be similarly treated, with the addition of French curtains. Each valance is to be surmounted by a specially designed ornament.

Mirror chandeliers, glittering with hundreds of electric lights, are to be suspended in the center court and the idea of palatial grandeur is to be carried out at the inner main entrance by a great French window backed by mirrors. The great urns that surmount the corners of the balconies around the court are to be treated with floral decorations to give added richness to the whole. The names of the exhibitors are to be in raised white letters on a red panel with gold borders.

Blue, set off by foliage and flowers, is the color scheme decided on for the second and fourth floors and green is to be utilized for the third floor.

Patton-Pitcairn Plans Largest Plant of Kind

MILWAUKEE, Dec. 26 — What is planned to be the largest single plant in the United States devoted to paint and varnish manufacture is under construction at Milwaukee by the Patton-Pitcairn division of the Pittsburgh Plate Glass Co. The division is a consolidation of the Patton Paint Co. and Pitcairn Varnish Co., old-established Milwaukee industries long affiliated with the plate glass concern before an actual merger of interests was effected some time ago.

The new building, costing $400,000, will be ready early in January. It is the first unit of the proposed construction to replace the present Patton and Pitcairn plants in Milwaukee. It is being equipped mainly as a research laboratory, in which all the scattered laboratories of the Pittsburgh company will be consolidated.

The intention is to apply to the paint and varnish industry the research methods successfully used in developing the plate glass industry.

New Plate Glass Factory

PITTSBURGH, Dec. 26—The Pittsburgh Plate Glass Co. is planning to erect a new plate glass factory at Creighton, Pa., which will have a capacity of from 15,000,000 to 20,000,000 feet annual production. It will be built in sections for the purpose of getting increased production at the earliest possible moment. When completed the plant will have a capacity equal to a third of the present production of the company.

BUICK NOT TO CLOSE

FLINT, MICH., Dec. 27—For the first time the Buick Motor Co. will not close its plant for the annual December inventory. President Bassett declares that there is no let-up in the volume of orders for immediate delivery, and because of this it is impossible to close the works for inventory. December, he says, will be another record month.

Peerless Arranges for Collins Notes

Will Pay Them Far in Advance—Factories in Cleveland at Work on Closed Cars

CLEVELAND, Dec. 27—Automobile factories in this city are operating on schedules arranged to meet an anticipated big demand for closed cars in 1923. Never before at this time of year have plant facilities been given over in so large a measure to the production of closed models. The seasonal demand is largely responsible, but an unusually large number of this type of car will be turned out for delivery in the spring.

Peerless Motor Car Co. is devoting considerably more than half of its production to closed cars. Chandler, Cleveland, Jordan and Stearns also are expanding their output along the same line.

Richard H. Collins, president of Peerless, states that the company will anticipate by a year and a half final payment on the Peerless-Collins notes, which were issued at the time he purchased control of the company. Funds have been deposited with a local bank for payment on April 1, 1923, of notes due October, 1924.

Year's End Brightened in Section of Indiana

(*Continued from page* 1300)

dition, the effect that the strike had on the buying morale of people not directly concerned was a handicap to all sales.

Then came the rail strike, the almost complete cessation of freight traffic in the mine country and toward the end of the summer there were many blue weeks, as well as blue Mondays. Thousands of cars were kept in garages and woodsheds because the owners did not want to spend money for gasoline. Work almost stopped in maintenance departments.

With the coming of the labor peace buyers showed a tendency to return, but there were debts to pay. Christmas shopping here was good on small and lower priced articles.

Hayes Likely to Acquire Imperial Wheel of Flint

DETROIT, Dec. 27—Stockholders are asked to ratify a deal which means the absorption of the Imperial Wheel Co. of Flint by the Hayes Wheel Co. of Jackson. This meeting is set for Jan. 3, and inasmuch as more than 75 per cent of the Imperial stockholders already have agreed to the plan, it is expected the deal will go through.

President Hayes desires the Imperial plant because of its location equi-distant from the Buick, Chevrolet and the new Durant plants in Flint, all of which are using Hayes wheels.

Durant's Flint Car Has First Showing

Chassis of New 6-Cylinder Addition Has Engine with 7-Bearing Crankshaft

(*Continued from page* 1298)

frame in line and prevents undue stresses on the members supported by it, and on the body, thus obviating body squeaks. Special washers fitting the circumference of the tubes are placed where the engine supporting arms rest on the tubes. The engine is held down by "through" bolts.

As in other models of Durant Motors the engine and gearset are separate units, the connection between them comprising two Spicer universal joints. The clutch is of the single plate, multiplying lever type and is completely inclosed in the flywheel. The gearset, which gives three forward speeds and one reverse, is a very compact unit and is bolted to the rear face of the rather deep central cross member of the frame.

Arrangement for Drive

The final drive is by an open propeller shaft with two Spicer joints, the drive being a Hotchkiss type. The rear axle drive is by spiral bevel gears and it is intended to offer a choice of several gear ratios. One of the driving gear sets has 9 teeth in the pinion and 43 in the ring gear. The gears are of 4.65 pitch and have a face width of 1¼ in. All bearings at the center of the axle are of the ball type, while those at the wheels are conical roller bearings.

The axle is a built up, semi-floating type and is made by the Adams Axle Co. Both brakes are carried on the rear wheels and act on the same 14-in. drums. The band brakes are the service brake and are 2 in. wide, while the hand-operated internal brakes are only 1¾ in. wide. Provisions for brake adjustment are made both directly at the brakes and in the brake linkage, the latter being of the form of coupling which can be taken up without first taking it apart.

Construction of Frame

The frame is built up of side members with a section of 5½ by 1¾ by ⅜ in. at the middle. These side members are straight from end to end in the vertical plane but the width of the frame tapers off from rear to front, as is shown by the fact that the front spring center distance is 26½ in. and the rear 37½ in. The frame has three pressed steel cross members, and in addition a tubular cross member at the extreme rear. Its stiffness is added to by the tubular muffler which is flange-bolted to the center and rear cross members. This muffler, together with the tubular sub-frame, is claimed to give such rigidity to the frame that it is possible to drive the car over the floor with only three wheels in place.

The steering gear is a Warner worm and gear type and has an 18 in. hand wheel with wood spokes extending all the way in to the aluminum hub to which they are bolted. The arrangement of the control members in the front compartment is somewhat out of the ordinary.

The steering post is in the usual position at the left, and the gear shifting lever in the center, but the latter is so short that its top comes flush with the top of the front seat, and as it stands close up to the seat when in the rearmost position it does not interfere with entrance to and exit from the driver's seat. The brake lever is placed alongside the front door, rather far forward, so as not to interfere with the use of this door, and is operated by the left hand.

The car has a wheelbase of 120 in. and is equipped with 32 by 4½-in. Fisk cord tires.

Body and Accessory Features

The open body is of the wood frame, sheet metal panel type and is of attractive appearance. It has a permanent top with the rear section completely metalled. There is a large bevel edged glass in this rear section. The cowl is provided with a ventilator which is operated by a lever underneath.

The so-called instrument board light is concealed in the cowl and gives unusually good illumination of the whole board. Among the equipment may be mentioned the Stewart speedometer, motor horn, complete set of electric lamps (including large size headlamps of barrel type and separate side lamps), a tool kit, pump and jack. There are die cast, enameled caps on the doors and door posts are provided for the side curtains. The chassis is fitted for Alemite lubrication.

Iowa Reports Used Car Values at Lowest Mark

DES MOINES, Dec. 26—According to a study just completed by S. P. Whiting, secretary of the Motor Trades Bureau of the Des Moines Chamber of Commerce, prices of used cars in November reached the lowest mark in the history of Iowa motor markets.

Whiting bases his conclusion on a survey of the weekly sheets covering used car transactions of the Des Moines automobile dealers supplemented by special reports from the leading dealers of central Iowa.

The survey reveals that lower prices of new cars through lower cost of material and keener competition is one of the chief reasons for the drop in used car values. It also shows that every decline in new car prices has been accompanied by an even sharper cut in used cars.

Another reason given by Whiting for the new low mark is that the present methods of financing the purchase of new cars by manufacturers and motor financing companies have worked to a decided advantage of the new cars, as it gives the purchaser a plan for buying a car with a down payment no larger than the price of a used car.

N. A. D. A. Will Hear Talk on Sales Cost

Richard Lennihan of Harvard Bureau to Address Dealers at Convention

ST. LOUIS, Dec. 27—Because of the interest of dealers generally in cost accounting and in developing a more thorough understanding of the relation between operating costs and total sales revenue, the 1923 convention of the National Automobile Dealers Association in Chicago, Jan. 27-30, will give a prominent place in its program to Richard Lennihan, assistant director of the Harvard Bureau of Business Administration.

Recent investigations of the association into the costs of doing business in the retailing of automobiles disclosed a widespread difference in the percentage of the "overhead" as compared to the total sales. These automobile business costs when compared to the costs of doing business in other merchandising lines expose a variance which the association executives believe is due to variance in the methods of accounting.

Lennihan's subject will be "Cost of Doing Business in Relation to Sales." His address will be given the afternoon of Monday, Jan. 29, and will cover comparison of costs in a number of merchandising lines together with some phases of the automobile business.

Bureau May Survey Conditions

The Harvard business administration bureau made exhaustive studies of the cost of doing business in the wholesale grocery field and in the retail shoe business for 1921. These studies disclosed the trend of increased costs as affected by the downward trend of prices.

Similar studies applied by the N. A. D. A. to the automobile business for 1921 have not been completely compiled but may be available for announcement by Lennihan as a part of his address. Because of the lack of general harmony in the methods of cost computing in the automobile business, it may develop that a thorough research on this subject will be undertaken for the association by the Harvard bureau.

As a corollary to Lennihan's address there will follow him on the program, a lecture on "Modern Methods of Salesmanship."

NEW YORK WANTS FEES CUT

BUFFALO, Dec. 26—A resolution was adopted by representatives from all the automobile federations of New York State at a convention here, asking the State legislators to introduce a bill amending the present law which calls for the payment of 75 cents per 100 pounds on all cars weighing over 3500 pounds. The federation representatives are in favor of fixing this rate at 50 cents per 100 pounds and a flat rate of $10 for electric vehicles.

FINANCIAL NOTES

Johns-Manville, Inc., stockholders have approved an increase in capitalization to 250,000 shares, of no par value, from 25,000. New stock is to be distributed in the proportion of eight new for one old, and the balance of 50,000 shares is to be sold to employees at $50 a share. The amount allotted to stockholders has already been over-subscribed, more than 1000 employees applying for a total of more than 67,000 shares. Directors recently declared a cash dividend of $40 a share and voted to retire the preferred stock at $120 a share.

Packard Motor Car Co. for November will show net earnings for the quarter ending Nov. 30, after taxes, interest and all charges, of slightly more than $2,500,000 available for dividends. After allowing for preferred dividends this is equivalent to 98 cents a share on the 2,377,000 shares of $10 par common stock which would be outstanding following the recent 100 per cent common stock dividend, or at the annual rate of nearly $4 a share.

Wayne Tank & Pump Co. preferred stock to the amount of $500,000 will be retired Jan. 1, this decision being reached following a special meeting of the stockholders. At the meeting authority was granted to increase the common stock of the company from $700,000 to $1,000,000. The action on the part of the company does not contemplate any changes in business policy or extensions of the plant, it is said.

Moon Motor Car Co. has declared a quarterly dividend of 37½ cents on common stock, thereby increasing the annual rate from $1 to $1.50, and an extra dividend of 12½ cents. The regular quarterly dividend of $1.75 on preferred stock also has been declared. The directors have voted to retire the outstanding preferred stock, which amounts to $314,000. All dividends are payable Feb. 1 to stock of record Jan. 15.

U. S. Light & Heat Corp. of Niagara Falls states that the year now closing has been one of the most satisfactory in its history, with earnings of well over $300,000. The number of storage batteries sold is reported to have been over 70 per cent in excess of the best previous year.

Auburn Automobile Co. has declared the regular quarterly dividends of 1¾ per cent on preferred and $1 a share on common stock, both payable Jan. 1 to stock of record Dec. 22.

Crane-Simplex Co., Inc., has declared an initial quarterly dividend of 1¾ per cent on preferred stock, payable Jan. 3 to stock of record Dec. 21.

DEVELOPS RINGLESS PISTON

NEW YORK, Dec. 27—The Franchi Ringless Piston Corp. of this city has developed an automobile engine piston which is intended to be used without flexible rings. I. D. Gutenstein and Aldo Franchi of the concern will demonstrate a Studebaker car fitted with these rings in Detroit during the latter part of January.

BUILDS NEW BATTERY BOX

STANLEY, WIS., Dec. 26—The Stanley Toy Works have placed into quantity production, following the relief of factory from holiday merchandise requirements, a standardized battery box which they have been manufacturing for several months. A single order for 18 carloads was booked during the past week for delivery from Jan. 1 to May 1. The box is made from No. 2 maple, a large supply of which abounds in the vicinity of Stanley. The concern maintains their own dry kiln plant, which has a capacity of 40,000 ft. The daily consumption of the factory runs about 5000 ft., which will be doubled shortly on the battery box run.

Canada Spent $1,115,918 for Parts in November

OTTAWA, ONT., Dec. 26—Canada spent $1,105,410 in the United States for automobile parts during November, 1922, according to a report of the external trade branch of the Dominion Bureau of Statistics.

During the same month the Dominion spent $7,901 for parts in Great Britain, $2,330 in Italy and $277 in Switzerland.

The total expenditure shows a remarkable increase over November, 1921, when importations amounted to only $415,882.

During November, 1922, Canada imported but three passenger automobiles from the United Kingdom, as compared with 459 from the United States. The value of the importations from Britain was $11,054, as compared with $521,929 for those from the United States. Canadians bought two Italian cars during the month, at a value of $2,732. The total value of automobile importations during November, 1922, was $535,715, as against $452,396 in November, 1921, and $783,543 in October, 1922.

Venezuela Plans Show at Caracas in January

CARACAS, VENEZUELA, Nov. 14 (*by mail*)—An automobile exposition is being planned for this city next January, with the representatives of all or practically all automobile lines sold here co-operating in what will be the first attempt to hold such a show in the northern section of South America.

Conditions affecting the automotive trade here are showing satisfactory improvement, and a greater degree of enthusiasm is being displayed by the representatives of all the more popular lines. Service, however, is still a problem, and it is hoped that every effort will be made by manufacturers to force the installation of better facilities.

WILLS JOHNSON DEAD

NEW YORK, Dec. 27—Wills Johnson, chairman of the appropriations committee of the General Motors Corp., died suddenly Christmas Day at his home near Greenwood, Va. He also held the position of an assistant to Alfred P. Sloan, Jr., vice-president in charge of operations of General Motors. Johnson was connected previously with the duPont company in the engineering department.

BANK CREDITS

Written exclusively for AUTOMOTIVE INDUSTRIES *by the Guaranty Trust Co., second largest bank in America.*

Last week the rate for call loans ranged between 4 per cent and 5 per cent, as compared with 3¾ per cent to 5 per cent in the preceding week. For fixed date maturities the market was quiet and was characterized by no special transactions. The quotations continued at 4¾ per cent to 5 per cent for all periods from sixty days to six months, the same as in the preceding week. The prime commercial rate remained unchanged at 4¼ per cent to 4¾ per cent.

Revenue freight loadings for the week ended Dec. 9 totaled 919,823 cars, an increase of 74,609 cars over the loadings for the preceding week and 178,587 cars more than in the week ended Dec. 9, 1921. The demand for freight cars in excess of the available supply on Dec. 8 showed a decrease of about 16 per cent from the shortage of Dec. 1.

Bank clearings at the leading cities of the United States totaled $7,831,613,000 for the week ended Dec. 21, which was a gain of 17.5 per cent over the preceding week and 8.6 per cent over the corresponding week last year. The turnover of business, as marked by bank clearings for New York City for the week ended Dec. 21, showing a gain of 4.6 per cent over the corresponding week last year.

According to the complete returns filed with the Interstate Commerce Commission, total gross earnings of 193 Class 1 railroads were larger for the month of October than for any preceding month since December, 1920. Net operating income totaled $85,254,996, marking a new high record for this year and the largest monthly total since October last year. This is equivalent to a return of about 4 per cent on the tentative property valuation as fixed by the Interstate Commerce Commission, and compares with 2.88 per cent for September and 5.01 per cent for October of last year. For the ten months ended with October, net operating income of Class I railroads amounted to $614,317,269, equivalent to an annual return of 3.97 per cent, as compared with an annual return of 3.23 per cent for the first 10 months of 1921.

The Federal Reserve statement as of Dec. 20 showed a decrease of $15,313,000 in gold reserves and $28,179,000 in total reserves. Bills on hand decreased $55,044,000, while total earning assets showed an increase of $68,950,000. Deposits increased $20,849,000, and Federal Reserve notes in circulation increased $77,526,000.

"POWER FARMING DAY"

CHICAGO, Dec. 26—A resolution favoring the designation of one day at State fairs next year as "Power Farming Day," was adopted by the International Association of Fairs and Expositions at its thirty-second annual meeting recently at Toronto.

Profit Is Reported by British Dunlop

Sir Eric Geddes May Be Chairman of Board, Succeeding F. A. Szarvasy

LONDON, Dec. 9 (*by mail*)—A net profit of £588,267 is reported by the British Dunlop Rubber Co. for the ten months ended June 30 against a loss of £8,320,006 for the preceding twelve months.

It is stated that the profits from all sources, less depreciation and "after charging to the reserve account losses of forward contracts over market prices arising during the period," amount to £1,054,683, but from this there have to be deducted £44,108 net trading loss of Dunlop Plantations, £115,310 net trading loss of the Improved Steel Co. and £306,996 interest.

The reserve fund now stands at £907,520, which is £1,860,124 lower than in the last balance-sheet. Loans from the bank have increased by £652,312 to £2,019,977. After deducting the profit now reported, there is still a debit balance of £7,731,739 on profit and loss account.

The necessary capital for the American subsidiary company has now been found, and the financing will take the form of a joint issue of capital in the United States and England.

A statement issued by the directors mentions the appointment of Sir Eric Geddes as a director and foreshadows his election as chairman of directors in place of F. A. Szarvasy, who undertook the reorganization of the management and finances two years ago and has temporarily held the office of chairman since then.

Timken Service Company Will Function January 1

CANTON, OHIO, Dec. 28—The Timken Roller Bearing Sales & Service Co., which brings the servicing of Timken bearings directly under the supervision of the Timken Roller Bearing Co., will start to function on Jan. 1. The new company adds the final link to the chain of complete control which the Timken Roller Bearing Co. exercises over its product from the raw material to the sale and maintenance of the finished bearing.

The parent company has complete factories located at Columbus, Ohio; Birmingham, England; Paris, France; Walkerville, Ontario, and in this city, and maintains 32 direct factory branches throughout the United States and Canada. In addition there is a country-wide organization of registered authorized distributors in the smaller cities.

GOVERNMENT WANTS TRACTORS

WASHINGTON, Dec. 27—While no appropriation was made in the 1924 budget submitted to Congress by the President for new automobiles and automotive equipment, such as trucks and motorcycles, an item of $1,700,000 is provided for the purchase of tractors. General Pershing and his staff have inspected a great many designs submitted.

INDUSTRIAL NOTES

Northlite Manufacturing Co., Chippewa Falls, Wis., has disposed of its gray iron foundry to A. M. Mattson and A. J. Torgerson of Eau Claire, Wis., who will continue its operation as the Mattson Foundry Co. The machine shop also has been placed on the market. The Mattson company will install additional facilities for brass and aluminum casting.

Van Norman Machine Tool Co.'s Detroit sales office will be managed after Jan. 1 by R. A. Griswold. Griswold previously represented the Rivet Lathe & Grinder Co. in Detroit and other sections of the country, and later served with B. C. Ames as field representative.

Globe Malleable Iron & Steel Co., Syracuse, has received an order for 150,000 sets of forgings from the Durant Motors, Inc. The contract calls for the completion of 125,000 sets before Feb. 15. The plant is being operated day and night to handle the order.

Theodore L. Dodd & Co., 80 East Jackson Boulevard, Chicago, with a branch office in the General Motors Building, Detroit, has been appointed western sales representative of the Cleveland Wrought Products Co. of Cleveland, Ohio.

Universal Shock Eliminator Co., Inc., of 7 West 61st Street, New York, has taken the Eastern distribution for the Lockhead four-wheel brake system, made by the Four Wheel Hydraulic Brake Co. of Detroit.

Stock Dividend Doubles Capitalization of Cole

INDIANAPOLIS, Dec. 27—Cole Motor Car Co. has declared a 100 per cent stock dividend on the 10,000 shares of capital stock of $100 par, thereby increasing the company's capitalization to 20,000 shares. The dividend is payable to stock of record of Dec. 15.

This is the third stock dividend which the company has declared, it having paid one of 65 per cent in July, 1912, and one of 20 per cent in July, 1914. In 1921 the company paid cash dividends of 20 per cent quarterly.

Gasoline Consumption Declined in October

WASHINGTON, Dec. 27—The monthly report of the Bureau of Mines shows that the domestic consumption of gasoline decreased by 18,000,000 gallons or 3.6 per cent during October as compared with previous month. It was, however, about 7.5 per cent above the figure for October last year.

October production of gasoline amounted to 566,278,689 gallons, the highest recorded except for last July when this figure was exceeded by only 3,400,000 gallons.

METAL MARKETS

Seldom has the steel market presented so serene an aspect in the last week of the year as is the case in 1922's few remaining days. Fewer mills than usual have shut down for repairs. Sales managers report a very gratifying amount of first quarter 1923 business in process of negotiation. The automotive industries are responsible for the greatest part of these inquiries which, according to one report, embrace one individual automotive inquiry involving 200,000 tons of bars and other rolled material. Demand for full-finished body sheets continues fair, but most of the orders actually booked within the last few days appear to have carried a compromise price between the 5 cents base nominally quoted by independent rollers and the 4.70 cents base price of the chief interest.

Demand for specialties, such as hot- and cold-rolled strip steel, has surpassed the expectations of producers. In fact, while ultraconservative steel men refuse to commit themselves regarding the outlook over the entire year 1923, they are ready to concede that the industry will be normally active during the first quarter of the year, this statement involving no risk because the business already booked for the first quarter of 1923 is sufficient to make a rate of operations a positive certainty.

A year ago the general run of prophecies was bleak, and developments, especially those of the second half of the year now drawing to a close, proved that the demand for steel had been much under estimated. Today there is in evidence general confidence in a continuance of the present rate of demand during the winter and spring of 1923, and as for the summer and fall of the coming year there is a disposition to withhold judgment. Certain it is that the steel industry enters upon the new year with a more satisfactory backlog of orders and amid more orderly market conditions than had been generally expected a few months ago.

Pig Iron.—In most of the pig iron centers the market has quieted down. Some automotive foundries have covered their requirements for the coming quarter, while others have deemed it wise to postpone contracts for deliveries beyond January until after New Year. The Detroit base price is $27, with some interests quoting up to $28. The Valley base is $26 and in Cleveland prevails about the same quotation, furnace for delivery in Cleveland. The Chicago market is steady at $28, furnace. Pig iron sellers predict another buying spurt in January.

Aluminum.—The usual holiday lull is in evidence in the aluminum market. Quotations are unchanged. The latest London quotation received here is £92 10s. per gross ton, the equivalent of about 19¼ cents on the basis of prevailing rate of exchange.

Copper.—Following the greatest activity which the copper market has enjoyed this year, demand has eased off slightly. While the buying movement was at its height, producers were able to advance prices by ¼ @ ⅜ cents, the first time in more than two years that such a move was successful. As a result of the upward movement in the copper market, the chief brass interest advanced prices for rolled copper and brass products to the extent of ½ cent per pound in one week. Large orders were placed between the first advance of ¼ cent and the second one of the same extent, a large share of the business emanating from the automotive industries.

Calendar

SHOWS

Jan 6-13—New York, National Automobile Show, Grand Central Palace, under auspices of National Automobile Chamber of Commerce.

Jan. 8 - 13 — New York, Second National Automobile Body Builders Show, Twelfth Regiment Armory, under the auspices of the Automobile Body Builders Association.

Jan. 27-Feb. 3—Chicago, Annual Automobile Salon.

Jan. 27 - Feb. 3 — Chicago, National Automobile Show, under auspices of National Automobile Chamber of Commerce, Coliseum and First Regiment Armory.

FOREIGN SHOWS

Dec. 15 - Jan. 2 — Paris, Aeronautical Salon, Grand Palace. Chambre Syndicale des Industries Aeronautiques, 9 Rue Anatole de la Forge.

Jan. 12-24 — Brussels, Sixteenth International Automobile and Cycle Exposition, Palais du Conquantenaire.

April - July, 1923 — Gothenburg, Sweden, International Automobile Exhibition, Sponsored by the Royal Automobile Club of Sweden.

RACES

May 10 — Berlin - Grunewald, German Grand Prix.

CONVENTIONS

Jan. 15-19—Chicago, Thirteenth American Good Roads Congress and Fourteenth National Good Roads Show.

Jan. 29 - 31 — Chicago, Annual Meeting, Automobile Electric Service Association, Congress Hotel.

Feb. 15-16—Chicago, City Club, Winter Sectional Meeting of the American Society for Steel Treating; W. H. Eisenman, 4600 Prospect Avenue, Cleveland, national secretary.

April 25, 26 and 27—New Orleans, Annual Convention of the National Foreign Trade Council.

S. A. E. MEETINGS

Metropolitan Section

March 15—Speaker, William P. Kennedy, President, Kennedy Engineering Corp.; Subject, Trolley Buses and Flexible Vehicles for Street Railway Service.

April 19—Speaker, Edw. E. La Schum, General Superintendent, Motor Vehicle Equipment, American Railway Express Co.; Subject, Engineering Features of Fleet Operation.

May 17—Speaker, F. P. Gilligan, Secretary, Henry Souther Engineering Co., Subject, Metallic Materials for Automotive Work.

Other Meetings

Jan. 9 - 12 — New York, Annual Meeting.

Jan. 31 — Chicago Meeting and Dinner of the Society at the Congress Hotel.

Suggests Boulevard for New York Relief

NEW YORK, Dec. 23—Most sensational of all ideas advanced by city officials as solutions of the traffic problem in New York is that of Dr. John A. Harriss, Deputy Police Commissioner in Charge of Traffic, who advocates a 360-foot crosstown boulevard, divided into spaces for slow-moving vehicles and for traffic moving at the rate of 35 m.p.h. It would be built from river to river somewhere between 42d and 59th Streets at a cost of $70,000,000.

The plan was outlined following the radical suggestion of Judge House of the Traffic Court that passenger cars and taxicabs be limited in number by law and that it might be for the best interests of the city to bar them from streets south of 59th Street. Dr. Harriss opposes Judge House in this, declaring that "you might as well stop the manufacture of automobiles as limit the use of passenger cars on New York City streets by legislative act. While motor cars are used for transportation, space will have to be provided for them."

Portrays City of Future

Dr. Harriss believes that New York City 100 years from now will have a population of 25,000,000; that the section from the Battery to 14th Street will be given over to storage and provision warehouses; the manufacturing and wholesale district will be from 14th to 42nd Street; the financial district will be from 42nd to 59th, with all north and south avenues and streets commercial and office buildings; the de luxe shopping district will be from 59th to 110th Streets, with an additional shopping section between 110th and 125th, while the residential section will be north of 125th to the Connecticut State line.

Visualizing the city in the future in this manner, Dr. Harriss outlined his boulevard plan as follows, suggesting that the immediate need is for the first of four cross-river boulevards:

A boulevard 360 feet wide from the Hudson River to the East River would be arranged as follows:

	Feet
Sidewalks, 30 feet wide	60
West bound traffic, next to curb	100
East bound traffic, next to curb	100
Center of Boulevard made up as follows:	
West bound express traffic	50
East bound express traffic	50
	360

The express traffic would pass under all of the north and south bound streets, with ramps to Sixth Avenue express highway and an artistic Park Avenue viaduct.

The turning of vehicular traffic or crossing of pedestrians permitted at street intersections only. Theater zones would be at the east and west end of the boulevard with automobile terminals and parking hotels.

Beneath the boulevard provision would be made for the parking of cars.

This express highway to connect with the elevated express highway on either side of the present Sixth Avenue elevated road, each 40 feet wide.

The express highways would connect with the marginal way express highways or express streets on the extreme west side and east side of Manhattan Island.

As the center of serious increasing congestion lies in the zone between Forty-second Street and Fifty-ninth Street, and as this condition has become acute and requires immediate relief, it is suggested that the other cross boulevards be not considered at this time.

S. C. Johnson to Build Factory in Australia

RACINE, WIS., Dec. 26—A complete manufacturing plant costing about $200,000 when finished will be erected at Sydney, Australia, by the S. C. Johnson & Son Co., manufacturer of waxes, polishes, etc., according to announcement made at the annual sales conference here. The company has maintained a branch office and distributing warehouse at Sydney for ten years, but Australasian business has increased so rapidly that the long time needed to get merchandise from Racine to Sydney must be overcome.

Southern Optimism Confirmed by Bank

ATLANTA, Dec. 26—Commercially, industrially and financially the Southeast is in a better shape at this time than it has been in many years, according to the monthly review of the Federal Reserve Bank of Atlanta.

Of the important lines of wholesale and retail trade reporting every one showed an increase the past two months as compared with two preceding months, and a substantial increase as compared with the same period in 1921, including automotive and accessory dealers, farm implements and tractors.

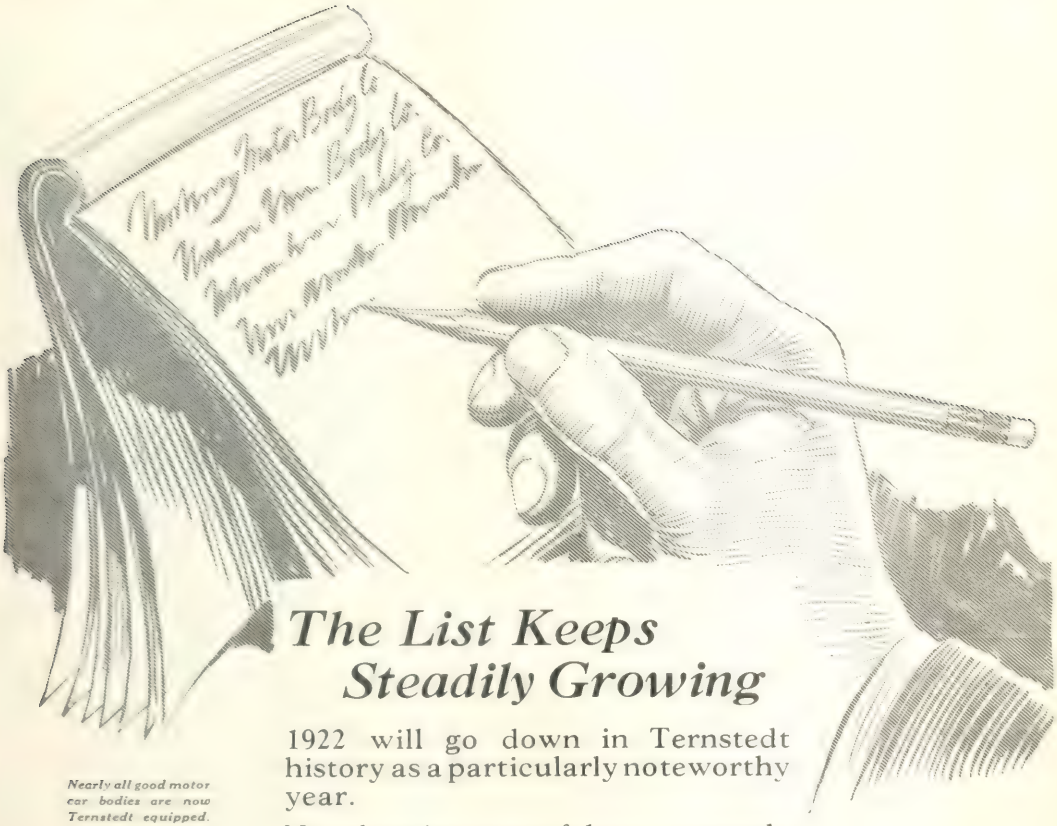
Virtually all manufacturing industries reported the same, and a shortage of labor for the first time in years. Financially the district has plenty of money due to the excellent crop prices this season, and bank clearings in all important southeastern cities are considerably larger than at this time a year ago.

Automotive sales all along the line—that is, higher priced as well as medium and lower priced cars—are in larger sales volume than for months with the 1923 outlook, so distributors advise the bank, portending another inflation period. They believe, however, that this inflation period will be on a more stable basis than that of 1919, and not followed by the long months of deflation.

Tractor, implement and truck sales were considerably better in October and November this year than in 1921, though the usual seasonable decline in tractor and implement sales is, of course, being noted. The 1923 spring outlook for tractors and implements for the entire South is the best it has been since the latter part of 1919 distributors here advise.

WINTON DROPS BRANCH

TOLEDO, Dec. 23—The Winton Co., following a policy established early in the year, has disposed of its Chicago factory branch and has appointed the Allison-Rood Co., former Lincoln distributor, as its Chicago sales agency.



Nearly all good motor car bodies are now Ternstedt equipped.

The List Keeps Steadily Growing

1922 will go down in Ternstedt history as a particularly noteworthy year.

Not alone because of the enormously increased demand that necessitated extensive plant additions—

But, because in supplying that demand, many new and prominent names have appeared on the books of Ternstedt.

And the list keeps steadily growing.

TERNSTEDT MANUFACTURING COMPANY
6307 West Fort Street Detroit, U. S. A.
Division of Fisher Body Corporation

TERNSTEDT

Largest Manufacturers of Automobile Body Hardware in the World

REG. U.S. PAT. OFF.

There's a Big Difference

between a man who *says* he's satisfied, and a man who *doesn't say* he is *dissatisfied.*

How often do you hear the axle of a car favorably mentioned by owner or dealer? Very often if it's a Timken Axle, mighty seldom if it isn't.

Timken Axles are a positive help in selling a car, not merely because they make no trouble for the owner, but because the *buyer knows* it, which is a distinction with a big difference. In other cases he doesn't know until he's had experience—and his first purchase is an experiment.

THE TIMKEN-DETROIT AXLE COMPANY, DETROIT, MICH.
Sole Representatives in the British Isles:
AUTOMOTIVE PRODUCTS COMPANY, 3, Berners Street, London, W. 1.



Motor car axles should be designed not only for long life and efficient service, but with an additional margin of strength to assure human safety.



—It's the same with Screw Threads

Despite the use of a very elaborate system of master, working and inspection gages, the failure of screws continues to be one of the mechanical world's greatest problems. The trouble is —like the old boiler tender shown here—thread gages depend upon the "feel."

But a screw which touches the ring gage only at a point or two, may feel just right to the most careful inspector. "Feel" is not dependable.

On the other hand, the Hartness Comparator projects the outline of the thread against a tolerance chart 200 times enlarged.

Each tiny error of lead, eccentricity, pitch diameter, form and other controlling factors can be SEEN and corrected.

A method 10 times faster. For every screw machine department and tool room. Catalog?

JONES & LAMSON MACHINE CO.

Makers of the Hartness Flat Turret Lathe and the Fay Automatic Lathe

Springfield **Vermont, U. S. A.**

Branch Office:
503 Market St.,
SAN FRANCISCO, CAL.

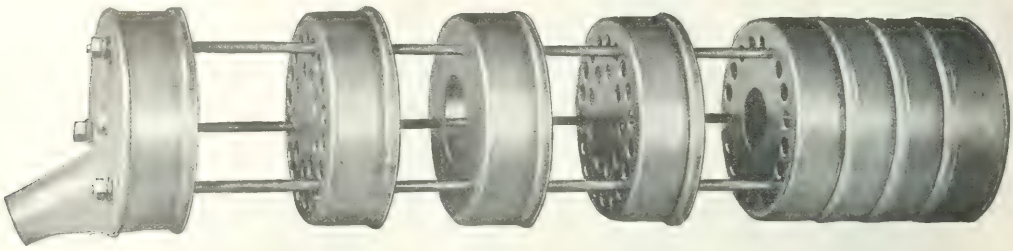
Branch Office:
9-10 Water Lane, Queen Victoria St.,
LONDON, ENG.

AGENTS: France, Spain and Belgium—F. Auberty & Co., 182 Rue Lafayette, Paris. Holland—Spliethoff, Beeuwkes & Co., Rotterdam. Japan, Korea, Manchuria and Formosa—Mitsui & Co., Ltd., Tokio. Australia—McPherson's Pty., Ltd., 554 Collins St., Melbourne. Sweden—A. Bol Oscar Lindbom, Post Box 420, Stockholm.



HARTNESS SCREW THREAD COMPARATOR

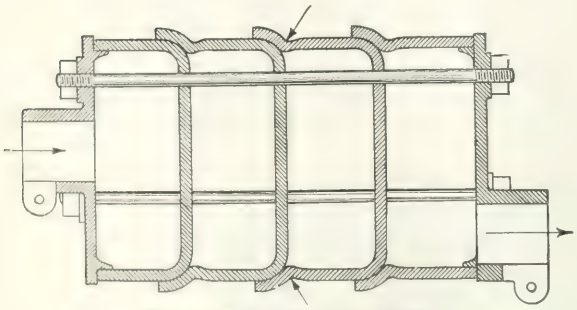
POWELL MUFFLER—BLOW-OUT PROOF



Have a ride down the exhaust pipe with me into the muffler. I am red hot steam and gas and fire. I come from any automobile engine.

I go into the muffler, some mufflers I blow up, some I rust out, some I loosen the insides, for I am made of hot stuff.

I find the Powell Mufflers will last the longest. I have tried and tried to bust and rust them, but they are made too strong. They always make the pipe from the engine strong, but some put on very light mufflers for me to bust. I like a muffler that will last a long time, that does not choke up, blow out or rust out. But many car makers put on a muffler because they are cheap; they should ask me—I am the exhaust from any automobile engine.



This is a Section of the Powell Muffler

Standard Equipment on the following cars and trucks:

Autocar Co.	Fifth Ave. Coach Co.
Brockway	Stewart Motor Truck Co.
Nordyke & Marmon Co.	H. H. Franklin Mfg. Co.
Packard Trucks	F. B. Stearns Co.
White Motor Co.	The Winton Company
Yellow Cab Co.	and many others

Special mufflers for automobiles.
Special mufflers for replacement.
Special mufflers for trucks.
Special mufflers for speed wagons.
Cold Drawn Cups and Metal Tool Boxes.

POWELL MUFFLER COMPANY

UTICA, NEW YORK



Motor Wheel
PRODUCTS

Tuarc

STEEL WHEELS

—a Motor Wheel Product

Gier
Tuarc
STEEL WHEELS

Tuarcs add strikingly to motor car attractiveness. Beautifully curved—they blend gracefully with body contour. Yet beauty is but one of the outstanding benefits conferred by Tuarcs.

Wholly outside valve stems first made practical on steel wheels by Tuarcs, give complete accessibility for inflating tires. Demountable rims, indispensable for greatest convenience, do away with lifting whole wheels, and eliminate the necessity of extra wheel and special carrier. Hubs that fit without a single special part facilitate installation. Only Tuarcs embody all these advantages.

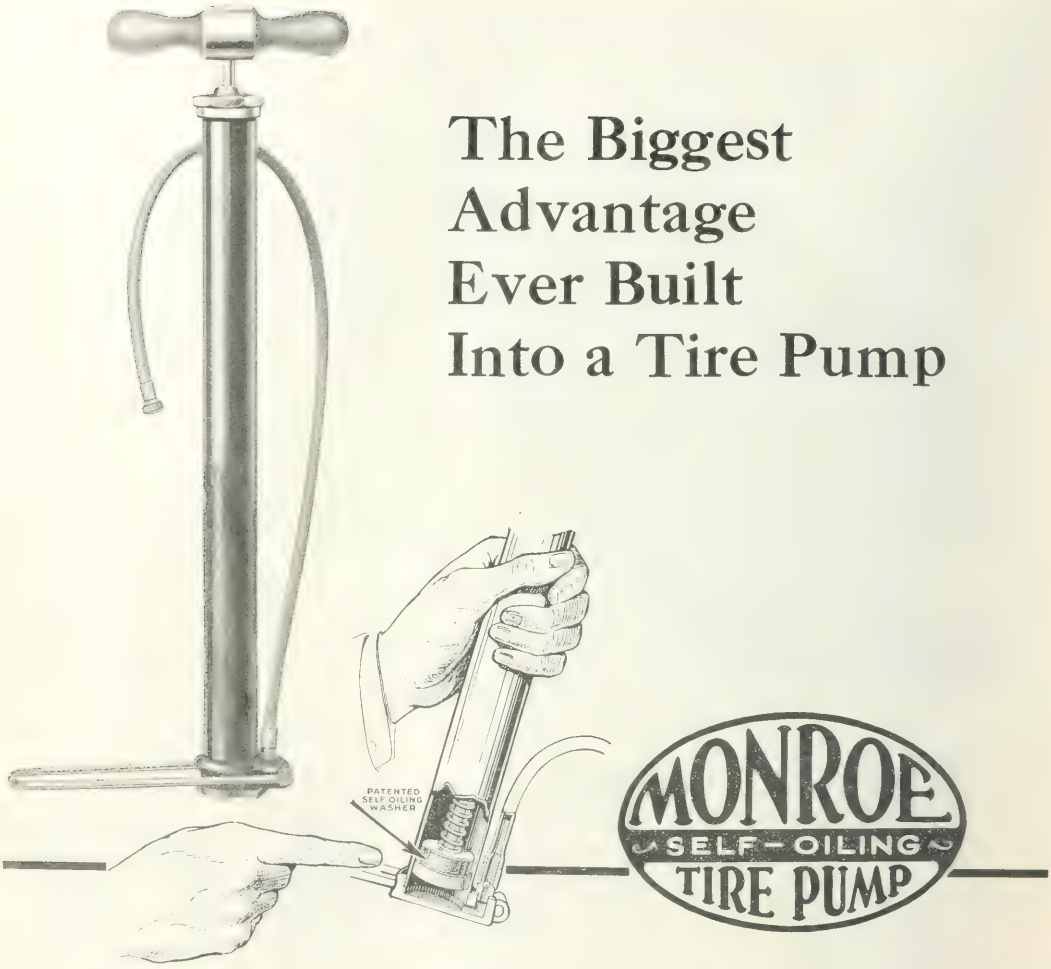
That is why these wheels are used as standard equipment by fourteen prominent manufacturers; why their dominance among steel wheels is steadily on the increase.

MOTOR WHEEL CORPORATION, LANSING, MICHIGAN

Motor Vehicle Wheels Complete—Metal Stampings—Steel Products

601 Capitol Theatre Bldg., 120 Madison Ave., Detroit
509 Fisk Bldg., B'dw'y at 57, New York — Bigelow Blvd. & Craig, Pittsburgh
584 Commonwealth Ave., Boston — 520 Van Ness Ave., San Francisco
10 South 18th St., Philadelphia — 1341 So. Hope St., Los Angeles

The Biggest Advantage Ever Built Into a Tire Pump



HOW IT WORKS

The patented MONROE Self-Oiling Washer is located just above the valve leather. Before the pump is assembled, this washer is thoroughly impregnated with a leather preserving oil. On each up stroke of the plunger the action of the valve spring compresses the washer and releases a very small amount of oil which is absorbed by the valve leather. The leather is thus kept so soft and pliant that it readily responds on every down position of the plunger, completely filling the barrel and assuring maximum compression. This proven principle of construction is an exclusive MONROE feature — no other tire pump has it.

Without doubt, the greatest improvement ever made in tire pump construction is the MONROE *patented* Self-Oiling Washer. For it has proven to be the one successful means of keeping valve leathers *permanently* lubricated.

Unless the valve leather of a tire pump is kept soft and pliant by proper lubrication, the pump is of little use in service. For it is the valve leather being forced against the inner surface of the barrel that causes compression, making it possible to deliver air to the tire.

This self-oiling feature alone has been the means of placing the MONROE in thousands of the best known motor cars as standard equipment. There are other advantages, too. Send for a sample MONROE. Compare it point for point with any other pump. You'll find it the *logical* pump to go in the car *you* build.

MONROE AUTO EQUIPMENT MANUFACTURING CO.

MONROE **MICHIGAN**

Sales Representative to Jobbers Only

The Fulton Company **Milwaukee, Wis.**

STANDARD EQUIPMENT IN MANY LEADING MOTOR CARS

Front Axles and TIMKEN Tapered ROLLER BEARINGS

The overwhelming dominance of Timken Tapered Roller Bearings in front wheel mountings is conclusive evidence of the correctness of Timken design and construction.

Specifically Timken design means

the ability to carry all loads—radial loads, thrust loads, and resultant loads—continuously and simultaneously at required speeds—

the capacity to carry more load, size for size, than any other type of bearing—

the possibility of being easily and quickly adjusted when the wear which *must* follow motion does occur, and made to function as when new.



Timken Bearings mean light, simple, compact hubs—an initial saving both to maker and user; and snug, true running, nice-steering front wheels—a final saving and a great comfort to the user in particular.

©1922, T R B Co. Canton, Ohio

The Timken Roller Bearing Co
CANTON, OHIO



New Departure Ball Bearings

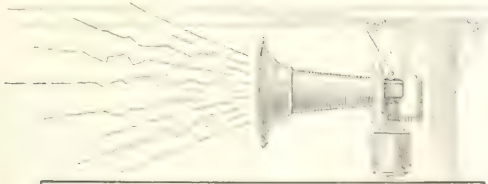
"The perfection of an art consists in the employment of a comprehensive system of laws commensurate to every purpose within its scope, but concealed from the eye of the spectator; and in the production of effects that seem to flow forth spontaneously, as though uncontrolled by their influence and which are equally excellent whether regarded individually or with reference to the proposed result."

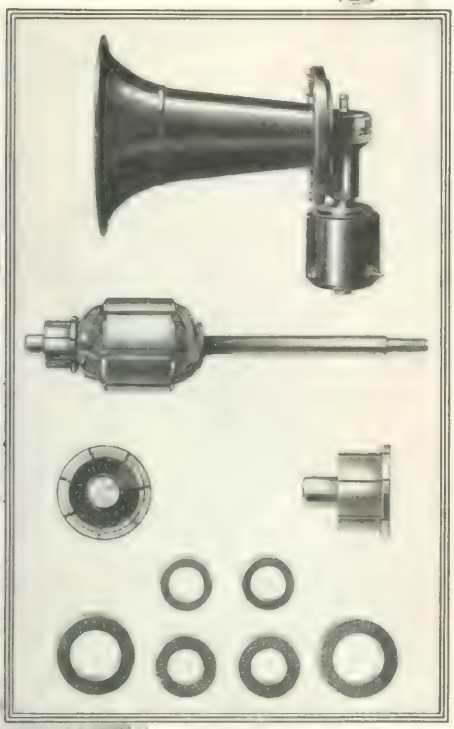
The governing policies in the manufacture of New Departure Ball Bearings could not be more concisely stated than by this writer. When it comes to producing a mechanical device for fighting off and nullifying the evils of friction, the ball type of bearing approaches most closely to absolutely perfection.

New Departure Ball Bearings are used in practically every make of American motor cars.

THE NEW DEPARTURE MANUFACTURING COMPANY

DETROIT Bristol, Connecticut CHICAGO





Standardizing a product *in the plans*

A long steady series of heavy vibrations —electrifying, penetrating, far reaching. . . . This was KLAXON, a new sound.

A small, compact, and easily operated device, for automobiles, industrial trucks, fire alarm and call systems, and, in France, for "gas alarms" . . . this was the Klaxon horn.

The public received it at once. Careful planning and construction backed up an efficient sales campaign and gave the buyer a finished article that needed no apology.

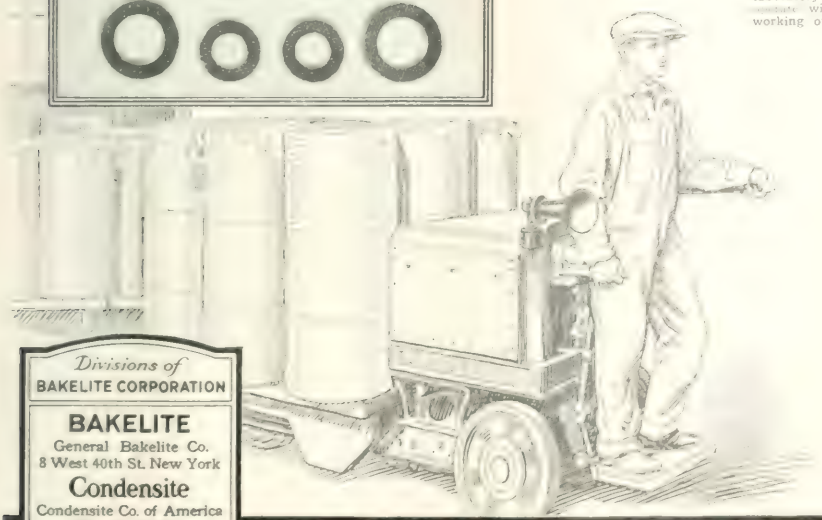
The faithful performance of Klaxon has been dependent upon the faithful performance and dependability of the materials of which it is made. In planning Klaxon they specified a Condensite molded commutator, Condensite impregnated armature, and Condensite-Fibre (moisture proof) insulating washers.

Condensite, like Bakelite and Redmanol, has proven a boon to the designing engineer through providing a standardized material of a thousand uses.

BAKELITE CORPORATION

Address the Divisions

Each Company maintains a research laboratory which will gladly co-operate with manufacturers in the working out of new applications.



Divisions of
BAKELITE CORPORATION

BAKELITE
General Bakelite Co.
8 West 40th St. New York

Condensite
Condensite Co. of America
Bloomfield, N. J.

REDMANOL
Redmanol Chemical Products Co.
636-678 West 22nd St.
Chicago, Ill.

The Material *of a* Thousand Uses

This Packard advertisement may suggest ways for making your reference advertising valuable to the buying group reached through The [illegible]ed Directory.

The Bac
Au

ESTABLISHED 1903
THE AUTOMOBILE TRADE DIRECTORY
PUBLISHED QUARTERLY
239 W 39th ST NEW YORK
The ORIGINAL BUYER'S GUIDE of the AUTOMOTIVE INDUSTRIES

E TRADE DIRECTORY

e Cable

Armored

Battery Charging Cable

Plain Acid Proof

Spot Light Cable

No Outside Braid

With Outside Braid

Specify by Trade Numbers

The Automobile Trade Directory

Lighting Cable
Two Conductor

Armored

Trade Numbers

Please Mention The Automobile Trade Directory

kbone of tomotive Advertising

and How to Use It

THE selling campaign that disregards Reference Advertising is seriously without a backbone.

Very few advertisers can afford big space in every issue of every important trade magazine. And in disregarding Reference Advertising, that is precisely what would be necessary in order to provide complete buying information for all prospects at all times. Because of the character of general advertising it obviously must be "come and go—here today and gone tomorrow."

But reference advertising is *permanent.*

If you could afford but *one* advertisement—a lasting advertisement that would reach 98% of the buyers of the industry and be referred to continually—you would use The Red Directory.

And if you could afford any amount of advertising—you would have an even bigger use for The Red Directory.

As a reference medium, The Red Directory supplements all your other advertising. And conversely—it is the vital backbone of all your advertising.

To use this advertising to best advantage, make it completely informative. Give the buyer all the information he needs in order to place an order—for that is why he consults the reference medium. Make it, as nearly as possible, a complete catalog for your automotive products.

And in all your other advertising refer to this catalog in The Red Directory. That gives a backbone and finality to your entire selling program. And it will lead to better business for you.

THE AUTOMOBILE TRADE DIRECTORY

"THE RED DIRECTORY"

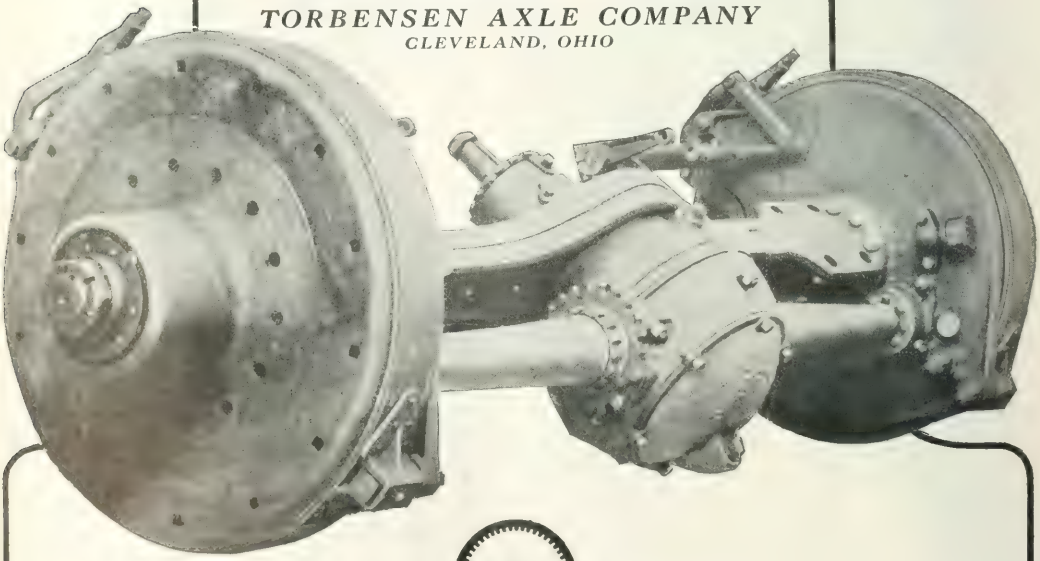
239 West 39th Street — New York City

The Original Directory of the Automotive Industries

TORBENSEN AXLES

Precisely the same features which have won Torbensen pronounced leadership in the light truck field, make it a better axle, also, for heavy duty trucks. It transmits more motor power to the driving wheels. It is the strongest axle, for a given capacity, built, as well as the lightest weight. It is much more simple in construction, and stands up better and longer. It is fully protected against dust, grit, and dirt.

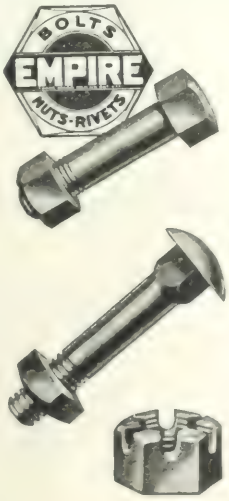
TORBENSEN AXLE COMPANY
CLEVELAND, OHIO



ANALYZE YOUR PRODUCTION SCHEDULES



Breakfast at the William Penn



I M stopping at the William Penn," said Riggs as Bronson and himself stepped out of the sleeper in Pittsburgh. "Have breakfast with me."

"All right," answered Bronson. "It beats all how eating makes one hungry. I've been feasting for several days now."

"Why all this fancy eating?" asked Riggs as they crawled into a taxi.

"Oh, I was up to the plant and we gave the old man a party. He's been grinding away there now for exactly fifty years."

"It's always interesting to know a man who has devoted his life to a task," said Riggs, a little later as the pair sat at a table.

"Usually a man stays because he likes the job, and he usually does well what he likes to do. A fine example of that is the Russell, Burdsall & Ward organization, bolt, nut and rivet people at Port Chester—you've heard of them. There's upwards of a hundred people in that plant who have been there more than 30 years. There's one man who has been on the job for 66 years, and a goodly group that has been there over 50 years."

"Yes, I know the concern," said Bronson. "I was purchasing agent for a little plant in Indiana when I first heard of Russell, Burdsall & Ward. We used to have a deuce of a time finding a dozen good nuts until we got acquainted with R. B. & W."

"I thought all nuts were alike," said Riggs.

"All Empire nuts are," said Bronson. "That's R. B. & W.'s trademark. They developed machinery to make nuts automatically perfect. A batch of bad nuts sure can break down the production schedule in any plant that uses many."

"Just how?" asked Riggs.

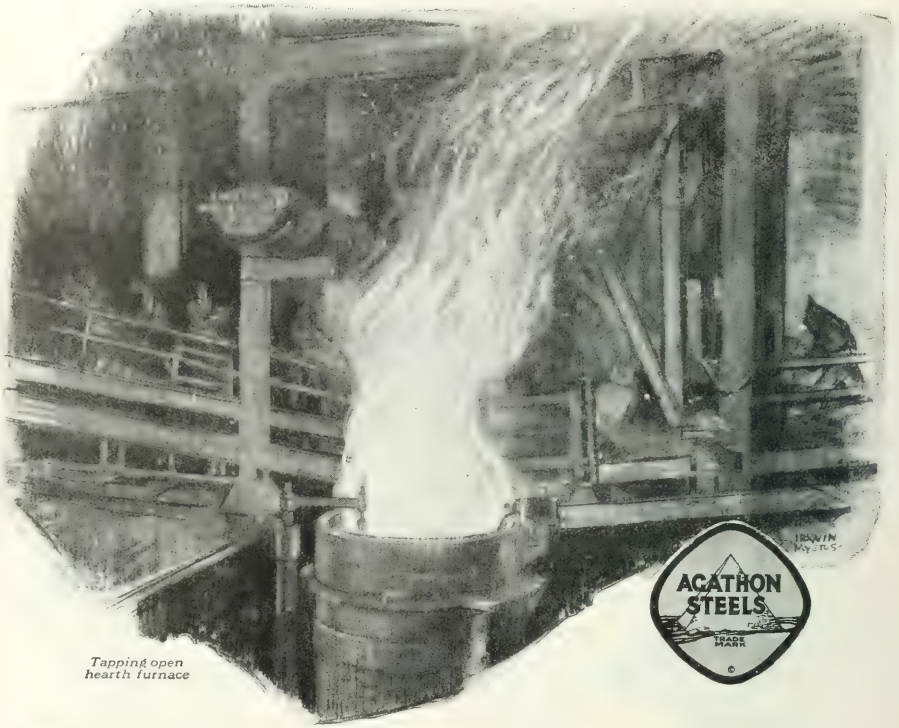
"Oh, it isn't the cost of the nut itself," answered Bronson. "It's the time the workman loses in trying on bad ones, but—"

"Here give me that check," said Riggs. "I invited you to breakfast. You know that nut dope rather interests me. I'm a stockholder in a little plant that may be overlooking something. I must make a memorandum on it—let's see, Russell, Burdsall & Ward, Empire nuts, Port Chester, N. Y.—there, that's done. Well, let's go."

RUSSELL, BURDSALL & WARD
BOLT & NUT COMPANY
PORT CHESTER, N.Y.

PEMBERWICK, CONN. • CHICAGO • SAN FRANCISCO • ROCK FALLS, ILL.

Makers of Bolts, Nuts and Rivets Since 1842



Tapping open hearth furnace

Today Are You Studying Your Problem in Steel?

Many manufacturers of products made of steel know, in a general way, that Agathon Alloy Steel is the superior of straight carbon steel for various constructional purposes. Questions beyond that they have set aside "to be investigated later."

Why not investigate now? Would a good alloy steel benefit *your* product? What exact analysis of alloy steel would be best? What heat treatment would be necessary? Would an alloy steel fit into your general scheme of machining, assembly, etc?

We can give you quickly and accurately just the information you will require to answer these questions and will be glad to do so on request. Send for interesting booklet—"Agathon Alloy Steels."

We have a daily production in all kinds of commercial alloy steels such as—

Nickel, Chrome-Nickel, Uma, Molybdenum, Chrome-Molybdenum, Nickel - Molybdenum, Vanadium, Chrome-Vanadium, Chromium, etc.

Deliveries in Blooms, Billets, Slabs, Bars, Spring Flats, Hot Rolled Strips, etc.

THE CENTRAL STEEL COMPANY, Massillon, Ohio

SWETLAND BLDG. CLEVELAND | BOOK BLDG. DETROIT | PEOPLES GAS BLDG. CHICAGO | UNIVERSITY BLOCK SYRACUSE | WIDENER BLDG. PHILADELPHIA

AGATHON ALLOY STEELS

HYATT

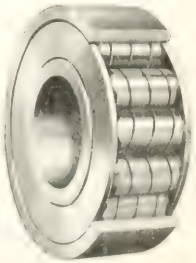


FOR more than 20 years the name "Packard" has been indelibly linked with all that is finest and best in automotive manufacture. Proud of such priceless reputation, Packard has jealously and consistently maintained a standard that has known no compromise with traditional Packard quality and character.

Since quality invariably seeks the association of quality, it is most fitting that the Packard Light Six should employ the services of Hyatt Roller Bearings.

Used in the transmission and on the shaft of the fan and pump unit Hyatt Roller Bearings assure for the entire life of this long-lived Packard car a most satisfactory bearing performance.

A Hyatt bearing with part of outer race removed to show the spiral rollers.



HYATT ROLLER BEARING COMPANY

Motor Bearings Division: Detroit, Michigan

Tractor Bearings Division Chicago, Ill. — *Pacific Coast Division* San Francisco, Cal. — *Industrial Bearings Division* New York, N.Y.

HYATT QUIET BEARINGS

Springs

carry the load, cushion the road shocks, take up the driving thrust from the rear wheels and protect riders and car from bumps and jars.

Springs must combine rigidity and flexibility in just the right proportion. They must have strength, elasticity and toughness to give them a high degree of resistance to fatigue, and to enable them to stand up without settling.

Vanadium Steel Springs

outride and outlast carbon steel springs. The high elastic limit of Vanadium Steel and its great toughness insure longer spring life. The well-known fatigue-resisting qualities of Vanadium Steel are the best assurance of long and dependable spring service.

Write for data on the strength, greater factor of safety and service life of Vanadium Steel Springs.

Vanadium Corporation of America

New York *Detroit*

VANADIUM STEELS

for Strength, Toughness and Durability



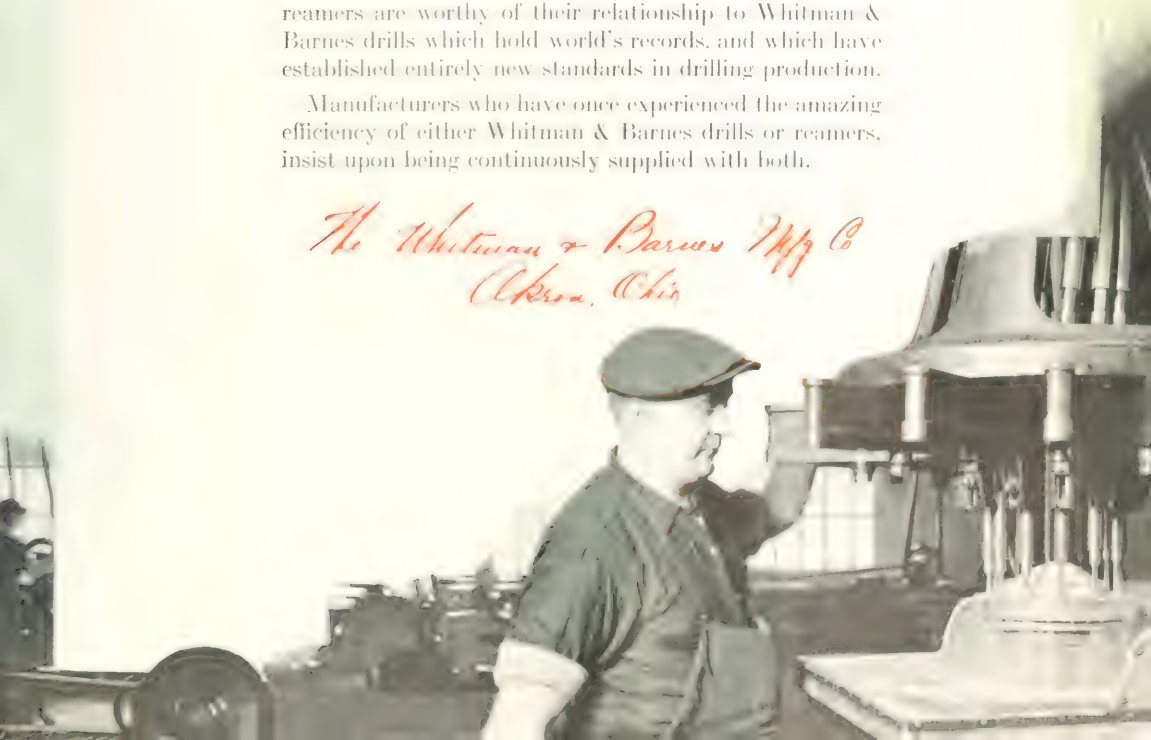
REAMERS

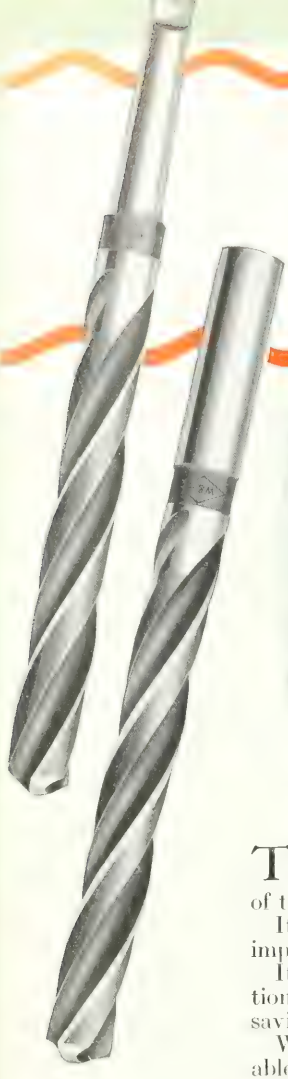
To justify their association with the Whitman & Barnes drills, Whitman & Barnes reamers must measure up to extraordinary requirements in the way of enduring quality.

In every possible respect these Whitman & Barnes reamers are worthy of their relationship to Whitman & Barnes drills which hold world's records, and which have established entirely new standards in drilling production.

Manufacturers who have once experienced the amazing efficiency of either Whitman & Barnes drills or reamers, insist upon being continuously supplied with both.

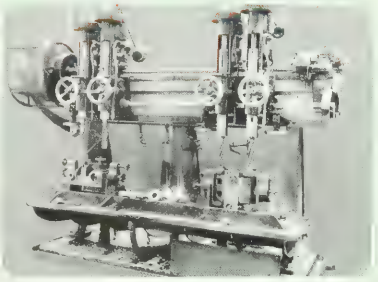
The Whitman & Barnes Mfg Co
Akron, Ohio





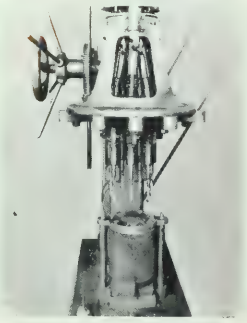
Holt CATERPILLAR *Tractors*

Reg. U.S. Pat. Off.



CAST steel track links, for Holt Tractor, are S. A. E. 1235, $2\frac{1}{4}$ inches thick. By the use of Whitman & Barnes high speed, three groove, one and three-eighths and two and seven-sixteenths drills, a production of 20 pieces an hour is maintained, re-grinding drills but once each day.

INDICATIVE of general production efficiency these cylinders are drilled and handled from floor to floor in $1\frac{1}{3}$ min. The prime factor in this notable rapidity of production is the Hercules $\frac{3}{4}$-inch drill used.



THE astonishing power and rugged durability of the Holt caterpillar tractor have long since attracted the attention of the whole world.

It is no slight distinction in itself to be identified as an important element in the production of this great machine.

It is an even greater distinction to be regarded as a production asset, and the basis of a substantial dollars and cents saving.

Whitman & Barnes are naturally well pleased that they are able so successfully to serve this distinguished company.

Here again is an occasion where Whitman & Barnes technical service is rendered with marked advantage, and where Whitman & Barnes drills and reamers perform with superior efficiency.

The same close co-operation that lowers shop costs for Holt, is available to every twist drill user.

"W & B" Warehouses

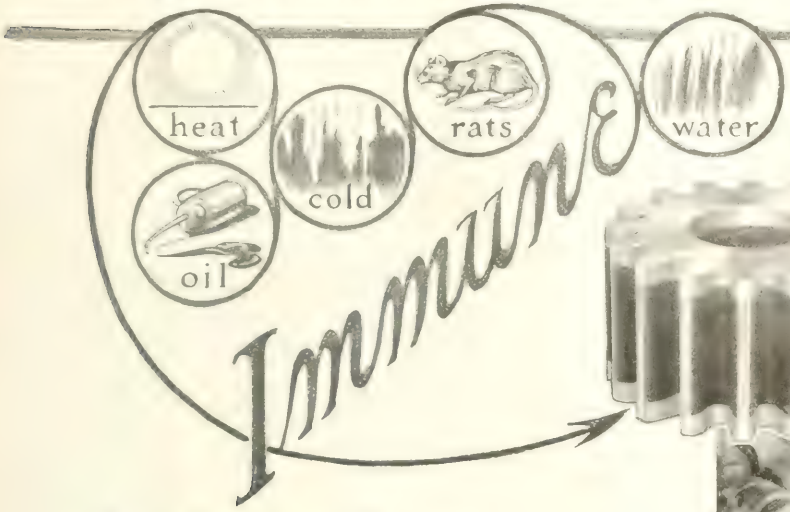
61 Reade Street, New York City
565 W. Washington St., Chicago, Ill.
139 Queen Victoria St., London, E. C. 4

Whitman & Barnes

AKRON, OHIO

Manufacturers of TWIST DRILLS AND REAMERS *Exclusively*

The ability of Fabroil Gears to resist destructive elements is only one of their many remarkable properties



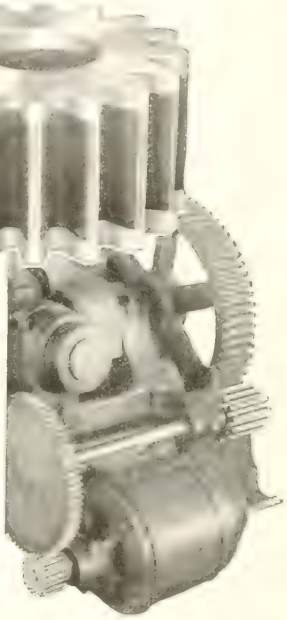
Let Service Tests Speak for Themselves

We have repeatedly claimed that Fabroil Gears lengthen the life of machinery and silence operation, and that they wear better than iron.

But don't be content to accept these statements. Test the gears yourself. Others have done it and become enthusiastic about them. When you have seen one of them at work you will also be convinced of their superior qualities.

Many leading machinery manufacturers and users now specify Fabroils as standard equipment. And you cannot afford to overlook the economies and other advantages to be gained.

There's a size to suit your needs—for driving coffee mills or for transmitting hundreds of horsepower. Standard blanks can be shipped from stock.



Two Fabroil Pinions driving tumblers in foundry.

Ask the G-E Sales Office nearest you for complete information.

General Electric Company

General Office Schenectady, N.Y.

Sales Offices in all large cities

40-A

U-LOY STEELS

Making travel comfortable in automobiles

Imagine!—twenty years ago—Saturday afternoon—ten miles to town. A farm wagon—rough roads, and—jolt! jolt! jolt! What a discomfort!

Not so today. In automobiles, traveling is now a pleasure and The Mather Spring Company, of Toledo, Ohio, has done much to make it so. Roads may be rough but Mather Springs take up the jolts. Possessing flexibility and life in the highest degree, they cushion the bumps, make riding comfortable and enable tires to give long wear. The unusual satisfaction these springs give can be a result of only two things: correct design and correct steel rightly heat treated. That steel is U-LOY.

Your product may require steel of highly elastic qualities as here—or exceptional strength—or unusual toughness. No matter what it may be, our metallurgists will work with you to determine the U-LOY Steel you need.

UNITED ALLOY STEEL CORPORATION
Canton, Ohio

New York	Chicago	San Francisco
Syracuse	Detroit	Indianapolis
Cleveland	Buffalo	Portland

Open Hearth and Electric Furnace U-LOY Steels are furnished in:—

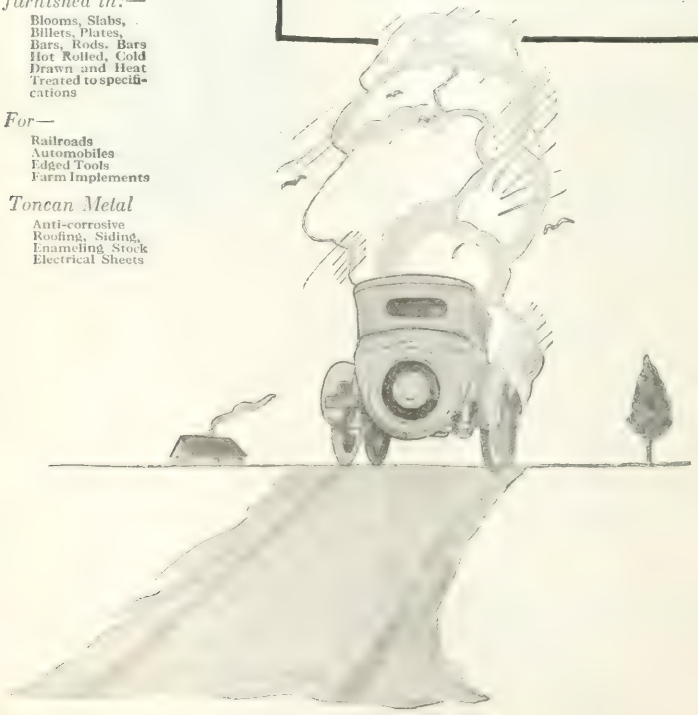
Blooms, Slabs, Billets, Plates, Bars, Rods. Bars Hot Rolled, Cold Drawn and Heat Treated to specifications

For—

Railroads
Automobiles
Edged Tools
Farm Implements

Toncan Metal

Anti-corrosive Roofing, Siding, Enameling Stock Electrical Sheets





MATHER SPRINGS

Give cars remarkably easy riding qualities. Made of U-LOY Steel.



Smooth

Like a well-built car on new asphalt, a genuine Morse Chain performs *smoothly*.

The specially shaped Morse links, operating on the exclusive "rocker-joint" principle, bring about this happy result. They mesh with the sprockets with a rolling motion that reduces friction and operates silently.

They drive cam and accessories the way you like to see production going.

MORSE CHAIN COMPANY

Main Office and Works
ITHACA, NEW YORK

Sales and Engineering Office
DETROIT, MICHIGAN



MORSE

GENUINE SILENT CHAINS



Alloy Steel that meets your requirements better than ever before

For you it may prove to be Harrisburg. For hundreds of critical buyers it has proven to be Harrisburg. An alloy steel that merely equals in quality and uniformity what you are now using gives little reason for a change in your source of supply. An alloy steel which shows greater uniformity, closer conformity to specifications than you have heretofore known is well worth adopting as a standard of quality.

The constantly increasing use of Harrisburg Alloy Steels simply means that in Harrisburg men with visions of improved products and improved production are finding steel that meets their requirements better than ever before.

You, too, may obtain such steels in form of skelp, slabs, billets, strips, rounds, flats and shapes. Your inquiries will receive prompt attention, and the service of our engineers is at your disposal.

HARRISBURG
PIPE & PIPE BENDING COMPANY
HARRISBURG, PENNA.

HARRISBURG
ALLOY STEELS

Oil-Vac

A KINGSTON PRODUCT

A Step Forward in Vacuum Fuel Feeding Systems

THE KINGSTON VACUUM FUEL FEEDING SYSTEM differs from other types in that the vacuum is not taken from the manifold, but is produced from oil pump suction. While we do not contend that this departure is revolutionary, automotive engineers who have investigated *Oil-Vac* agree with us that it is an important step forward.

Oil-Vac, the new system, does away entirely with the intake manifold as a suction source. Briefly it consists in utilization of the suction produced by a properly proportioned oil-circulating pump.

With the *Oil-Vac* system there is the certainty of increased suction with increased engine speed. When the greatest amount of fuel is needed, as on long grades and at high speeds, the greatest amount is actually being delivered.

In the case of *Oil-Vac*, since there is no connection with the manifold, there is no disturbance of carburetion.

With *Oil-Vac*, since the vacuum is created by the circulating oil pump of the motor, an absence of oil causes the vacuum tank automatically to cease to function—a warning device that every motorist will appreciate.

With *Oil-Vac*, crank case dilution is materially lessened, oil runs cooler and lubricates more efficiently.

These are a few of the points of superiority in *Oil-Vac*. Watch for the full story as it appears in this publication.

NO OIL—NO VAC—

No Gas

With Oil-Vac the vacuum ceases to exist when the oil supply becomes exhausted. This constitutes a factor of safety that automobile builders and motorists have long desired.

BYRNE, KINGSTON & CO., KOKOMO, IND.

BRANCHES:

New York, 243 West 55th Street
Chicago, 1130 Michigan Avenue
Detroit, 1610 Woodward Avenue
Boston, 15 Jersey Street
San Francisco, 32 Van Ness Avenue

A Certain Car Manufacturer



wanted a feed system he could depend upon to take his car where it was going and bring it back. A system that both owners and dealers would be perfectly satisfied with. He chose the Stewart Vacuum System.

He wanted a speedometer that was absolutely reliable and accurate; that would register correct speed from the first turn of the wheel without vibration, without noise. An instrument of quality appearance, fine workmanship.

He chose the Stewart Magnetic Speedometer. What else was there to do? Ninety per cent of manufacturers have done likewise.

All Stewart-Warner Products are backed up by exclusive Service Stations throughout the world.

STEWART-WARNER SPEEDOMETER CORPORATION
CHICAGO U. S. A.



Stewart Model 131

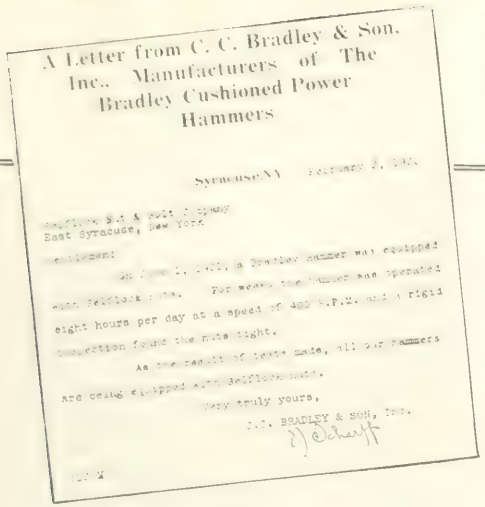


Warner De Luxe Model 72



Van Sicklen Standard Model

Stewart
PRODUCTS
USED ON 8 MILLION CARS



A Letter from C. C. Bradley & Son, Inc., Manufacturers of The Bradley Cushioned Power Hammers

Syracuse, N.Y. February 3, 1922.

Gentlemen:

On June 21, 1921, a Bradley hammer was equipped with Selflock nuts. For seven months the hammer was operated eight hours per day at a speed of 400 B.P.M., and a rigid inspection found the nuts tight.

As the result of tests made, all our hammers are being equipped with Selflock nuts.

Very truly yours,

C. C. BRADLEY & SON, Inc.

No Form of Vibration Has Been Discovered That Will Jar Selflock Nuts Loose.

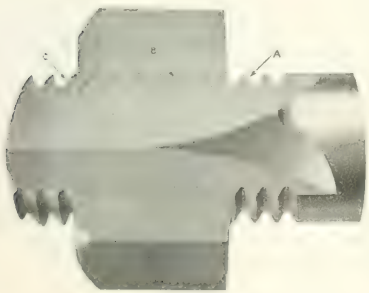
ASIDE from the indisputable holding qualities of Selflock Nuts, brought so forcibly to light in the letter reproduced on this page—aside from double frog railroad crossing tests — laboratory tests of the most intense character—

Aside from valid evidence and statements of tests that have proved, unmistakably and decisively, that Selflock Nuts cannot be jarred or shaken loose—aside from all this is their rare *economy* value.

One-piece—no extra parts—no lock washers — no extra lengths of bolt material—no extra locking devices —but a one-piece nut whose threads lock in a vise-like grip.

Selflock Nuts are not only sound in principle — but are unmistakably *Economical* in every respect.

We invite engineers to put Selflock Nuts to any test they may prescribe. Your inquiries will receive our very prompt attention.





U. S. Standard Thread

SELFLOCKING Screwthreads are equal in area and strength with Standard threads. They differ only in the shape of their cross section.

The depths, flats, top and bottom, widths or bases, and the number of threads per inch are exactly the same. The only difference is that the bases of the SELFLOCKING threads are to one side a few thousandths of



Selflock Thread
U. S. Patents No. 1,250,748, No. 1,300,801

Although the contour of each type of thread is slightly changed, the bearing sides of both nut and bolt threads are in perfect contact, and each and every SELFLOCKING thread carries its proportion of the total load.

SELFLOCK nuts can be used many times without losing their efficiency, and their locking qualities remain intact if they are reversed after several times use one side down

Selflocking Set Screws, Cap Screws, and Stud Bolts have Standard number of threads per inch and will frictionally lock in any properly standard threaded hole. Plain nuts will also lock on all Selflocking Screws and Studs

SELFLOCK NUT AND BOLT CO.

INCORPORATED

EAST SYRACUSE - NEW YORK



THE practical way to go about the marketing of any worth-while automotive product is first to enlist the help of the trade. They can get your product to the consumer, quickly and economically.

But even if your product *is* worth-while you may find difficulty in getting the trade to accept it, until jobber and dealer are satisfied as to its salability.

There is no better way to acquaint the dealers and jobbers all over the country with the merits of your product than by advertising through the business magazines which they read. Find your strong selling points * and present them in a consistent advertising program.

The dealers and jobbers who read *Motor World* and *Motor Age* do three-quarters of the trade's entire business.

Advertising in these magazines will put you in touch with the men in the trade who can serve you best.

Rates and sample copies on request.

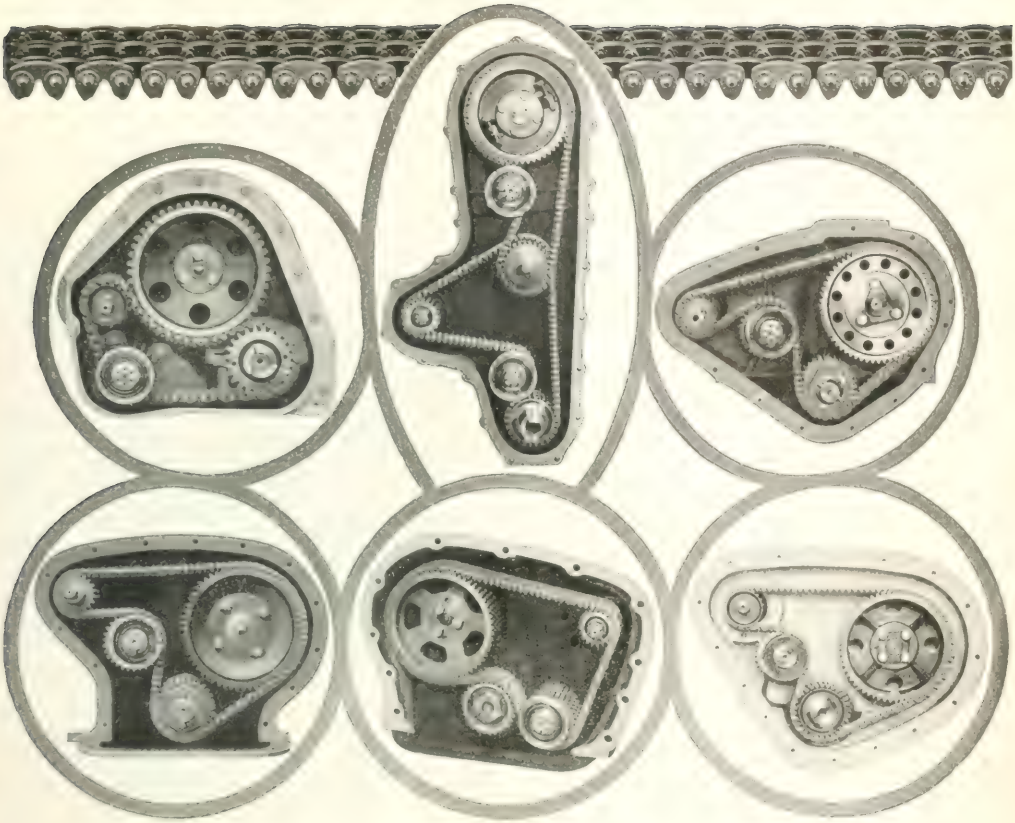
**The Merchandising, Research, and Advertising Service Bureaus of The Class Journal Co. can help you.*

Are you on our mailing list for "Facts and Information concerning the Automotive Distributing Field?"

THE CLASS JOURNAL COMPANY

New York, U. P. C. Bldg., *Chicago*, Mallers Bldg.; *Boston*, 185 Devonshire St.; *Philadelphia*, Widener Bldg.; *Cleveland*, Guardian Bldg.; *Detroit*, 317 Fort St., West; *Indianapolis*, 1212 Merchants Bank Bldg.

Publishers of AUTOMOTIVE INDUSTRIES, MOTOR WORLD, MOTOR AGE, COMMERCIAL VEHICLE, EL AUTOMOVIL AMERICANO, MOTOR BOAT, DISTRIBUTION & WAREHOUSING, THE TIRE RATE BOOK.



ALL ARE QUIET-RUNNING ENGINES

ONE of the great accomplishments in engine refinement is the quiet-running motor "front end."

Noisy gearing, just like hand cranking, has been superseded. Quiet-running is demanded by the car buyer. Automobile Engineers are meeting his wishes—and adding at the same time many unlooked for advantages. Link-Belt has produced the winning combination — the Link-Belt Silent Chain and the famous Automatic Tightener. It keeps just the right operating tension on the chain at all times—automatically. Requires no hand adjustment.

You can build quiet-running into "front end" drive. Give the car-user something he has wanted but didn't know he could get.

LINK-BELT COMPANY, INDIANAPOLIS

1131

LINK-BELT

SILENT CHAIN FRONT END DRIVES

Annual Reference Number

of

THE COMMERCIAL VEHICLE

JANUARY 15th, 1923

The Fleet Owners' Reference Book for 1923

This annual reference number of THE COMMERCIAL VEHICLE (heretofore published on January 1st) will be larger and more complete than ever before. It will present a fund of constructive information to everyone identified with the use or sale of motor trucks, buses, trailers, parts and accessories.

Besides an exhaustive survey of conditions and accomplishments in the field during the past year, it will contain a forecast of the trend for 1923.

Complete specifications of gasoline and electric trucks, bus chasses and trailers on the American market will be published. All representative makes will be included.

This issue will present an opportunity, the value of which a great many manufacturers recognize. As a medium for getting and keeping the attention of the country's big motor truck fleet owners, it is unparalleled, for these fleet owners will retain this number for reference during 1923.

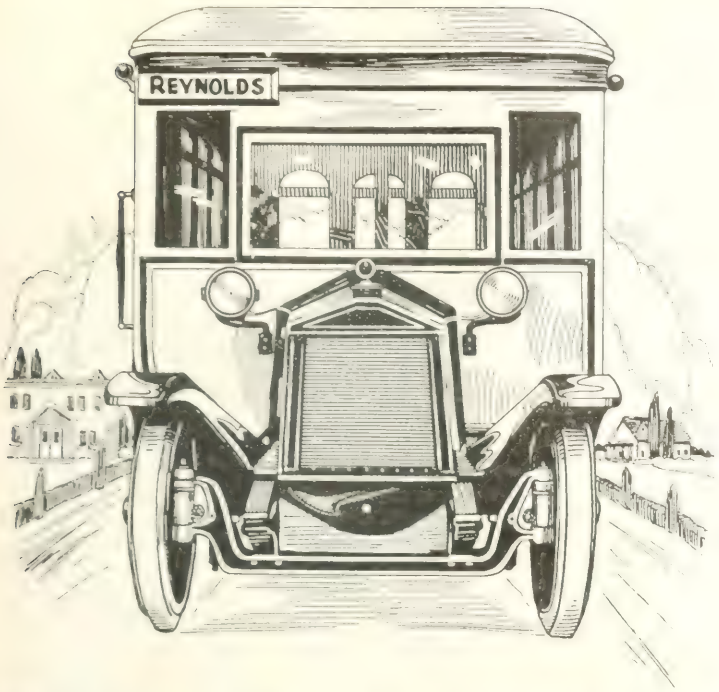
Far sighted manufacturers who look to these fleet owners for a portion, or all, of their business will not overlook the opportunity to get their message over in a convincing way in this January 15th number. Incidentally, this issue also affords an excellent beginning for a strong campaign in this field during the coming year.

Copy and cuts should reach us as much in advance of closing date (January 9th), as possible, to insure best attention and position. Our Service Department will gladly assist in preparation of copy. Rates and other data will be promptly furnished on request. *Make your reservation now!*

Forms Close January 9th, 1923

THE COMMERCIAL VEHICLE

239 West 39th Street **New York, N. Y.**



Making Good Coaches Still Better

Coach builders who strive for the best in construction and who realize how vitally important the front axle is to the successful service of a motor coach, place their trust in SHULER FRONT AXLES.

SHULER FRONT AXLES are built by an organization that specializes in **front axles exclusively** for motor coaches, trucks, tractors and trailers. Our engineers are at the service of manufacturers who want to make a good vehicle better by using these specialized and highly perfected units.

SHULER AXLE COMPANY

Front Axles for Trucks, Tractors and Trailers

3001 Jones Street — Louisville, Kentucky



Automotive Market in Latin America Due for Larger Development

"We have not realized in an automotive way the possibilities of the roads already built."

This comment upon conditions in South America was made by one of our leading export executives upon his return from a three months' trip through Argentina, Brazil, Chile, Peru and Uruguay.

The time to increase your effort in this field is now—when the spring season is approaching.



El Automóvil Americano

Automoviles · Camiones · Moto-Cicletas · Aeroplanos · Tractores

Published by

The Class Journal Co.

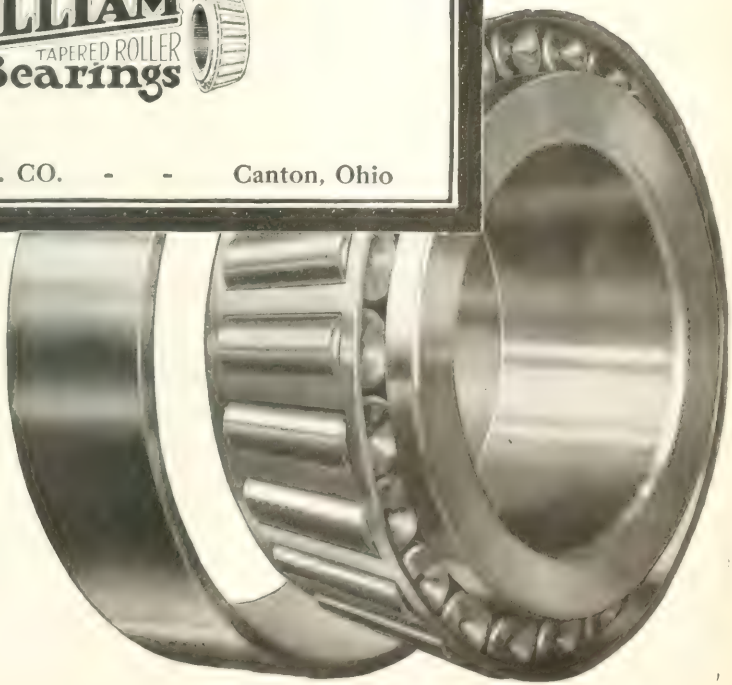
239 West 39th Street New York

The Rollers in GILLIAM Tapered Roller Bearings are contained within a clean-cut, one-piece, steel stamped cage flanged inward on the small diameter, thus insuring rigidity and durability.

Axle manufacturers using Gilliam Tapered Roller Bearings include: Adams, Clark, Columbia, Flint, Salisbury, Sheldon, Standard Equipment, Torbensen, U S, Vulcan, Wisconsin.

GILLIAM TAPERED ROLLER Bearings

THE GILLIAM MFG. CO. - - Canton, Ohio



Cups, Cones, Rollers
ALLOY Steel
THROUGHOUT

A. I. 12-28-22

Minnesota Mining & Mfg. Co.
797 Forest St.,
Saint Paul, Minnesota

Please send us samples and full information regarding your "3-M" Waterproof Sandpaper.

Name

Address

State whether trial will be used on varnish or surfacer.



REG. U. S. PATENT OFFICE

WETORDRY

REG. U. S. PATENT OFFICE

SAMPLES

Will be sent upon request to Automobile Manufacturers, Body Builders, or Repainters interested in a successfful waterproof sandpaper.

Used with water, it is already replacing oil sanding and pumice rubbing in several automobile and body plants; is highly recommended by varnish manufacturers, and in letters we have received is declared the greatest improvement ever offered the industry.

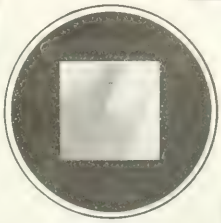
We stand the expense of your investigation. The samples are free.

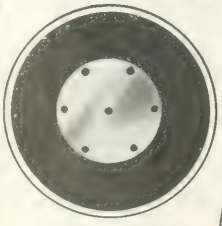
USE THE COUPON



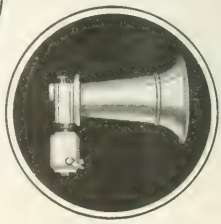
Horn Diaphragm made of

LANCASTER
Special Alloy Strip
STEEL





COLD ROLLED STRIP STEEL
Alloy, High & Low Carbon
for
Brake Bands - Diaphragms
Clutch Discs
Shoe Shanks



Other Quality Products
COLD DRAWN WIRE & BARS
Spring Wire - Ball Steel
Drill Rod - Spoke Wire
Special Axle Steel

LANCASTER STEEL PRODUCTS CORPORATION
MILLS LANCASTER, PA. U.S.A.

HARTFORD DETROIT BUFFALO NEW YORK CHICAGO PHILADELPHIA

PERFECTION
S P R I N G S



IT takes knowledge and care and a certain amount of devotion to an ideal to make even such prosaic things as springs—and make them really good. That's why Perfection Springs made to the same specifications as others are often so vastly different, just as cakes made to the same recipe by two different cooks. And it doesn't take a highly trained inspector to detect the difference, in either case.



THE PERFECTION SPRING COMPANY
CLEVELAND, OHIO



SPRINGS, WIRE & STEEL
EST.
"BARNES-MADE" PRODUCTS
1857
SCREW MACHINE PRODUCTS

The Wallace Barnes Company

"Spring Makers for Three Generations"

Main Office and Works – Bristol, Conn.

Western Office—6400 Miller Avenue, Detroit

BEFORE THE ADVENT

of the Audit Bureau of Circulations in 1914, each publisher made his own circulation statements to advertisers.

Many of them were truthful. Some were not.

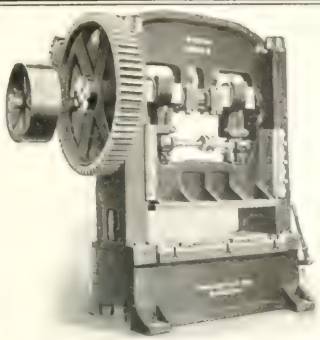
But there was confusion and lack of uniformity. An intelligent comparison was impossible. Details regarding distribution were not generally given because there was no standard of practice in keeping the records.

The Audit Bureau of Circulations has brought order out of chaos. Today the Bureau's system of keeping records is almost universal among the better publishers. Uniform reports are furnished to advertisers verified by that absolutely independent organization.

The experienced advertiser demands A. B. C. reports and if the publisher has nothing to hide, he gets them.

A. B. C. reports in Automotive Industries are furnished on request.

Lower Costs



and Maximum Production

615E Double Crank Press

Sheet Metal Machines and Tools

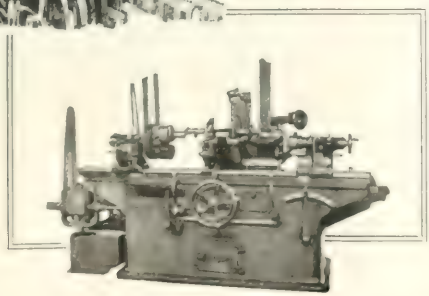
Are you getting the maximum output with the minimum costs? Can you replace expensive castings with metal stampings or drawn metal parts?
Let our Engineering Department—over 43 years' experience—help you to reduce your costs and increase your production; you are under no obligations in doing so.
We are manufacturers of presses, punches, squaring shears, ring and circle shears and tinners' tools. Ask for catalog.

NIAGARA MACHINE & TOOL WORKS
Established 1879
BUFFALO, N. Y. U. S. A.

NIAGARA

60163





Be Sure It's a Service Station Grinding Machine

Not all grinding machines are suitable for your service stations—this particular Landis is especially so. It has everything to make it a success in the hands of garage mechanics.

Quick and easy changing from one job to another.

A crankshaft one hour—a set of pistons another. Then a set of valves, or tappets or whatever comes along.

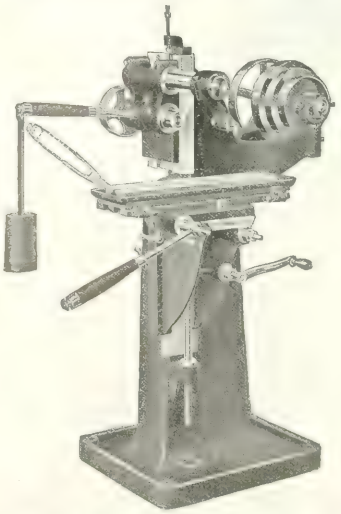
Made by grinding machine specialists of many years' experience. Country-wide Landis Service.

LANDIS

LANDIS TOOL CO., WAYNESBORO, PA.
New York Office, 51 Chambers St.

THE
"WHITNEY"
HAND
MILLING MACHINE

THOUSANDS IN USE



PROMPT DELIVERIES

Don't forget that the greatest demand for the

"WHITNEY"

comes from big plants manufacturing interchangeable work, where rapid, accurate and economical production are absolutely essential.

One manufacturing concern has ordered over 700 of these machines. Many others have over 100 each.

THE WHITNEY MFG. CO.
Hartford, Conn.

CHAINS, KEYS and CUTTERS
HAND MILLING MACHINES

FOREIGN AGENTS
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SUPREME
AUTO
OIL

FLOWS FREELY AT ZERO

DEALERS:

Your customers will appreciate
SUPREME AUTO OIL

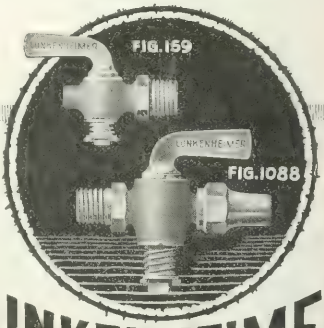
Frozen oil in the crankcase plays havoc with bearings and batteries.

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GULF REFINING COMPANY
General Sales Offices: Pittsburgh, Pa.

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LUNKENHEIMER
Ground Key Cocks

For Gasoline, Oil, Air and Drain Service, particularly adaptable for Automotive use. Male or female pipe threaded ends, soldering or flared tubing union connections.

Spring Key Pattern provides self-adjustment, though easily operated key.

The comprehensive line of Lunkenheimer Ground Key Cocks for all classes of service is thoroughly illustrated and described in Booklet 522-HK. Write for a copy.

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"QUALITY"
LARGEST MANUFACTURERS OF HIGH GRADE ENGINEERING SPECIALTIES IN THE WORLD
NEW YORK CHICAGO CINCINNATI U.S.A. BOSTON LONDON
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"Van Dorn" GEARING

GEARING
Worn-out Gear Teeth—
THE REMEDY

Everything wears out—even gear teeth. But some wear too rapidly.

"Van Dorn" Gears stay on the job.

The reason is obvious.

A complete analysis of the gear application dictates the most suitable material to use, the proper method for cutting or generating the teeth, and the production of high quality gears that stand up under the most severe usage.

It's all in knowing what is required and the facilities for performing the work.

"Van Dorn" is prepared to handle many gear problems.

Why not let us analyze your gears? Send prints or rough sketches.

Gear Craftsmen Since 1897

THE VAN DORN & DUTTON CO.
GEAR SPECIALISTS
CLEVELAND, OHIO, U.S.A.

THE TOWING MOTOR OF INDUSTRY



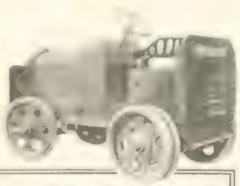
THE value of a product, such as the TOWMOTOR, becomes distinctly prominent when it is supported by a long list of satisfied users who testify to its economy of up-keep—saving of time and man-power—and dependability throughout.

A large iron works says:
"The TOWMOTOR is doing the work of five men and one team in our plant, is working every day and giving very satisfactory service."
All claims for the TOWMOTOR are supported by any number of such letters from well known organizations in various parts of the country. A lengthy list of satisfied users tell the complete story of the TOWMOTOR.

Co., Liverpool, England

The superiority of the TOWMOTOR has been proved in service. Write for complete list of users and their comments on the savings it affords.

The Towmotor Co.
Cleveland, Ohio



For *Towmotor* has Made Good

We are Playing Square with YOUR Customers By Playing Square with YOU—

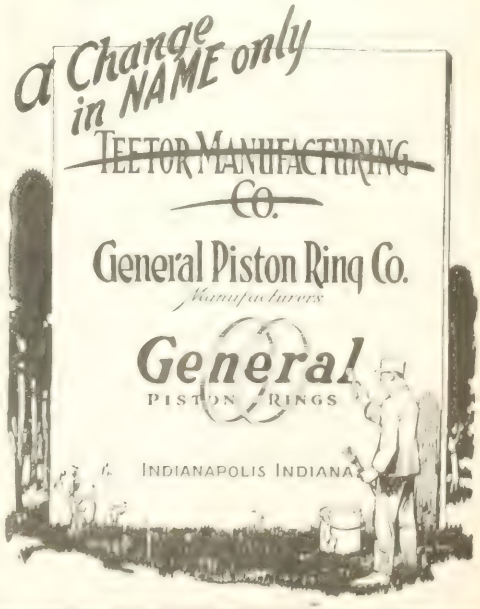
General PISTON RINGS

As far as piston rings are concerned we could make a lower quality ring that would get your cars out of the factory satisfactorily, rings that could "get by." And that would mean more immediate profits to us too. But if your customers get a continued high class motor performance over a period of years, they are going to be satisfied. Then you are going to be satisfied and pleased with your piston ring source. Although we are the last in line to profit, that is the way we prefer to do business.

Oil pumping or loss of compression after only a few months service is one evidence of ordinary piston rings. That condition is neither necessary nor fair to your customer—and it is unknown among those we serve. Over twelve years of 100% satisfaction is behind the General Piston Rings you get today. And although your car owners cannot specify the piston rings you should use—their continued satisfaction is both your best asset and ours.

And General Piston Rings cost no more.

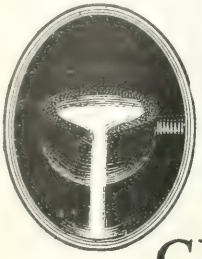
GENERAL
PISTON RING COMPANY
Indianapolis, Indiana



This is Real Economy!

Castings are such a vital part of the car, truck or tractor that it is a matter of ultimate economy to buy from a source where unfailing quality is assured.

For not only do castings, that are exactly up to specifications, make for a better product and one that will give greater satisfaction in service, but they also help to cut production costs since no expensive machining is necessary.



You can buy Cheney Castings with Absolute Confidence because they are made right by men who know how to make them right.

Put your casting problems up to Cheney—he will solve them.

This is real economy.

Cheney and Son
Manlius, N. Y.

CHENEY
GRAY IRON CASTINGS

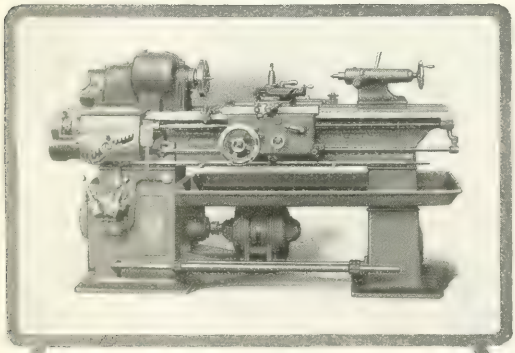
There's a wonderful talking point in the fact that Hoover Balls are practically the unanimous choice of the industry.

HOOVER

The World's Largest Plant Manufacturing Steel, Brass, Bronze, Monel, Aluminum and Hollow Balls

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Ann Arbor, Mich.

Chicago.....180 N. Market St.
Philadelphia.....239 Middle City Bldg.
Cleveland.....3124 Edgehill Road
Chattanooga.....Sanford Bros.

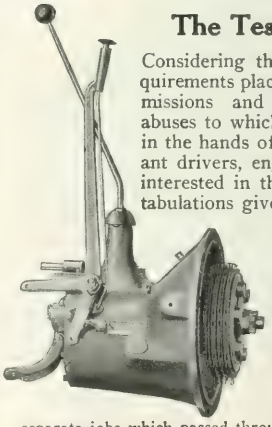


New Principle of Motor Drive

This HENDEY 1922 design 14" lathe is driven by a constant speed motor through speed change gears running in oil tight box located in cabinet leg. From here the drive is by enclosed belt to spindle. Not a geared head lathe. 9 spindle speed changes obtained in speed box and 9 through spindle back gears. Belt pull on spindle is downward opposing upward thrust of heavy cuts. Foot treadle for momentary stopping by releasing belt tension. Ask for special folder of 1922 design.

THE HENDEY MACHINE CO.
TORRINGTON, CONN.

HENDEY



The Test of Service

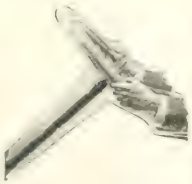
Considering the heavy service requirements placed upon truck transmissions and clutches, and the abuses to which they are subjected in the hands of careless and ignorant drivers, engineers will then be interested in the repair percentage tabulations given below.

Read the Story

The following table is an actual record of the repairs on REPUBLIC trucks made by the Roberts Motor Car Company, REPUBLIC distributors, at Portland, Oregon. There were 317 separate jobs which passed through their shops and the following table shows the percentage of repairs from the different parts of the trucks:

Transmission (FULLER)	1.26%
Clutch (FULLER)	5.66%
Springs of all kinds	1.26%
Frame, all kinds	1.56%
Shift spring, rear axle, all causes	2.50%
Shift spring, front axle, all causes	2.52%
Rear axle, except brake	6.00%
Steering gear, repairs all kinds	6.00%
Propeller shaft and Universal joints	8.20%
Brakes	11.34%
Engine repairs, all kinds	53.70%
TOTAL	100.00%

FULLER & SONS MFG. CO., Kalamazoo, Mich.



WHY PERMIT ANY TREMOR CAUSED BY UNBALANCE?

There is no necessity for

Vibrations

in an automobile, caused by unbalance of crankshaft, flywheel or clutch-housing.

The driver is not the only occupant of the car who becomes forcibly aware of "engine periods," altho probably most responsive thereto.

Let us eliminate vibration in your cars.

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GEAR COVERS
GAS TANKS
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SPECIAL STAMPINGS

Over 40 years of successful manufacturing experience, fifteen acres of floor space, a strictly modern equipped plant, an organization of specializing experts are a few reasons why it will be to your advantage to let us furnish estimates from your blueprints.

Our name plate has always stood for quality, integrity and highly developed workmanship. We mean to live up to that reputation.

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Detroit Office: 712 Dime Bank Bldg.
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G.P.&F.SERVICE
"KNOWING HOW SINCE '81"

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Success in the largest sense can come only to the manufacturer who understands not his own business alone but also the needs of the various businesses he serves. Only out of such knowledge can come the full measure of the service a buyer has a right to expect. An experience of 17 years in the production and use of die-castings—daily contact with hundreds of industries where die-castings are used—unceasing research, experiment and development—the constant operation of the largest plants in the industry—these are some of the factors contributing to the mastery of the art which has made Doehler the world's largest producer of die-castings. Every Doehler Die-Casting is a master casting.

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Doehler die-cast automotive parts—accurate, uniform, high in quality.

BRYANT CHUCKING GRINDER COMPANY

Springfield, Vermont

BRYANT

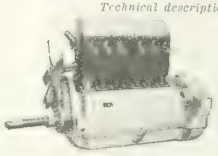
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Hole and Face Grinders
Deep Hole Grinders

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Power plants for the heavier and better class of passenger cars, and heavy duty types for truck and tractor service.
Built particularly to meet the exacting demands for power and endurance in high grade vehicles. Have successfully met these demands for over 20 years.
Technical descriptions sent upon request.



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Milwaukee, Wisconsin



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And HEAVY DIE FORGINGS

The Park Drop Forge Co.

Cleveland, Ohio

THRUST Ball Bearings, Angular Contact Thrust Bearings and **Angular Contact Radial Bearings** made to your requirements and dimensions. **Star Ball Retainers** for Thrust, Magneto and Cup and Cone Bearings.



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Lancaster, Penna.

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Interlocked spokes and steel fellae



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The Advertising Man must know that the circulation claims of the papers with which he does business are justified by the facts. He has the reports of the Audit Bureau of Circulations.

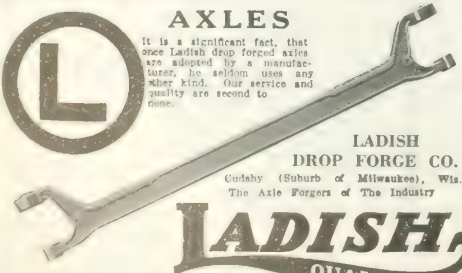
Good firms invite investigation of their rating or their merchandise.

Good papers furnish A. B. C. reports to their advertisers.

Ask to see the A. B. C. report of the AUTOMOTIVE INDUSTRIES.

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It is a significant fact, that once Ladish drop forged axles are adopted by a manufacturer, he seldom uses any other kind. Our service and quality are second to none.



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Cudahy (Suburb of Milwaukee), Wis.
The Axle Forgers of The Industry

LADISH QUALITY DROP FORGINGS

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"Trustworthy Engine"

FOUR SIZES
35 to 70 H. P.
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Builders of Internal Combustion Engines for Automotive and Industrial Power Purposes.

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The WHITE Hardware Metal

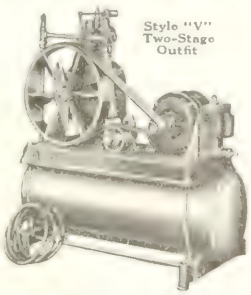


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AIR COMPRESSORS



Style "V" Two-Stage Outfit

CURTIS is recognized as a pioneer in the air compressor field. Sixty-nine years' manufacturing experience, twenty-six of which have been devoted to pneumatic machinery, has enabled us to develop compressors entirely original in design. As a result, Curtis Outfits have many exclusive features that assure dependable service with minimum upkeep.

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We manufacture a complete line of single and two-stage outfits—a size, style and arrangement to suit your needs. There are definite reasons why you should insist on a Curtis. Write at once for full details—our proposition and prices.

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An Original Design

The efficiency of a two stage compressor depends on how thoroughly the air is cooled in the intercooler. Copper throws off heat faster than any other metal—it is used exclusively on Curtis intercoolers, thus assuring fullest advantage of two-stage compression.

FIRST AND ONLY
Two-Stage Compressor with a Copper Intercooler



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Our factories are tooled up with the most modern machinery for quantity production of piston pins and valves. We have manufactured Piston Pins and Valves for years and our products have an excellent reputation.

We are in position to manufacture to your specifications from your blueprints in any quantity, promptly.

May we submit prices on your requirements?

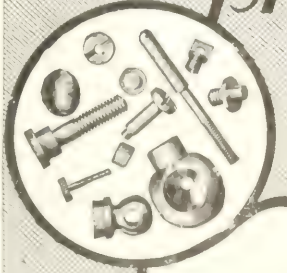
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Screw Machine Products
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Of proper material;
Turned on the finest modern machinery;
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WATERBURY CONN.

A complete service—
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Steel Products Company service has always meant an engineering staff that serves as "a department of your own plant" in the fulfillment of your individual assembly needs, and three great factories to meet every requirement of quality, quantity and delivery

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Originators and makers of the non-burning Thompson Silcrome Valve

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Trade Mark

Meisel *quality* actually eliminates your gear troubles—enhances the value of your products.

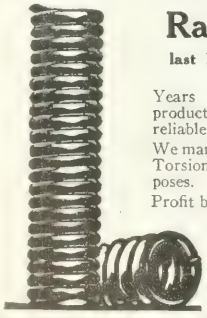
An ideal—*accomplished* and *sustained*. You are losing — time — patience — money: unless you use Meisel *quality*.

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and other Hardened and Ground Parts, Bushings, Piston Pins, etc. In any quantity. Accuracy. Service. Exceptional prices.
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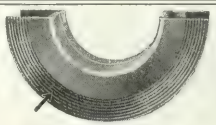
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last longer—therefore—cost less.

Years of Spring making and quantity production enables us to guarantee you a reliable product at low ultimate cost.
We manufacture Extension, Compression, Torsion Springs for great variety of purposes. Any material desired.
Profit by getting our quotations.

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PATENTS PEND.



These Screws with their super-fastening Qualities and easy operation have found a place in the automotive industry.

Eliminates the tapping operation. It cuts its own thread and turns under the impact of a hammer blow.

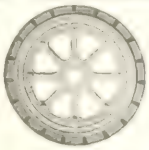
Vibration cannot jar it loose.

A cheaper means of fastening than machine screws—and a far superior one than escutcheon pins for attaching name plates, parts, etc., to steel, cast iron or composition.

We'll be glad to send you samples and tell you about the fine results obtained by a number of leading automotive manufacturers.

There's a size that will exactly fit your needs.

PARKER SUPPLY CO., Inc., Dept. AI, New York
Branches: Chicago, Philadelphia, Springfield, Minneapolis.



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of MALLEABLE IRON

Van Metal Wheels have many advantages. Light in weight, easily cleaned, moderate in price and strong—they are ideal for passenger cars, trucks and particularly for bus jobs. Van Wheels are hollow spoked, cast of malleable iron, in all standard sizes.

See our exhibits at New York Auto Show, Jan. 6 to 13; at Chicago Auto Show, Jan. 27 to Feb. 3.

Write for further information.

VAN WHEEL CORPORATION, ONEIDA, N. Y.

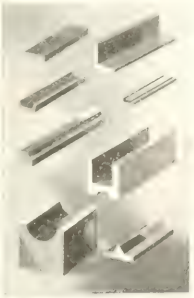
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Built By MUSKEGON MOTOR SPECIALTIES CO.
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By Repulation—"The Best Cam Shafts Made"

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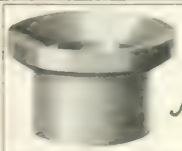
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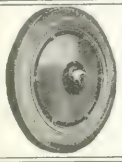
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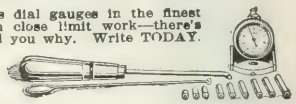
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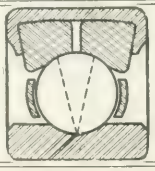
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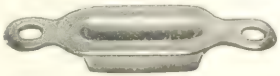
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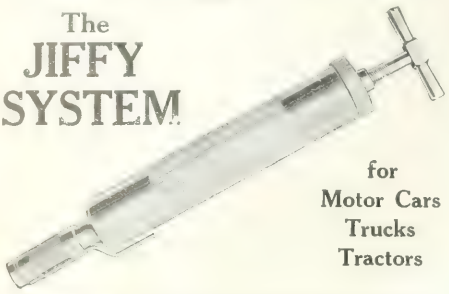
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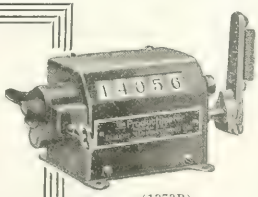
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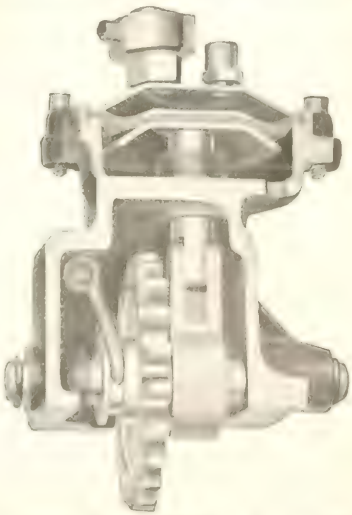


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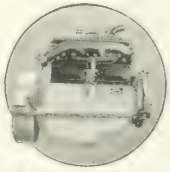
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